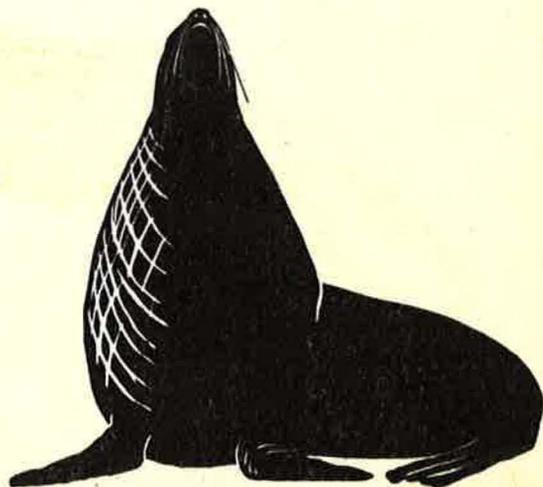
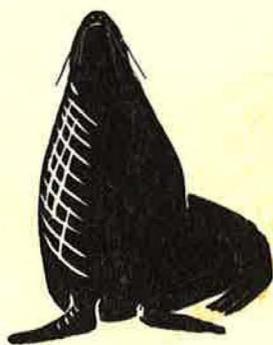
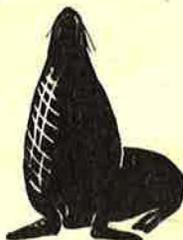


ALASKA FUR SEAL INVESTIGATIONS PRIBILOF ISLANDS, ALASKA



1957

1369 72

ERRATA

OMISSIONS

Page 9 Line 15 returns from 4-year-olds in 1958

" 11 " 8 (appendix tables CC and DD).
V, W, X, Y, Z, AA, GG, HH, II, and JJ and text

Figures 13 and 14 are not included in this report now.
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They will be provided later as a supplement and can be

inserted in the proper place.
" 146 " 5 occasionally been incomplete

OMISSIONS

Appendix tables H, I, J, K, L, M, N, O, P, V, W, X, Y, Z, AA, GG, HH, II, and JJ and text figures 13 and 14 are not included in this report now. They will be provided later as a supplement and can be inserted in the proper place.

CONTENTS

	Page
I. INTRODUCTION	1
A. ALASKA FUR SEAL INVESTIGATIONS	1
B. PRIBILOF ISLANDS, ALASKA	2
II. POPULATION	4
A. Age classification of males	4
B. Report of Field Activities	11
June - September 1957	
C. Mating tendency	20
1. Correlations of sexes	23
2. Influence of age	22
D. Tagging	25
U. S. Fish and Wildlife Service	
Bureau of Commercial Fisheries	
Branch of Marine Mammals	
Seattle, Washington	24
E. Seal pup weighting	29
III. REPRODUCTION	32
A. Summary of previous studies	32
B. Current studies	32
1. Methods used in the female skin	32
2. Sampling methods and errors	34
3. Results	36
C. General conclusions	40

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CONTENTS

	Page
I. INTRODUCTION	1
A. Objectives.	1
B. Personnel and facilities.	2
II. POPULATION	4
A. Age classification of males	4
B. Tag recoveries	11
C. Homing tendency.	21
1. Comparison of sexes	21
2. Influence of age.	22
D. Tagging.	23
E. Bull counts	24
F. Seal pup weighing	29
III. REPRODUCTION.	32
A. Summary of previous studies	32
B. Current studies	32
1. Methods used in the female kill.	32
2. Sampling methods and errors	34
3. Results	36
C. General statement	40

Contents

	Page
IV. MORTALITY	46
A. Dead pup counts.	46
1. Total counts.	46
2. Sample area counts	51
B. Pathology	53
1. Survey of death causes	53
2. Body temperatures of moribund seal pups	54
3. Cause of death in so-called "roadskin" seals	55
C. Recent mortality trends	55
V. OTHER WILDLIFE SPECIES	58
A. Reindeer	58
B. Birds	59
VI. LITERATURE CITED	61
VII. APPENDIX	62

St. Paul Island

A. Age classification of males in commercial kill, St. Paul Island, Alaska, 27 June to 10 August 1957.	62
B. Cumulative age classification of males in commercial kill, by day, St. Paul Island, Alaska, 27 June to 10 August 1957	66

Contents

Page	Appendix (continued)	Page
46	C. Number pregnant and non-pregnant among seals 4 or more years old and 5 or more years old, St. Paul Island, 1957	69
46	D. Reproductive condition of female seals sampled from commercial kill, by date and age, St. Paul Island, 27 June to 20 August 1957	71
51	E. Reproductive condition of female seals sampled from commercial kill, by rounds and age, St. Paul Island, 1957.	80
53	F. Length of females sampled from commercial kill, by age, St. Paul Island, 27 June to 20 August 1957.	86
53	G. Age classification of females in commercial kill, St. Paul Island, 27 June to 20 August 1957	87
54	H. Cumulative age classification of females in com- mercial kill, by day, St. Paul Island, 27 June to 20 August 1957.	90
55	I. Projected reproductive condition of total female kill by round, based upon daily samples, St. Paul Island, 1957.	92
55	J. Reproductive condition of females sampled from commercial kill, by length, St. Paul Island, 27 June to 20 August 1957	93
58	K. Field length of tagged females recovered from commercial kill, by age, St. Paul Island, 27 June to 20 August 1957	94
58	L. Uterine horn of pregnancy in females sampled from commercial kill, St. Paul Island, 27 June to 20 August 1957.	95
59	M. Vibrissal color of females sampled from com- mercial kill, by length, St. Paul Island, 27 June to 20 August 1957.	96
61		
62		
62		
66		

Contents

Appendix (continued)	Page
N. Vibrissal color of females sampled from commercial kill, by age, Pribilof Islands, 27 June to 20 August 1957	97
O. Vibrissal color of females sampled from commercial kill, by reproductive condition, Pribilof Islands, 27 June to 20 August 1957	98

St. George Island

P. Vibrissal color of females sampled from commercial kill, by length, St. George Island, 27 June to 20 August 1957	99
Q. Age classification of males in commercial kill, St. George Island, Alaska, 27 June to 10 August 1957.	100
R. Cumulative age classification of males in commercial kill, by day, St. George Island, Alaska, 27 June to 10 August 1957	104
S. Number pregnant and non-pregnant among seals 4 or more years old and 5 or more years old, St. George Island, 1957	107
T. Reproductive condition of female seals sampled from commercial kill, by date and age, St. George Island, 27 June to 20 August 1957.	109
U. Reproductive condition of female seals sampled from commercial kill, by rounds and age, St. George Island, 1957.	115
V. Length of females sampled from commercial kill, by age, St. George Island, 27 June to 20 August 1957	119
W. Age classification of females in commercial kill, St. George Island, 27 June to 20 August 1957	120

Contents

Page	Appendix (continued)	Page
97	X. Cumulative age classification of females in commercial kill, by day, St. George Island, 27 June to 20 August 1957	123
98	Y. Projected reproductive condition of total female kill by round, based upon daily samples, St. George Island, 1957	125
	Z. Reproductive condition of females sampled from commercial kill, by length, St. George Island, 27 June to 20 August 1957	126
99	AA. Uterine horn of pregnancy in females sampled from commercial kill, St. George Island, 27 June to 20 August 1957	131
	<u>Pribilof Islands</u>	
100	BB. Numbers, pregnant and non-pregnant, in samples of female seals, by rookery, Pribilof Islands, 1957	132
104	CC. Field length of tagged 3-year-old male seals, by time of recovery, Pribilof Islands, 1957	133
107	DD. Field length of tagged 4-year-old male seals, by time of recovery, Pribilof Islands, 1957	135
	EE. Field length of tagged 3-year-old female seals, by time of recovery, Pribilof Islands, 1957	137
109	FF. Field length of tagged 4-year-old female seals, by time of recovery, Pribilof Islands, 1957	138
115	GG. Length classes of tagged 3-year-old male seals, by rookery of recovery, Pribilof Islands, 1957	139
119	HH. Length classes of tagged 4-year-old male seals, by rookery of recovery, Pribilof Islands, 1957	140
120	II. Length classes of tagged 3-year-old female seals, by rookery of recovery, Pribilof Islands, 1957	141

Contents

Appendix (continued)	Page
JJ. Length classes of tagged 4-year-old female seals, by rookery of recovery, Pribilof Islands, 1957 . . .	142
KK. Estimate of escapement of fur seal bachelors from commercial harvest, by Dr. D. G. Chapman	143

FIGURES

1. Cumulative percent 3 and 4-year-old male seals in commercial kill, St. Paul Island, 1957.	7
2. Cumulative percent 3 and 4-year-old male seals in commercial kill, St. George Island, 1957.	8
3. Fluctuations in St. Paul Island cumulative kill of 3 and 4-year-old male seals as of 31 July.	10
4. IBM cards used for recording tag recovery and female reproductive data	12
5. Tag and check mark locations used in 1957	26
6. Seal pup weighing on Reef rookery, St. Paul Island, 31 August 1957	31
7. Same description as above.	31
8. Stainless steel tray used to hold and segregate female tooth samples in the field and later in the laboratory during the cooking process.	33
9. Field examination of genital tracts, St. Paul Island, 19 August 1957	35
10. Crossover method of sampling female kill, St. Paul Island, 1957. Method is also used in collecting male tooth samples	35

Contents

Page	Figures (continued)	Page
142	11. Reproductive condition of females by 5-day rounds, St. Paul Island, Alaska, 1957	41
143	12. Reproductive condition of females by 5-day rounds, St. George Island, Alaska, 1957.	42
	13. Reproductive condition of seals, by age, St. Paul Island, 1957 (in supplement)	43
	14. Reproductive condition of seals, by age, St. George Island, 1957 (in supplement)	44
7	15. Dead pups on Northeast Point, St. Paul Island, 14 September 1957	47
8	16. Dead pups on Polevina sand beach, St. Paul Island, 3 September, 1957. Persistent killing of females from this area caused death from starvation for most of the pups	50
10		
12	17. Dead pups on Polovina sand beach, St. Paul Island. Biologist shown marking pups with lime as he counts them.	51
26	18. Mortality fluctuations, St. Paul Island	57
31	19. Reindeer herd, St. Paul Island, 17 August 1957. After a search of several hours, the herd was found here on the floor of Crater Lake (photo-print is reversed).	60
31		

TABLES

35	1. Cumulative number of male seals killed, St. Paul Island.	5
35	2. Percent age composition of male kill at various levels, St. Paul Island	6

Contents

Tables (continued)	Page
3. Tag recoveries from male and female seals in commercial kill, by age, Pribilof Islands, 1957	14
4. Recovery location of tagged seals in commercial kill, 1957.	15
5. Tagging locations, Pribilof Islands	25
6. Harem and idle bull counts, by rookery, St. Paul Island, 1957	27
7. Harem and idle bull counts, by rookery, St. George Island, 1957	28
8. Seal pup weights, St. Paul Island, 30-31 August 1957	30
9. Summary of reproductive condition of females sampled from commercial kill, by age, St. Paul Island, 27 June to 20 August 1957	38
10. Summary of reproductive condition of females sampled from commercial kill, by age, St. George Island, Alaska, 27 June to 20 August 1957	39
11. Dead pup counts, Pribilof Islands, Alaska, 1957	49
12. Dead pup counts, study areas, St. Paul Island, Alaska, 1957	52

I. INTRODUCTION

A. Objectives

The goal of fur seal research and management is not a changing target. Therefore, the objectives are essentially those stated previously. Some aspects are more clearly defined but the primary objective of fur seal management is still to attain maximum sustained productivity. Research will continue to be designed to indicate the steps necessary to achieve the primary objective and to recognize what progress is being made toward it. Population, reproduction, and mortality studies receive principal emphasis because the problem is largely an ecological one. The investigators are attempting to understand the reaction of the fur seal herd to various environmental factors including harvest by man.

In recent years, research has been limited to land, but with the signing and ratification of a convention on the conservation of North Pacific fur seals by Canada, Japan, the Union of Soviet Socialist Republics, and the United States in 1957, preparations are now being made to comply with the Convention requirements for pelagic research.

With the second season of an expanded fur seal research program nearing the end, a substantial body of research data is available. Through expansion and intensification of effort in certain areas, the data now collected are becoming more useful. Doubtless, information acquired through research will have an increasing influence on fur seal management in future years.

The return on time and money invested in research is cumulative. Time is required to develop an effective staff and program and time is also required to obtain facts. The seasonal changes in fur seal numbers and movements, and the large quantities of data needed to accurately represent a population of about one and one-half million animals requires that any effective research must be sustained.

B. Personnel and facilities

Field season studies in 1957 were in progress between 23 June and 20 September on St. Paul and St. George Islands. Biologists participating in the program were Ford Wilke, Biologist-in-charge; Carl Abegglen, Alton Roppel, and Karl Niggol. Two biological aides, Gary Baines, graduate student at Washington State College, and William Barmore from Purdue University, were employed for the field season. Barmore spent the sealing season on St. George Island, returning to St. Paul via the supply ship, U.S.S. Merrick, 28 August. Lavrenty Stepetin, resident on St. Paul Island, again proved to be an indispensable assistant. Innokenty Lestenkof, resident on St. George Island, gave excellent assistance to the biologist stationed there.

Dr. L. P. Doyle, veterinary pathologist from Purdue University, was stationed on St. Paul Island from 28 June to 15 August. Bacteriological equipment was set up in the new laboratory for his use in the study of mortality causes.

Storage cabinets, counter-high working space, overhead storage shelves with sliding doors, a refrigerator, and a workbench were installed in the so-called skinning room in the laboratory. Its utility was increased several-fold by these additions.

The research staff appreciates the assistance and cooperation given to them throughout the season by Mr. Clarence L. Olson, General Manager, Mr. Roy Hurd, St. Paul Island Manager, Mr. Dan Benson, St. George Island Manager, and members of their organization.

II. POPULATION

A. Age classification of males ^{1/}

The crossover sampling method initiated in 1956 was used to obtain 3,529 male canine teeth for age determination on St. Paul Island and 1,233 teeth on St. George Island. This method, and the 10 percent sample size, will continue to be used for age classification of the male kill until improved methods are developed.

The age composition of the male kill changed drastically from 1956. A comparison of 1957 with the three preceding years is made in table 1, showing cumulative numbers of 3 and 4-year-old males at comparable dates. This change is also shown in table 2, percent age composition of male seals at various kill levels. The greatest change between 1957 and some earlier years is in numbers of male seals taken rather than in the age composition of the kill.

Age composition and tag recovery data from the 1956 male kill suggested that the 1953 year class was large and a large 4-year male kill in 1957 might be available. The evidence was not conclusive nor was a statement of certainty made concerning it. After mid-July, 1957, it became obvious that neither 4-year males nor 3-year males would be taken in the numbers associated with the past decade of sealing (figures 1 and 2).

The age three kill exceeded 38,000 in 1956, a figure several

^{1/} Appendix KK, pages 143-161, gives an analysis and discussion of the escapement of bachelors from data available through 1956.

Table 1. Cumulative number of male seals killed, St. Paul Island.

Date	1954 ^{1/}		1955		1956		1957	
	3	4	3	4	AGE		3	4
1 July	3367	3952	1574	1962	1079	3056	1360	1071
6	5075	6258	3341	3643	2671	7060	2994	2161
11	9643	9667	5929	6248	6145	12677	4507	3296
16	15106	11561	10416	8999	9808	17954	6777	4651
21	22198	13301	15358	11648	14589	22159	9380	5602
26	30598	14995	21717	15638	20726	25999	13350	6784
31	32352	15365	30733	18083	26590	28560	16804	7547
10 August					35502	30663	23473	8855
15					38290	31448		

^{1/} Sealing ended 27 July

Table 2. Percent age composition of male kill at various levels,
St. Paul Island.

Kill level	Date	Age	
		3	4
	<u>1954</u>	<u>percent</u>	<u>percent</u>
10,000	4 July	44	54
20,000	11	49	49
30,000	18	56	41
50,000	27	65	31
	<u>1955</u>		
10,000	9 July	50	48
20,000	16	54	44
30,000	22	56	42
50,000	31	62	36
	<u>1956</u>		
10,000	6 July	24	64
20,000	11	30	62
30,000	16	33	60
50,000	26	41	52
	<u>1957</u>		
10,000	13 July	53	41
20,000	24	63	33
30,000	6 August	68	27
34,055	10	69	26
50,000			

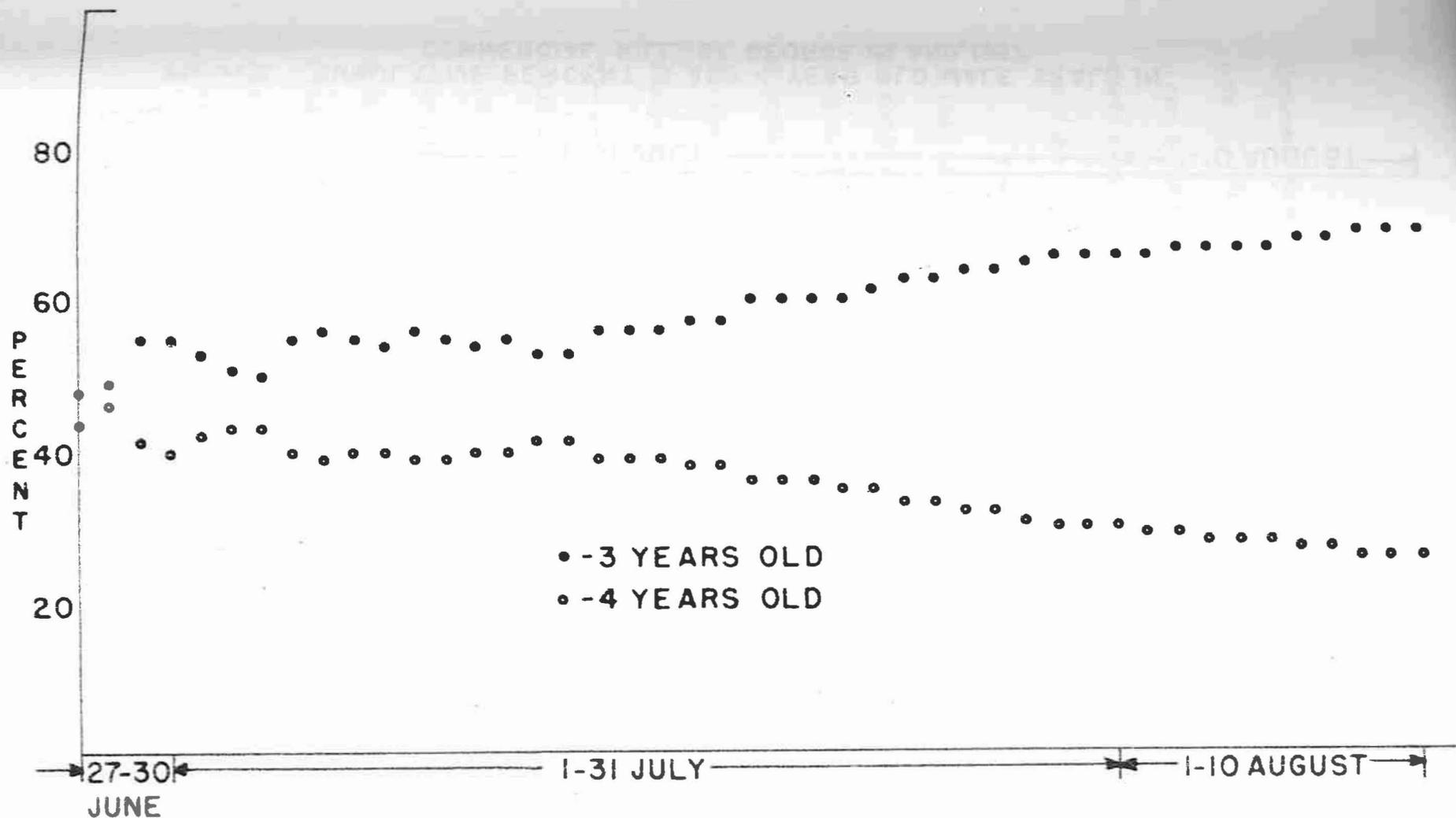


Figure 1. CUMULATIVE PERCENT 3 AND 4 YEAR OLD MALE SEALS IN COMMERCIAL KILL, ST. PAUL ISLAND, 1957

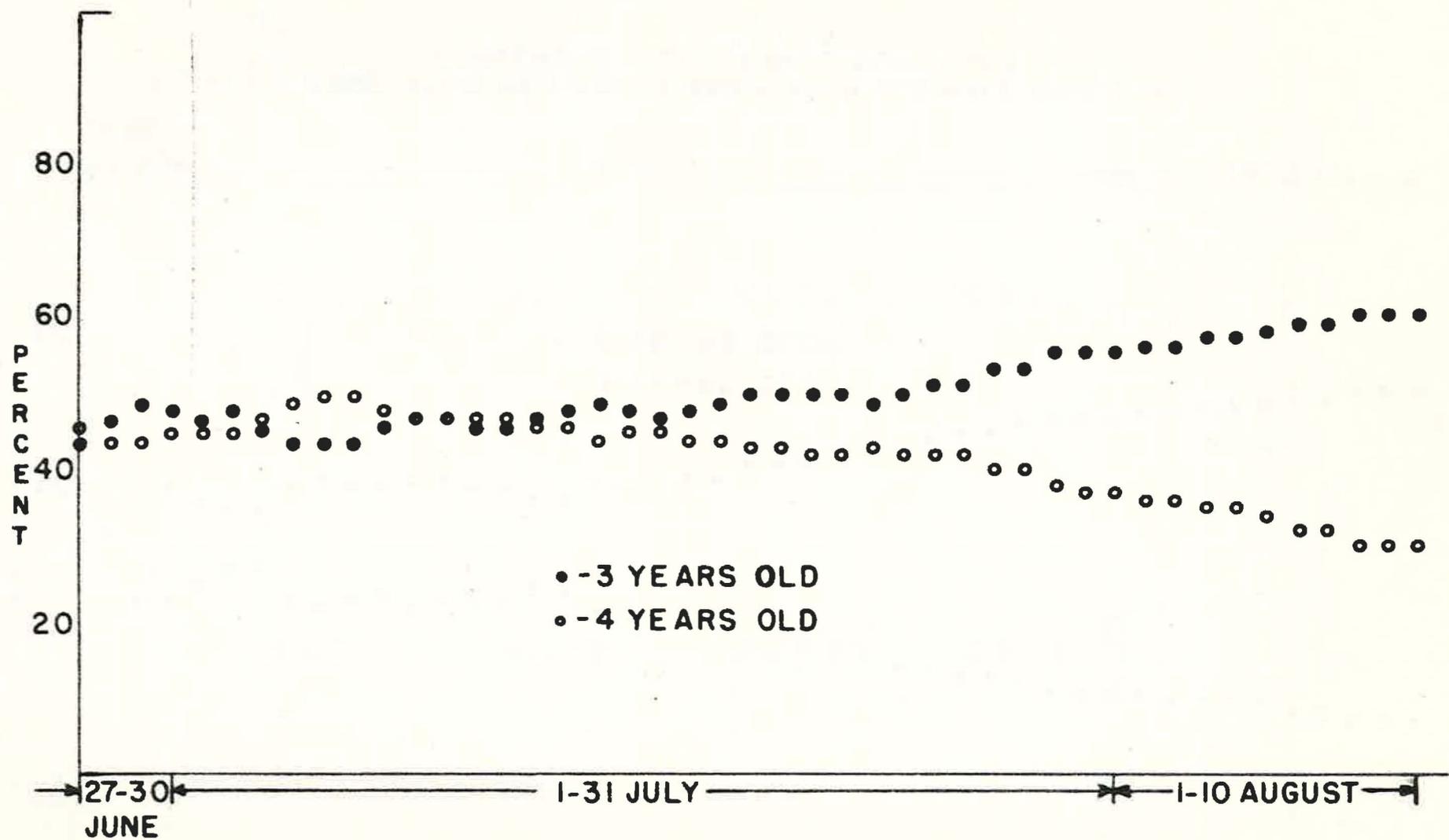


Figure 2. CUMULATIVE PERCENT 3 AND 4 YEAR OLD MALE SEALS IN COMMERCIAL KILL, ST. GEORGE ISLAND, 1957

thousand in excess of the average 3-year male kill. The 4-year kill was 31,000, substantially over the average 4-year kill. Tag returns from 3-year animals taken in 1956 gave the first evidence of year-class size. Further information on the 1953 year class will be derived from the 1957 4-year tag recoveries.

The steady comparative decline in 1957 male abundance is shown in both tables. Killing of males ended 10 August on both islands, and in the remaining ten days only females were harvested. During this period, 997 males on St. Paul and 154 on St. George were killed accidentally. Failure of the 3-year male class to materialize, with a decrease of 30 to 50 percent in numbers killed by 31 July, can only be partly explained by facts now available. Pup mortality on land in 1954 was greater than any previous year. However, less than one-third the total mortality before age three occurs among the pups on land. Tag returns from 4-year-olds in 195⁷ will complete recovery from the 1954 year class and give population estimates which should help explain the lack of 3-year-old animals in 1957. Additional evidence of a small 1954 year class was the appearance of only 166 3-year-olds in the 1957 sample of 8,615 females, although in 1956, 187 appeared in a sample of 3,751 females.

The decreased abundance of both 3 and 4-year males undoubtedly has many causes. Figure 3 shows the fluctuations about the mean of the

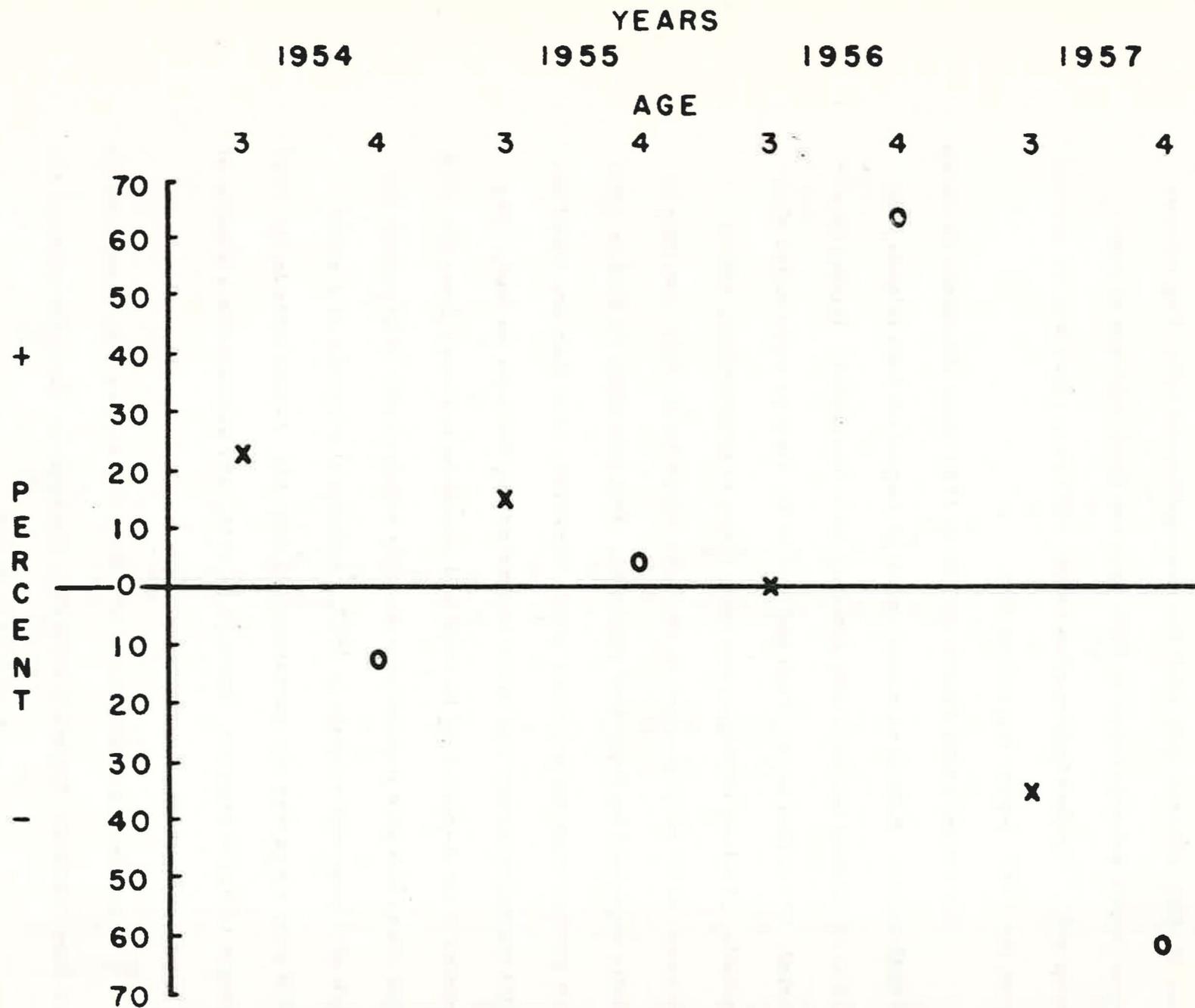


Figure 3. FLUCTUATIONS IN ST. PAUL ISLAND CUMULATIVE KILL OF 3 AND 4-YEAR-OLD MALE SEALS AS OF 31 JULY. MEAN PERCENT OF BOTH AGES, YEARS 1954-1957, IS ZERO BASE LINE.

number of 3 and 4-year males taken on St. Paul Island by 31 July for the years 1954-57.

More detailed information on the age composition of the male kill on both islands is given in appendix tables A, B, Q, and R.

B. Tag recoveries

The standard practice of killing tagged male seals only if they fell within the commercial size limits of 41 to 45-3/4 inches was continued (appendix tables ^{CC} ~~O~~ and ^{DD} ~~P~~). There is no evidence that a tag on a seal causes bias on the part of the clubbers.

As a row of ten seals was positioned for skinning, one man examined each animal for a tag or the check mark used to identify a seal that has lost its tag. He recorded the tag numbers together with the field lengths and sex of the seals. The field length and sex were also noted for animals having only a check mark. On St. Paul, this work was assigned to Lavrenty Stepetin, an extremely proficient island resident. Biologist William Barmore conducted the work on St. George. He was assisted by Innokenty Lestenkof, also a very capable island worker.

Following each daily kill, the tag number, field length, sex, rookery of recovery, rookery of tagging, date, and age were recorded on punch cards, one to each seal (figure 4). Because of the current volume of work, the Keysort cards used previously were replaced with IBM cards which can be sorted more rapidly.

U. S. FISH AND WILDLIFE SERVICE
FUR SEAL INVESTIGATIONS

DATE OF RECOVERY			ROOKERY OF RECOVERY	ROOKERY OF TAGGING	TAG NUMBER	SEX	AGE	LENGTH (INCHES)	FIELD NUMBER	ISLAND
DAY	MO.	YR.								
0	0	0	0	0	0	0	0	0	0	0
1	2	3	4	5	6	7	8	9	10	11
1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9
1	2	3	4	5	6	7	8	9	10	11

IBM 420409

U. S. FISH AND WILDLIFE SERVICE
FUR SEAL INVESTIGATIONS

DATE			FIELD NUMBER	TAG NUMBER	TAG MARK	REPRO. COND.	UTERUS	OVARIES	AGE	ROOKERY OF RECOVERY	VIB. COLOR	ROUND NO.	OVARIES										LENGTH (CM)				UTERUS																																																			
MO.	DAY	YR.											FIXED	UNTAGGED	NON-PREG.	MULTI	STERILE	PREG.	PRIMI	NULLI	POST	REG.	RIGHT	LEFT	CL	PL	PATH. CYSTS	MENO. WEIGHT	DIAM. (mm)	TOTAL WEIGHT (LBS.)	TOTAL	FORE-FLIPPER	HIND-FLIPPER	FLIPPER	FLIPPER	FLAC. SO. GROSS APPEARANCE	ANCE																																									
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																													
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																																										
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3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																																							
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5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5																																						
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6																																					
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1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

IBM 420410

REPRODUCTIVE STATE OF FEMALE

Figure 4. IBM cards used for recording tag recovery and female reproductive data.

Two tags applied in 1941 were recovered from females. Their condition was such that they probably would have remained attached several more years. From a single vantage point on Northeast Point rookery on 12 July, six tagged females were observed in adjacent harems as follows: one "USA" series, age 16; two "A" series, age 10, and three "CS" series, age 8. On the previous day, several tagged harem bulls were seen on Polovina rookery. Although the observers were close enough to read the series designation of the females, the size of the tags and their location on the bulls showed that these males were either nine or ten-year olds. Table 3 gives the tag returns by sex and age for both islands. Table 4 gives the recovery location of tagged seals in the 1957 commercial kill.

It is believed that the confusion on the kill field immediately behind the clubbers resulted in the loss of an unknown number of tag-lost recoveries, especially those with check marks on hindflippers. Several tags went unnoticed, but fortunately, most of these were recovered when noticed by the stripping crew. At times, the tallyman was forced to do his work behind some of the slitters or even to measure seals that had already been stripped.

It is necessary that biologists work closely with the tallyman in order to obtain measurements of all tagged seals in addition to selected females. If tag recovery information is to be accurate, at least one row of seals should remain clear between the slitters and the row on which the tallyman and biologists are working.

Table 3. Tag recoveries^{1/} from male and female seals in commercial kill, by age, Pribilof Islands, 1957.

Series	Age	St. Paul		St. George		Total
		male	female	male	female	
USA	16		2			2
No letter	12		2			2
A	10		34		1	35
B	9		167		2	169
CS	8		134		2	136
D	6		24			24
E	5	23	536	3	1	563
F	4	129	113	12	2	256
G	3	325	32	38	3	398
H	2	125		53	1	179
	Total	602	1044	106	12	1764

^{1/} Includes 99 tag-lost seals

Table 4. Recovery location of tagged seals in commercial kill, 1957

Rookery of tagging	Rookery of Recovery										Total
	St. Paul Island						St. George Island				
	NEP	TOL	L-K	ZAP	REEF	POL	NO.	EA.	STAR	ZAP	
<u>H-Series - 2-yr-old seals, males</u>											
NEP	18	1	-	2	-	2	1	2	3	-	29
TOL	2	1	-	6	1	-	-	1	1	6	18
L-K	-	2	2	1	-	-	2	1	2	1	11
ZAP	1	-	1	9	-	3	1	4	2	2	23
REEF	3	3	2	16	21	2	2	2	3	5	59
POL	4	1	3	5	-	10	1	5	3	1	33
T.L.	2	-	-	-	-	1	-	1	-	1	5
Total	30	8	8	39	22	18	7	16	14	16	178
<u>G-Series - 3-yr-old seals, males</u>											
NEP	39	2	1	4	-	5	2	3	1	-	57
TOL	10	12	1	12	-	1	2	2	-	3	43
L-K	7	3	8	7	-	2	1	-	-	-	28
ZAP	4	10	3	50	-	5	-	2	1	5	80
REEF	16	11	4	41	23	5	4	4	-	5	113
POL	12	3	-	1	1	12	-	1	-	-	30
T.L.	2	1	-	5	-	2	-	-	-	2	12
Total	90	42	17	120	24	32	9	12	2	15	363

Table 4. Recovery location of tagged seals in commercial kill, 1957 (con.)

Rookery of tagging	Rookery of Recovery										
	St. Paul Island						St. George Island				Total
	NEP	TOL	L-K	ZAP	REEF	POL	NO.	EA.	STAR	ZAP	
<u>F-Series - 4-yr-old seals, males</u>											
NEP	18	1	1	1	1	1	-	1	1	1	26
TOL	2	8	2	4	1	1	-	-	-	1	19
L-K	1	1	4	-	-	1	-	1	-	-	8
ZAP	2	1	-	15	-	-	-	-	-	-	18
REEF	8	8	2	9	5	1	-	1	1	-	35
POL	3	1	-	-	-	12	-	1	1	1	19
T.L.	8	-	1	3	-	2	-	1	-	1	16
Total	42	20	10	32	7	18	-	5	3	4	141
<u>E-Series - 5-yr-old seals, males</u>											
NEP	7	-	-	-	-	-	-	-	-	-	7
TOL	-	-	-	-	-	-	-	-	-	-	0
L-K	-	-	-	-	-	-	-	-	-	-	0
ZAP	1	1	-	-	-	-	-	-	-	-	2
REEF	-	1	-	1	1	-	-	-	-	2	5
POL	3	-	-	-	-	6	-	-	-	1	10
T.L.	1	-	-	-	-	1	-	-	-	-	2
Total	12	2	-	1	1	7	0	0	0	3	26
Total males all rookeries	174	72	35	192	54	75	16	33	19	38	708

Table 4. Recovery location of tagged seals in commercial kill, 1957 (con.)

Rookery of tagging	Rookery of Recovery										Total
	St. Paul Island						St. George Island				
	NEP	TOL	L-K	ZAP	REEF	POL	NO.	EA.	STAR	ZAP	
<u>H-Series - 2-yr-old seals, females</u>											
NEP	-	-	-	-	-	-	1	-	-	-	1
<u>G-Series 3-yr-old seals, females</u>											
NEP	5	-	-	-	-	-	-	1	-	-	6
TOL	-	1	-	-	-	1	-	-	-	-	2
L-K	-	-	-	-	1	-	-	-	-	-	1
ZAP	-	-	-	6	-	-	-	-	1	-	7
REEF	1	-	-	1	5	1	-	-	-	-	8
POL	-	-	-	-	-	5	-	-	-	-	5
T.L.	-	1	-	-	2	2	-	1	-	-	6
Total	6	2	0	7	8	9	0	2	1	0	35
<u>F-Series - 4-yr-old seals, females</u>											
NEP	4	2	-	-	-	1	-	-	-	-	7
TOL	1	8	-	2	3	-	1	1	-	-	16
L-K	-	-	-	-	-	-	-	-	-	-	0
ZAP	-	4	-	8	-	1	-	-	-	-	13
REEF	1	1	-	2	22	1	-	-	-	-	27
POL	3	-	-	-	-	36	-	-	-	-	39
T.L.	1	2	-	2	6	2	-	-	-	-	13
Total	10	17	0	14	31	41	1	1	0	0	115

Table 4. Recovery location of tagged seals in commercial kill, 1957 (con.)

Rookery of tagging	Rookery of Recovery										Total
	St. Paul Island						St. George Island				
	NEP	TOL	L-K	ZAP	REEF	POL	NO.	EA.	STAR	ZAP	
<u>E-Series - 5-yr-old seals, females</u>											
NEP	69	2	1	1	-	4	-	-	-	-	77
TOL	--	-	-	-	-	-	-	-	-	-	0
L-K	-	-	-	-	-	-	-	-	-	-	0
ZAP	-	4	-	22	-	-	-	-	-	-	26
REEF	1	5	-	6	103	3	1	-	-	-	119
POL	12	2	-	2	-	250	-	-	-	-	266
T.L.	6	2	-	2	9	30	-	-	-	-	49
Total	88	15	1	33	112	287	1	0	0	0	537
<u>D-Series - 6-yr-old seals, females</u>											
POL	-	-	-	-	-	24	-	-	-	-	24
<u>CS-Series - 8-yr-old seals, females</u>											
NEP	36	1	-	-	2	3	-	-	1	-	43
TOL	-	-	-	-	-	-	-	-	-	-	0
L-K	-	-	-	-	-	-	-	-	-	-	0
ZAP	-	-	-	-	-	-	-	-	-	-	0
REEF	-	3	-	1	18	2	-	-	-	-	24
POL	1	-	-	-	-	67	-	-	-	1	69
T.L.	-	-	-	-	-	-	-	-	-	-	0
Total	37	4	0	1	20	72	0	0	1	1	136

Table 4. Recovery location of tagged seals in commercial kill, 1957 (con.)

Rookery of tagging	Rookery of Recovery										Total
	St. Paul Island						St. George Island				
	NEP	TOL	L-K	ZAP	REEF	POL	NO.	EA.	STAR	ZAP	
<u>B-Series - 9-yr-old seals, females</u>											
NEP	-	-	-	-	-	-	-	-	-	-	0
TOL	-	-	-	-	-	-	-	-	-	-	0
L-K	-	-	-	-	-	-	-	-	-	-	0
ZAP	-	-	-	2	-	-	-	-	-	-	2
REEF	-	4	-	6	32	1	-	-	-	-	43
POL	1	-	-	1	-	118	-	-	-	1	121
T. L.	2	-	-	-	-	-	-	-	1	-	3
Total	3	4	-	9	32	119	-	-	1	1	169
<u>A-Series - 10-yr-old seals, females</u>											
NEP	11	-	-	-	-	-	-	1	-	-	12
TOL	-	-	-	-	-	-	-	-	-	-	0
L-K	-	-	-	-	-	-	-	-	-	-	0
ZAP	-	-	-	1	-	-	-	-	-	-	1
REEF	-	1	-	1	5	1	-	-	-	-	8
POL	-	-	-	-	-	11	-	-	-	-	11
T. L.	-	1	-	2	-	-	-	-	-	-	3
Total	11	2	0	4	5	12	0	1	0	0	35

Table 4. Recovery location of tagged seals in commercial kill, 1957 (con.)

Rookery of tagging	Rookery of Recovery										Total
	St. Paul Island						St. George Island				
	NEP	TOL	L-K	ZAP	REEF	POL	NO.	EA.	STAR	ZAP	
<u>1945-Series - 12-yr-old seals, females</u>											
TOL	-	1	-	-	1	-	-	-	-	-	2
<u>U.S.A. -Series - 16-yr-old seals, females</u>											
REEF	-	-	-	-	1	-	-	-	-	-	1
POL	-	-	-	-	-	1	-	-	-	-	1
Total	0	0	0	0	1	1	0	0	0	0	2
Total females all rookeries	155	45	1	68	210	565	3	4	3	2	1056

Notes:

1. No tagging done in 1950
2. Percent recovery of seals on rookery of tagging

<u>Males</u>		<u>Females</u>	
<u>Age</u>	<u>Percent</u>	<u>Age</u>	<u>Percent</u>
2	35	2	0
3	41	3	76
4	50	4	76
5	58	5	91
		6	100
		8	89
		9	92
		10	88
		12	100
		16	100

3. St. George

- NO. = North
 EA. = East
 STAR = Staraya Artil
 ZAP = Zapadni

None of the marked flippers, possibly by branding or tattooing, recorded in 1956 were reported this year.

C. Homing tendency

The 1,056 tagged females recovered in 1957 (table 3) will make it possible to get a much better understanding of the behavior of female seals at various ages. Male tag recoveries add to our general fund of knowledge on the current population and the constant changes that are taking place in response to population pressure.

1. Comparison of sexes

The proportion of tagged females recovered on the rookery of tagging was about double the recovery rate for tagged males of the same age on the home rookery. It would appear offhand that the homing tendency is much more strongly developed in females than in males but the evidence does not justify this conclusion. The evidence on males is limited to animals two to five years old. Males three to five years old appear in late June, July, and the first few days of August, when the harem organization is strong. They are forced to come ashore on hauling grounds that are not separated from the sea by harems since harem bulls will not tolerate trespassing, even by young males, during the breeding season. Females in these age classes do not appear in maximum numbers until August when the harem organization has nearly disappeared. Females would not be prevented from landing in a harem

area in any season but the comparison between sexes might be considerably different if males also delayed their arrival until August.

Tag recoveries from males old enough to have harems would likewise contribute to a true comparison of the homing tendency in male and female fur seals.

2. Influence of age

Unquestionably, homing tendency strengthens with age. Yearling seals delay their arrival on the breeding islands until late October or November. Two-year-old seals appear in considerable numbers by very late July or August and, when they do appear, they show no strong affinity for any rookery on either St. Paul or St. George Islands. It is true that 35 percent of the males return to the rookery where they were born but the remainder are recovered on one of the St. George hauling grounds about as frequently as on a St. Paul hauling ground. As an example, in 1957, six 2-year-old males tagged on Tolstoi, St. Paul Island, were recovered at Zapadni on St. Paul and six were also recovered at Zapadni on St. George.

Although very little information has been furnished by the Union of Soviet Socialist Republics on recoveries of Pribilof tagged seals on the Commander Islands, it can be presumed that a substantial number have been recovered and that the ones recovered are mostly young males.

Males will tend more strongly to return to their home rookery as they grow older. Unlike females which show nearly a 100 percent return

when they are ready to give birth, males must not only reach potential breeding age but must wait beyond this age until they attain the size and strength necessary to take over a position on the rookery. This means that, whereas, almost all females return to their home rookery at age five or six, males may not reach this stage until about eight or nine.

The opinion was previously held that practically all mature females would return to and remain on the rookeries where they were born. The 1957 tag recoveries show a sprinkling of 8, 9, and 10-year-old females recovered on other than their home rookeries, including those on St. George Island. The case is not yet clear-cut because many females taken in 1957 came from hauling grounds or rookery fringes rather than from harem areas. It might be expected that idle females would not confine themselves to their home rookery.

D. Tagging

Pup tagging on St. George presents a minor problem, in coordinating personnel, due to limited transportation between the islands. However, satisfactory arrangements were made this year, whereby two of the biologists went to St. George via the Penguin on 20 August and returned on the naval supply ship eight days later. Working with a resident crew of fifteen men, the tagging was completed in the interim. Tagging was finished on St. Paul prior to the arrival of the supply ship there. A crew of thirty men was provided by the Pribilof Island manage-

ment for tagging on St. Paul. In addition, two trucks were provided for transportation.

This was the third consecutive year in which 50,000 tags were used and the second in which 10,000 or 20 percent were applied to pups on St. George Island. Following standard procedure, tags were allotted to each rookery according to the proportion of harem bulls counted on that rookery. A list of tagging locations and number of pups tagged at each is given in table 5.

All tags used in 1957 were of monel metal (Style 19M, National Band and Tag Company, Newport, Kentucky, 0.9 x 9.5 x 1.01 mm. before folding) and had the series designation "J" stamped ahead of the number. They were attached to the rear edge of the left front flipper at the junction of fur and bare skin. To permit identification of individuals that have lost their tags, the front edge of the same flipper was notched near the tip (figure 5).

E. Bull counts

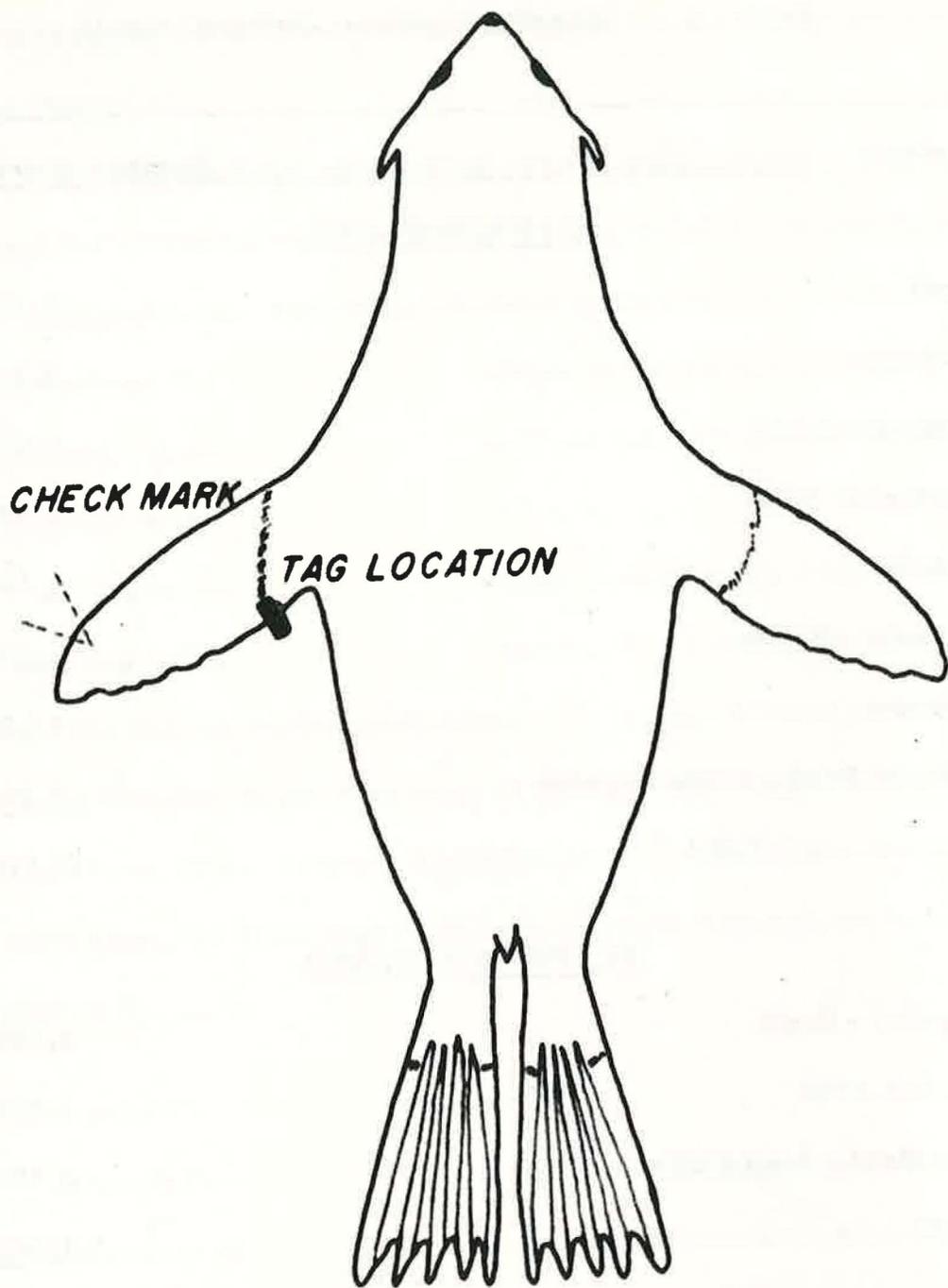
In accordance with a decision made in Washington in 1956, the General Manager of the Pribilof Islands gave first-season training to biologists in making the annual bull counts. Research personnel accompanied Mr. Clarence L. Olson through all rookery surveys on both islands. Counts made by the biologists were compared frequently during the census with those obtained by Mr. Olson, thus providing a check on

Table 5 . Tagging locations, Pribilof Islands

Rookery	Number of seals tagged
<u>ST. PAUL ISLAND</u>	
Reef	10,800
Polovina	4,100
Little Polovina	1,000
Northeast Point	9,200
Tolstoi	4,100
Lukanin - Kitovi	3,200
Zapadni	4,100
Zapadni Reef - Little Zapadni	<u>3,500</u>
Total	40,000
<u>ST. GEORGE ISLAND</u>	
Zapadni - South	2,700
Staraya Artil	1,500
East Reef - East Cliffs	2,100
North	<u>3,700</u>
Total	10,000
Grand total	50,000

Per tag #'s listed in
Record of Tagging -
Pribilof Islands (Part)
- in Archives 7.03 04,
1970 tagged on
Reef & 9,300 on
NE Point. All other
#'s okay

Per Table 7 - p24
1955 Fur Seal Survey,
39,870 pups tagged
on St P, 9,972 on
St G. Assume
remainder spotted
or not spotted.



**Figure 5. TAG AND CHECK MARK LOCATIONS
USED IN 1957**

Table 6. Harem and idle bull counts, by rookery,
St. Paul Island, 1957

Date	Rookery	Bulls		Total
		harem	idle	
10 July	Gorbatch	872	392	1264
	Ardiguen	131	70	201
	Reef	<u>1553</u>	<u>802</u>	<u>2355</u>
	Total	2556	1264	3820
11 July	Polovina	363	1282	1645
	Polovina Cliffs	619	651	1270
	Little Polovina	<u>248</u>	<u>606</u>	<u>854</u>
	Total	1230	2539	3769
12 July	Merjovi	675	1687	2362
	Vostochni	<u>1553</u>	<u>1957</u>	<u>3490</u>
	Total	2208	3644	5852
13 July	Tolstoi	978	746	1724
	Lukanin	211	213	424
	Kitovi	<u>547</u>	<u>71</u>	<u>618</u>
	Total	1736	1030	2766
14 July	Zapadni	987	812	1799
	Little Zapadni	606	365	971
	Zapadni Reef	<u>239</u>	<u>406</u>	<u>645</u>
	Total	1832	1583	3415
	Grand total	9562	10060	19622

Table 7. Harem and idle bull counts, by rookery,
St. George Island, 1957

Date	Rookery	Bulls		Total
		harem	idle	
15 July	East Reef	192	316	508
	East Cliffs	322	416	738
	Total	514	732	1246
15 July	Staraya Artil	373	609	982
16 July	North	881	759	1640
17 July	Zapadni	373	382	755
17 July	South	282	211	493
	Grand total	2423	2693	5116

progress in learning the methods and landmarks employed during the past decade. While counts made by the biologists and Mr. Olson were usually comparable, it is believed that one more season of training will be needed to provide the practice desirable before assuming responsibility for the counts.

The 1957 bull counts obtained by Mr. Olson, General Manager, are listed in tables 6 and 7. On St. Paul, harem bulls increased 2 percent and idle bulls 10 percent over 1956. On St. George, harem bulls increased 12 percent over 1955 and idle bulls 29 percent. Bull counts were not made on St. George in 1956.

F. Seal pup weighing

This year, the first of a series of seal pup weights (figures 6 and 7) was obtained on St. Paul Island to provide, if possible, a condition factor that might be related to survival. Average weight changes in pups from year to year may show some correlation with the numbers of an age class harvested three and four years later. A total of 1,200 pups were weighed, 300 each from Northeast Point, Zapadni Reef, Polovina, and Reef rookeries. The following table gives the mean weights for the various groups.

Table 8. Seal pup weights, St. Paul Island, 30-31 August 1957.

<u>Group</u>	<u>Sample size</u>	<u>Mean weight (kilograms)</u>
<u>Males</u>		
tagged	262	7.9
untagged	391	8.7
combined	653	8.4
<u>Females</u>		
tagged	196	7.4
untagged	351	7.7
combined	547	7.6
<u>Males and females</u>		
tagged	458	7.7
untagged	742	8.2
combined	1200	8.0

On all rookeries except Zapadni Reef, the mean weights of untagged males were significantly higher than those of tagged males. The greatest difference, 1.4 kilograms, was noted on Reef rookery. Untagged males outweighed tagged males by 1.1 kilograms on Northeast Point and 0.8 kilograms on Polovina rookery. The reason for this and the fact that females were unaffected, is unknown at this time.



Figures 6 and 7. Seal pup weighing on Reef rookery, St. Paul Island, 31 August 1957.

III. REPRODUCTION

A. Summary of previous studies

Information on fur seal reproduction through 1956 was derived from data on 7,441 female genital tracts and accompanying tooth-ridge counts to determine ages. Corroborative evidence was found in 1956 for the apparent low pregnancy rate in 4-year females. No sound indication was found in 1956 samples, or previously, that females in the third year of life (except in the last few days of this year) are ever pregnant. Sampling done in 1956 was believed to be representative of the animals killed. Of the herd as a whole, however, only 4-year-old females were considered to be adequately represented.

B. Current studies

1. Methods used in the female kill

In 1957, improved methods of collection (figure 8), a longer female kill, and previous experience in gathering mass data made possible a total collection of 8,659 female samples. Sampling was continuous during the 55-day killing season, 27 June through 20 August. Information obtained from the 1956 season showed that sealing could be continued through August without a prohibitive loss of skins because of rejection for "staginess." Late killing takes advantage of the period of rapidly increasing availability of females.

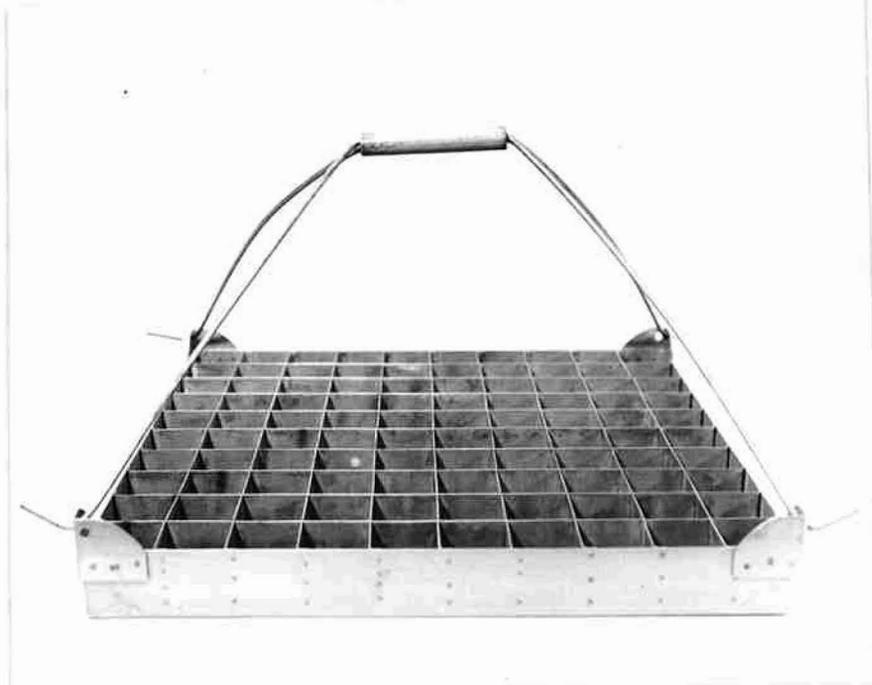


Figure 8. Stainless steel tray used to hold and segregate female tooth samples in the field and later in the laboratory during the cooking process.

The 1956 sealing season extended from 27 June through 15 August. A fall season lasted from 4 to 8 September and small-scale sampling continued until 23 September. Based on what was learned in 1956, instructions issued for 1957 extended the commercial season five days. Sealing was to continue until 20 August or such earlier time as a total of 50,000 females were taken. As in 1956, all available females 41 inches long, or longer from nose to tip of tail, were to be taken.

The goal of 50,000 females for 1957 caused a series of harem drives to be made on St. Paul Island. These drives occurred largely on two rookeries, Polovina and Reef, and continued to 20 August. The 1957 female kills on St. George Island were made to take advantage of the marked increase in availability of females beginning in late July, as clearly demonstrated in 1956.

A comparison of 1956 and 1957 methods on both islands is necessary to provide an understanding of differences between the data for the two years. The 1956 St. George Island sealing operation, as it concerned females, is comparable with the 1957 St. Paul Island operation. In both instances, continuous harem drives were in effect throughout the season. The 1956 St. Paul Island operation was comparable to the 1957 operation on St. George Island. Most females were taken in the usual sealing drives and the kill increased with availability.

2. Sampling methods and errors

On St. Paul Island 6,643 females were examined (figure 9). Of this total, 34 were not aged because of tooth loss or questionable handling. Also, the following discrepancies appear in the accompanying tabulated St. Paul data: 3-year females, primipara pregnant, 1 in 127; 4-year females, primipara non-pregnant, 3 animals; multipara pregnant, 7 animals; multipara non-pregnant, 3 animals. The discrepancies imply breeding occurred at age one in the 4-year non-pregnant multiparous



Figure 9. Field examination of genital tracts, St. Paul Island, 19 August 1957.



Figure 10. Crossover method of sampling female kill, St. Paul Island, 1957. Method is also used in collecting male tooth samples.

animals and at age two in the remainder. Twelve instances of 5-year females recorded as multipara non-pregnant would also mean that breeding occurred at age two. Considering these cases at ages 3, 4, and 5 as errors in judgement made during the genital tract examination, the error is just over one percent or 26 in 2,302. The error in determining present reproductive condition, that is, whether pregnant or non-pregnant at time of examination, is insignificant. This information is the chief concern of the examination and is of vital importance. History of reproductive activity prior to 1957 is not so readily discernible nor as important to current studies as the present condition. However, it is valuable data and will be used in developing information on female reproduction.

Age analysis was done by the ridge-count method using the right upper canine tooth (figure 10). Changes due to growth take place between the beginning and end of the season, particularly in the younger age groups. Comparison with known age teeth from tagged animals currently being taken, as well as with a reference collection, keeps the analysis accurate by facilitating interpretation.

3. Results

Table 9, summary of reproductive condition, sample females, St. Paul, 1957, lists the reproductive condition, by age, of all sample females except two each in age classes 2, 12, and 16 which are referred to in appendix tables D and E, giving reproductive condition by

day and round. Reproductive condition of St. George Island's samples, by day and round, is given in appendix tables T and U. Table 10 summarizes the reproductive condition of sample females on St. George Island, 1957.

The maximum pregnancy rate recorded was 81 percent for 7-year females.

The all-female pregnancy rate of 59 percent for the 1957 sample females was 15 percent higher than in 1956. Among primipara and multipara females, 76 percent were pregnant in 1957 as compared with 66 percent in 1956. The number of pregnant and non-pregnant seals in the St. Paul Island female sample, 4 or more years old and 5 or more years old, is listed in appendix table C. The same data for St. George are given in appendix table S.

Since it is probable that the inclusion of a large number of females from harems accounted for part of the rise in pregnancy rate, a new rate has been computed which does not include females from Polovina and Reef rookeries. The 3,155 animals taken from areas other than Polovina and Reef rookeries had a pregnancy rate of 51 percent, midway between the 1956 and 1957 all-female values. Harem females were also obtained on other rookeries but it is impossible to separate them completely from hauling ground females.

The proportion of females of various ages in the 1957 sample resembles that of 1956 in age classes 6 and older. The largest age

Table 9.

Summary of reproductive condition of females sampled from commercial kill,
by age, St. Paul Island, 27 June to 20 August, 1957

Reproductive condition	Age									Total	
	3	4	5	6	7	8	9	10	10+		
<u>Nullipara</u>											
number	126	542	678	105	20	10	2		3	1486	
percent	100	86	44	11	3	2				22	
<u>Primipara</u>											
<u>Pregnant</u>											
number	1	77	647	247	59	26	8	4	3	1072	
percent		12	42	25	8	5	2	2		16	
<u>Non-pregnant</u>											
number		3	28	23	8	1	1		1	65	
percent			2	2	1					1	
<u>Multipara</u>											
<u>Pregnant</u>											
number		7	178	523	510	405	346	185	661	2815	
percent		1	11	53	73	70	72	72	51	43	
<u>Non-pregnant</u>											
number		3	12	84	103	134	126	68	635	1165	
percent			1	8	15	23	26	26	49	18	
Total	127	632	1543	982	700	576	483	257	1303	6603	
Percent	2	9	23	15	11	9	7	4	20		
Percent pregnant		13	53	78	81	75	73	74	51		
<u>All females</u>			<u>Primipara and multipara females</u>								
		number	percent			number	percent				
Pregnant		3887	59		Pregnant	3887	76				
Non-pregnant		2716	41		Non-pregnant	1230	24				
Total		6603			Total	5117					

Sample size in percent of total kill: 18

Table 10.

Summary of reproductive condition of females sampled from commercial kill, by age, St. George Island, Alaska, 27 June to 20 August, 1957

Reproductive condition	Age										Total
	2	3	4	5	6	7	8	9	10	10+	
Nullipara											
number	2	39	230	252	46	2	2	1		1	575
percent	100	100	92	60	14	1	1	1			29
Primipara											
Pregnant											
number			12	110	56	17	3				198
percent			5	26	18	10	2				10
Non-pregnant											
number			9	16	27	8	5	1		1	67
percent			3	4	8	4	4	1			3
Multipara											
Pregnant											
number				43	129	95	82	63	35	241	688
percent				10	40	54	60	57	46	51	34
Non-pregnant											
number					64	54	44	46	41	234	483
percent					20	31	33	41	54	49	24
Total	2	39	251	421	322	176	136	111	76	477	2011
Percent	-	2	12	21	16	9	7	5	4	24	
All females						Primipara and Multipara females					
			number	percent					number	percent	
Pregnant			886	44		Pregnant			886	62	
Non-pregnant			1125	56		Non-pregnant			550	38	
Total			2011			Total			1436		

Sample size in percent of total kill: 20

groups were a year older than in 1956. Five-year-old females were the dominant age class instead of 4-year-olds as in 1956.

The decline in numbers of 4-year females prevailed on both islands in 1957. No explanation of the failure of this age class to appear in the kill is offered. They were not subjected to a kill as 3-year-olds because females of this age fall below minimum size limits. Comparison of St. George Island pregnancy rates between 1957 and 1956 shows a marked change. The all-female pregnancy rate in 1957 was 44 percent, while the 1956 rate was 54 percent. Animals of breeding age were 62 percent pregnant in 1957 compared with 73 percent in 1956. Graphs showing the reproductive condition of seals by age^{1/} and by 5-day rounds for both islands are included (figures 11, 12, 13 and 14).

C. General statement

As each sample was examined, presence or absence of milk from the mammary glands was noted. At the beginning of the season, standards were arbitrarily set for assigning condition as either lactating or non-lactating. Apparent anomalies were so frequent that the value of recording such information is questionable. Numerous cases of nulliparous and non-pregnant multipara animals secreting quantities

^{1/} Figures 13 and 14, showing reproductive condition of seals by age, will appear in supplements to this report.

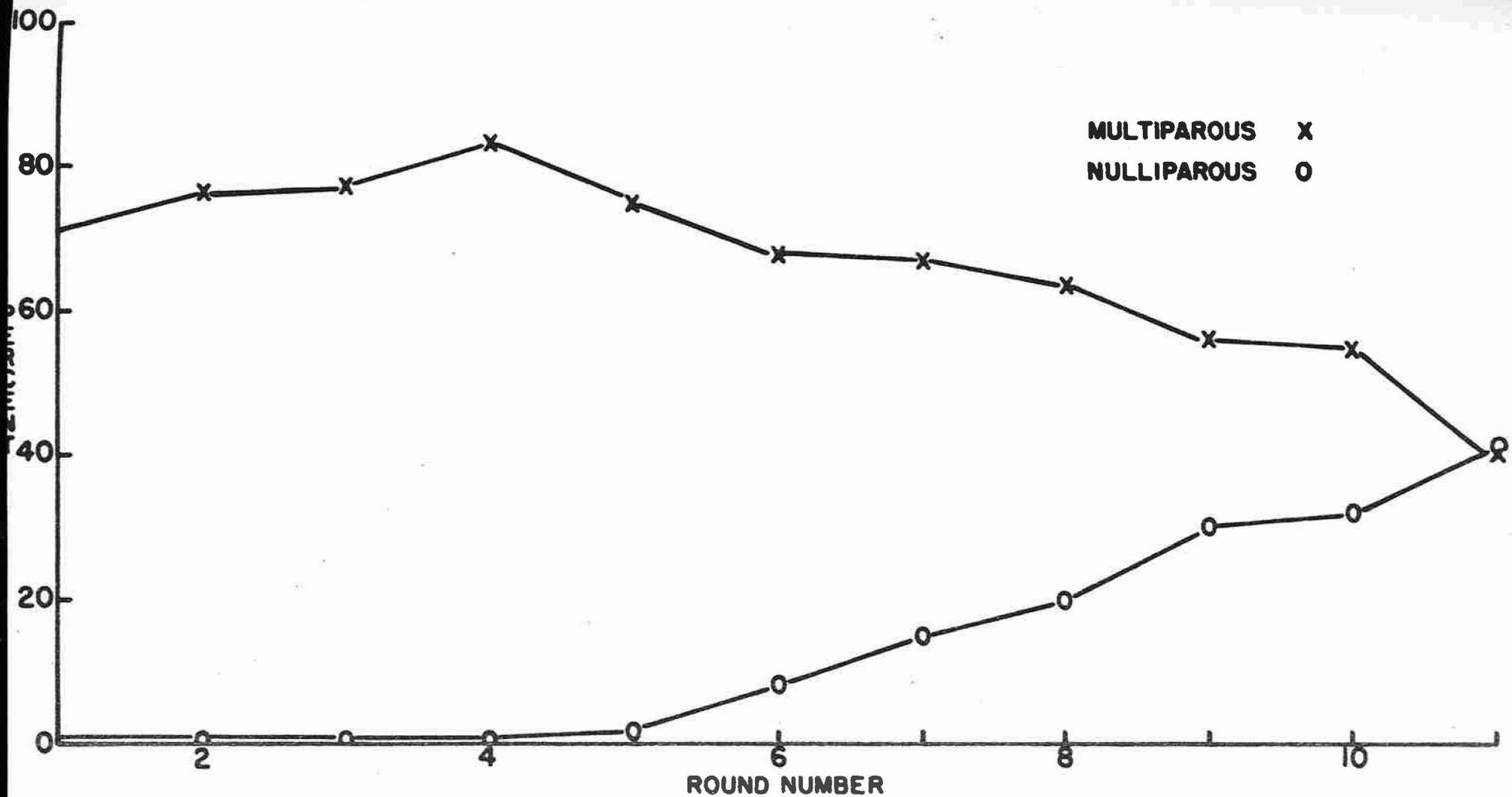


FIGURE 11. REPRODUCTIVE CONDITION OF FEMALES BY 5-DAY ROUNDS, ST. PAUL ISLAND, ALASKA, 1957

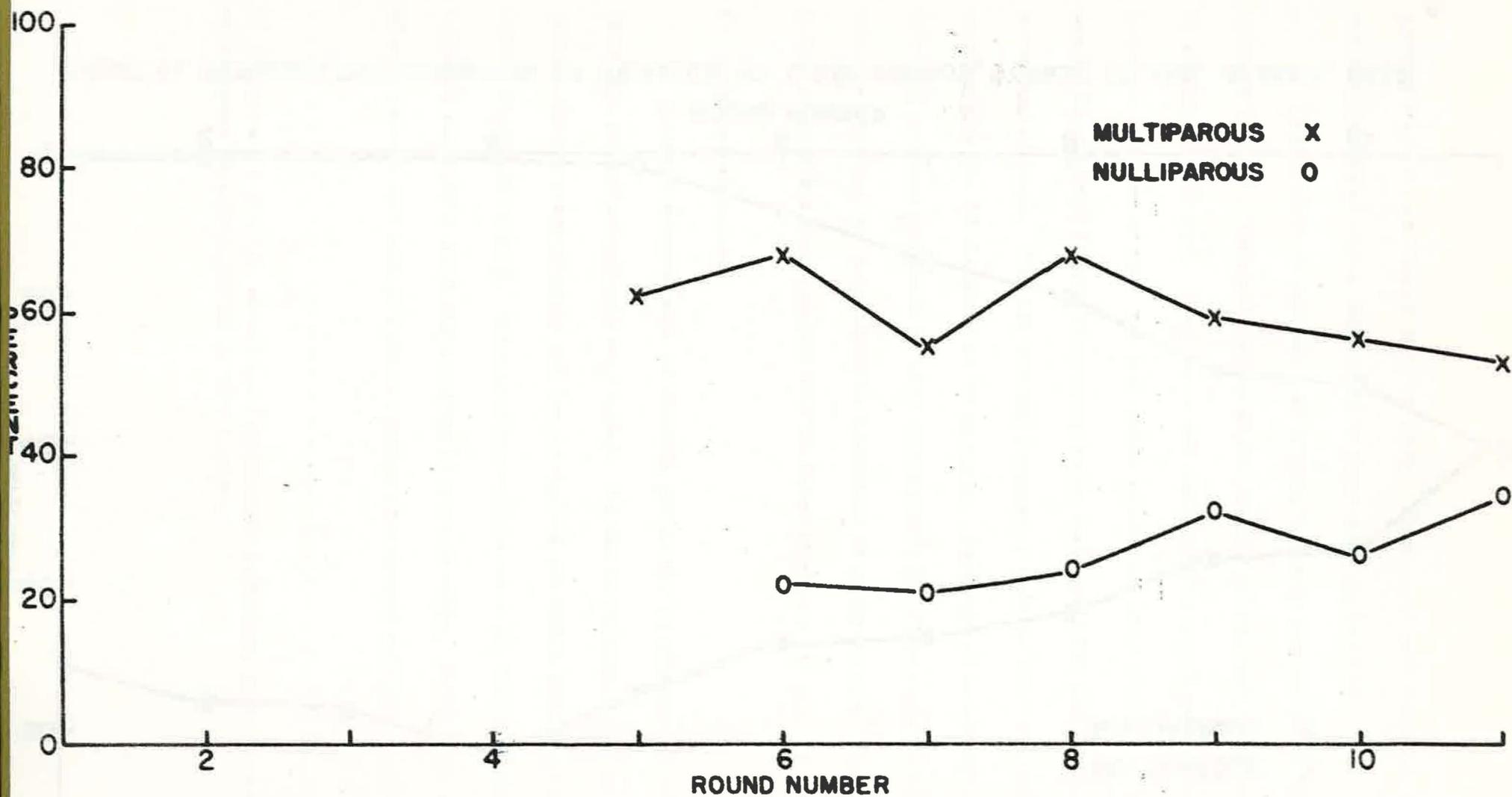


FIGURE 12. REPRODUCTIVE CONDITION OF FEMALES BY 5-DAY ROUNDS, ST. GEORGE ISLAND, ALASKA, 1957

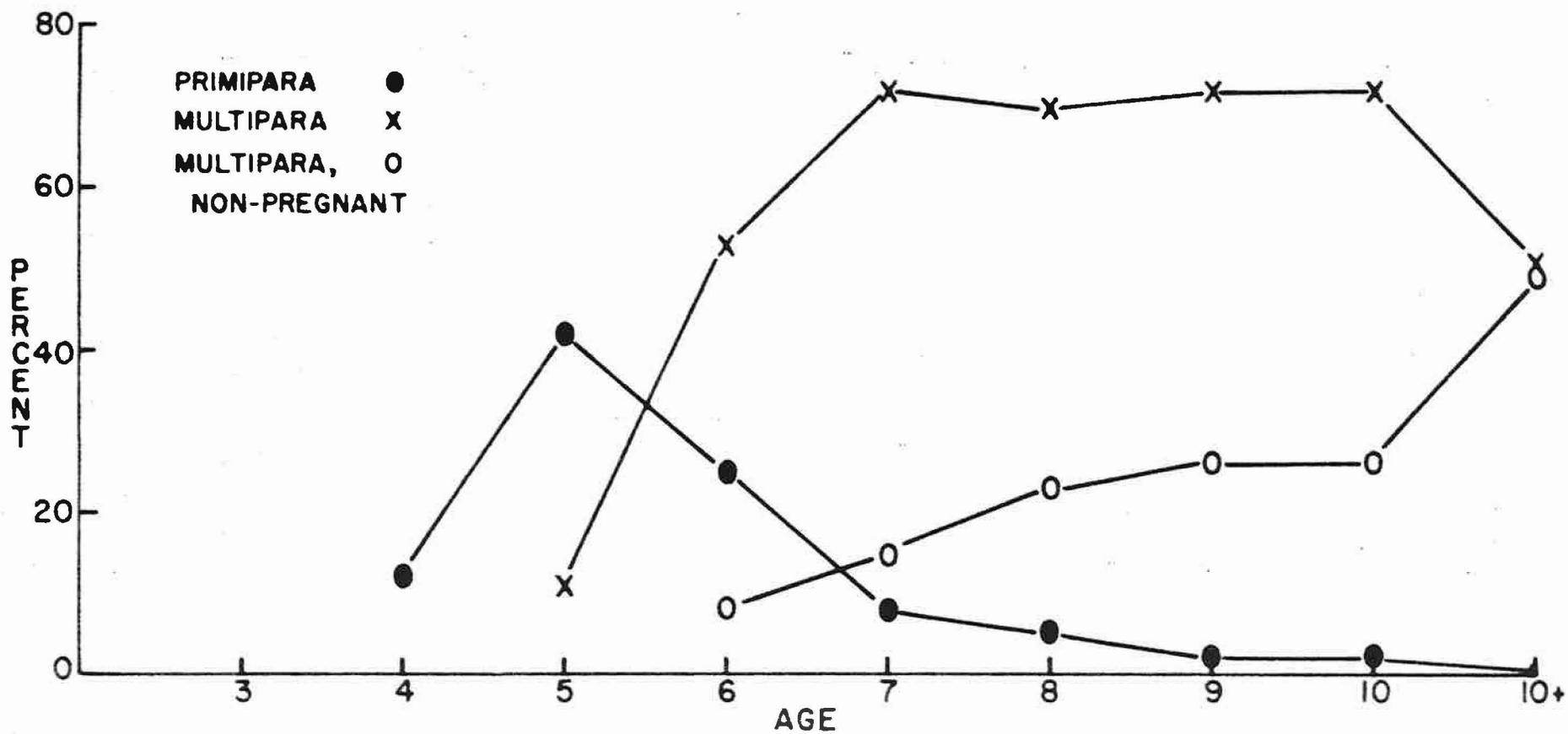


FIGURE 13. REPRODUCTIVE CONDITION OF SEALS BY AGE, ST. PAUL ISLAND, 1957

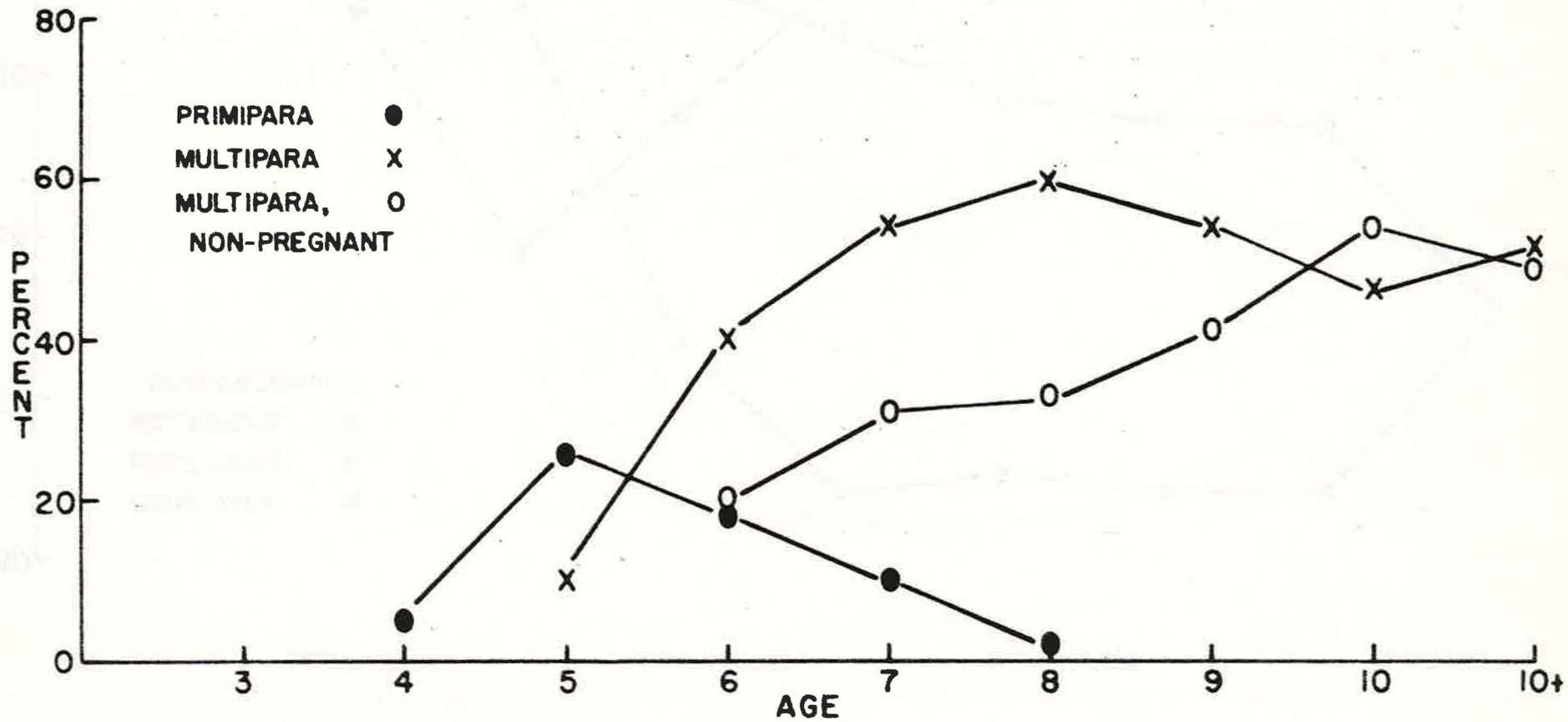


FIGURE 14. REPRODUCTIVE CONDITION OF SEALS BY AGE, ST. GEORGE ISLAND, 1957

pseudo-preg.?

of milk or milk-like fluid confuse an attempt to associate lactating with nursing. It is highly improbable that all lactation observed in examinations meant the female was nursing. Further study is necessary to accurately relate lactation to reproductive condition.

IV. MORTALITY

A. Dead pup counts

1. Total counts

It has been the practice to make a count of dead pups beginning about 15 August. Studies have shown that when the commercial kill is confined to males, relatively few deaths occur after this date. The heavy mortality caused by hookworm infections usually ceases between 10 and 15 August. Because of the availability of female seals, which now compose a substantial proportion of the kill, it is necessary to extend the sealing season to 20 August. Fur seal pups nurse only about every eight days (Bartholomew and Hoel, 1953) and are able to live two to three weeks without feeding. When nursing females are taken in the kill, as they were in 1957, pups continue to die for at least three weeks after the close of the killing season (figure 15). A dead pup count which is inclusive must be delayed until about 10 September. In 1957, a count of dead pups on Polovina and Polovina Cliffs rookeries was made by two men on 16 August and repeated on 3 September by five men. The first count was 9,861 and the second, 9,857. It was known from the fresh carcasses that new pup deaths had occurred in the intervening period as a result of the inclusion of nursing females in the commercial kill. It is certain that an unknown number of pup carcasses disappeared between the first and



Figure 15. Dead pups on Northeast Point, St. Paul Island, 14 September 1957. Shows pups recently dead from starvation. Pups that died from hookworm infection would be in a much more advanced state of decomposition because deaths from this cause stop about mid-August.

second count. Under these conditions, it is difficult to select a suitable time to make the dead pup counts. If made at the usual time, pups are still dying; if made later, dead pups begin to disappear.

A change that would partially remedy this situation, and at the same time produce a more generally satisfactory female kill by taking

a larger proportion of good quality female skins, would be to stop the killing of females from known harem areas. This may not be entirely possible in 1958 when 50,000 females are to be killed. The availability of females along the back fringes of rookeries and on certain beaches is so great by 10 August, that it should be readily possible to reach the planned future quota of 30,000 females from these areas alone. It would not be necessary to remove from the harem areas groups of females heavily mixed with nursing pups.

It is also believed, as was stated in our report in 1956, that the results obtained from raiding harems during July when they are tightly organized and stoutly defended, does not compensate for the difficulty and danger involved. Since only certain areas are so situated that harem drives are possible at all, a heavy drain is put on a few parts of some rookeries and none at all over most of the rookery expanse. The loss of pups which is, at least partly, caused by such concentrated raiding is illustrated in figures 16 and 17. The females obtained by harem raiding during July 1957 could have been taken in a single day by 15 August.

The total dead pup count for both islands was 74,515. Included in this figure is a 5 percent addition to allow for dead pups missed. Table 11 gives the 1957 dead pup count by rookery. A comparison is made between the 1957 counts and the mean of the counts for 1951 and 1953 through 1956. A decrease in mortality occurred on all rookeries.

Table 11.
Dead pup counts, Pribilof Islands, Alaska, 1957

<u>St. Paul Island</u> Rookery	1957	Mean mortality 1951 & 53-56	Decrease from mean in 1957 (percent)
Northeast Point			
Morjovi	4,253	6,251	-32.0
Vostochni	12,732	19,631	-35.1
Polovina			
Little Polovina	1,695	3,099	-45.3
Polovina Cliffs	4,425	6,409	-31.0
Polovina	5,432	6,004	-9.5
Reef			
Ardiguen	249	293	-15.0
Gorbach	3,801	4,644	-18.1
Reef	11,301	13,434	-15.9
Sivutch	---	---	---
Kitovi, Lukanin, Tolstoi			
Kitovi	1,588	2,077	-23.5
Lukanin	870	1,155	-24.7
Tolstoi	5,659	6,603	-14.3
Zapadni			
Little Zapadni	2,325	3,679	-36.8
Zapadni Reef	917	1,361	-32.6
Zapadni	6,415	9,221	-30.4
Actual total	61,662	83,861	-26.5
Add 5 percent	3,083		
Estimated total	64,745		
<u>St. George Island</u>		Mean mortality <u>1953-54 & 56</u>	
	9,304	11,557	-19.5
Summary, 1957			
<u>Pribilof Islands</u>	70,966		
Add 5 percent	3,548		
Estimated total	74,514		



Figure 16. Dead pups on Polovina sand beach, St. Paul Island, 3 September 1957. Persistent killing of harem females from this area caused death from starvation for most of the pups.



Figure 17. Dead pups on Polovina sand beach, St. Paul Island. Biologist shown marking pups with lime as he counts them.

2. Sample area counts

A dead pup census on the sample areas outlined by permanent signs placed in position in 1956 was made for the second year (table 12). The sample areas contained 32 percent of the dead pups counted in 1956. In 1957, they contained 32.5 percent of the pups counted. If the relationship between total count and sample area count remains fairly constant

Table 12. Dead pup counts, study areas, St. Paul Island, Alaska, 1957.

Northeast Point Rookeries

Morjovi	1,409
Vostochni	3,201

Polovina Rookeries

Little Polovina	941
Polovina	3,612

Reef Rookeries

Gorbatch	1,178
Reef area 1 (north)	1,073
" area 2 (south)	1,825

Kitovi, Lukanin, Tolstoi

Tolstoi	2,482
---------	-------

Zapadni Rookeries

Little Zapadni	659
Zapadni	3,349

Total	19,729
--------------	---------------

again in 1958, consideration will be given to making only sample area counts until a re-evaluation is believed necessary. A comparison of the percent of the total rookery count represented by sample area counts for 1956 and 1957 is listed below:

Rookery	<u>1956</u> Percent of total rookery count	<u>1957</u>
Morjovi	42.0	33.1
Vostochni	20.6	25.1
Little Polovina	51.6	55.5
Polovina	26.3	36.6
Gorbach	33.1	31.0
Reef	30.2	25.6
Tolstoi	52.3	43.8
Little Zapadni	39.2	28.3
Zapadni	51.3	52.2

B. Pathology

1. Survey of death causes

Dr. L. P. Doyle, veterinary pathologist, recently retired from Purdue University, spent the period from 27 June to 16 August surveying mortality causes among fur seal pups. It was considered that an

appraisal of the relative importance of mortality causes needed to be made if the effects of herd reduction were to be traced.

Between 29 June and 15 August, Dr. Doyle examined 1,816 pups. The animals examined came from ten rookeries representing the entire breeding area of St. Paul Island. Death causes revealed by post mortem examinations fell into about five main categories as listed:

1. physical injury
2. congenital defects
3. starvation
4. hookworm
5. cause unknown

Early season deaths were largely due to physical injuries and occasional congenital defects; mid-season deaths were mostly due to hookworm infections and late season deaths were due to starvation.

Attempts were made throughout the study to develop cultures of pathogenic bacteria without success.

Hookworm infection appears to be the only cause for death for which direct control measures may be possible.

A report of the pathological study is being compiled.

2. Body temperatures of moribund fur seal pups

The sudden spurt in deaths among seal pups during rainstorms is observed each year on the Pribilof rookeries. The young

animals are able to withstand hookworm infections, starvation, and other causes of debilitation until drenched in cold rain. Then, often within a few hours, the rookeries are littered with dead and dying seal pups. The need for heat is more than their weakened system can supply.

Approximately 50 moribund pups were picked up on 10 August as part of a study of mortality causes carried on by pathologist L. P. Doyle. The body temperatures (anal) of 18 of these in various stages of moribundity were taken. The temperatures ranged from 18.4°C. (65.1°F.) to 25.8°C. (78.4°F.). Normal resting temperature is 38.2°C. (100.8°F.) (Bartholomew and Wilke, 1956).

3. Cause of death in so-called "roadskin" seals

Dr. L. P. Doyle performed an autopsy examination of two seals that had died of exhaustion during a sealing drive.

One, a male 9 to 10 years old, died from the effect of a distended heart. One chamber of the heart was so extended as to be unable to function. A smaller male, about 4 years old, bled internally from capillaries and in effect drowned in its own blood.

C. Recent mortality trends

The opinion was expressed in the 1956 report that seal pup mortality is now fluctuating on either side of a mean and that it would vary between about 75,000 and 125,000 annually unless a man-created

change in herd size takes place. Events of 1957 did not make a change in this opinion necessary. Fluctuations of recent years on St. Paul Island appear in figure 18. There are no positive facts that will explain these fluctuations. However, the weather appears to be a very important factor. Generally, mortality is low in warm, dry seasons and high during the cool, wet seasons when the islands are swept by driving rainstorms during July and early August. The lowest mortality of recent years occurred in 1953 when there was a remarkable number of sunny days. A relatively dry season occurred again in 1955, and 1957, although, not sunny, was so dry that many small ponds became very low or disappeared entirely.

The correlation between seal mortality and rainfall and temperature will be examined by a study of U. S. Weather Bureau summaries for St. Paul Island.

THOUSANDS

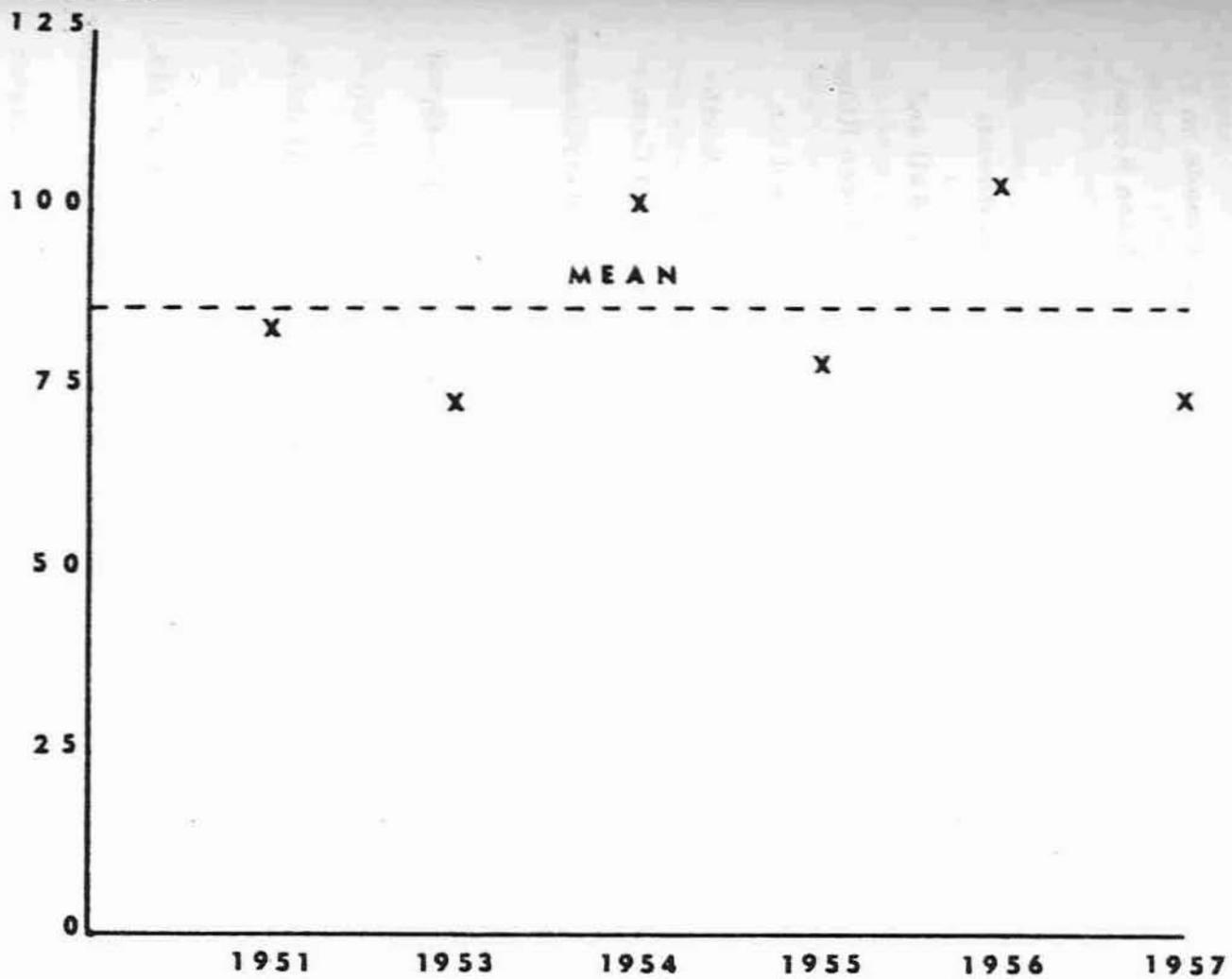


FIGURE 18 MORTALITY FLUCTUATIONS ST PAUL ISLAND

V. OTHER WILDLIFE SPECIES

A. Reindeer

A count of the reindeer herd on St. Paul Island was made on 17 August by Carl Abegglen, Gary Baines, Dr. R. Graber, Alton Roppel, Lavrenty Stepetin, and Ford Wilke.

In the morning, the island was searched from the Southwest Point road toward the interior. One party entered at Ridge Wall and followed high land to Cone Hill. A second party entered between Ridge Wall and Southwest Point and proceeded to Fox Hill, then joined the first party at Cone Hill. A third party searched the area from Southwest Point to Rush Hill. Reindeer were located moving behind Crater Hill at about 1130. Abegglen and Stepetin remained to keep the reindeer in sight and the others returned to the village.

In the afternoon, all members of the party climbed to the top of Crater Hill after examining the area around North Hill and Low Hill. The reindeer had settled down around Crater Lake and were still there when the observers left to return to St. Paul Village.

Counts ranged from 212 to 220 but most counts were about 215. It is believed that there were at least 215 and possibly up to 217 reindeer on St. Paul Island at the time of the count. Conditions for obtaining an accurate count were much better than usual. The reindeer were lying down or standing quietly and were observed from a high vantage point. (figure 19).

Only one animal was noticeably in poor condition. About 25 of the reindeer were white or partly white. Most of the western end of the island has been grazed by reindeer. Wherever the deer were grazing, plants of the seacoast angelica were gnawed in to the root crown. The valley between Low Hill and Crater Hill was marked with trails as if the ~~deer~~^{deer} had been coming frequently to Crater Lake for water.

One skeleton from a 1957 death was seen by Abegglen and Stepetin and Mr. Harry May reported that a deer had recently died near Southwest Point.

It is assumed that some plan will be developed for utilizing the reindeer herd in 1958 or at the very latest by 1959.

B. Birds

Although there is no fixed policy on seasons for sea bird hunting on the Pribilof Islands, in recent years hunting has been authorized to begin on 15 September. The flight behavior of young kittiwakes, both Pacific and red-legged, was observed again in 1957. It is concluded that 15 September is a satisfactory starting date for sea bird hunting and that the date should be made known to the people on the islands well in advance of the 1958 season. Maturity time for young kittiwakes will not vary greatly from year to year so there is no need to change the start of the hunting season even though there may be local requests to do so.

About 60 bird skins (museum type) were added to the collection held in the laboratory on St. Paul Island.

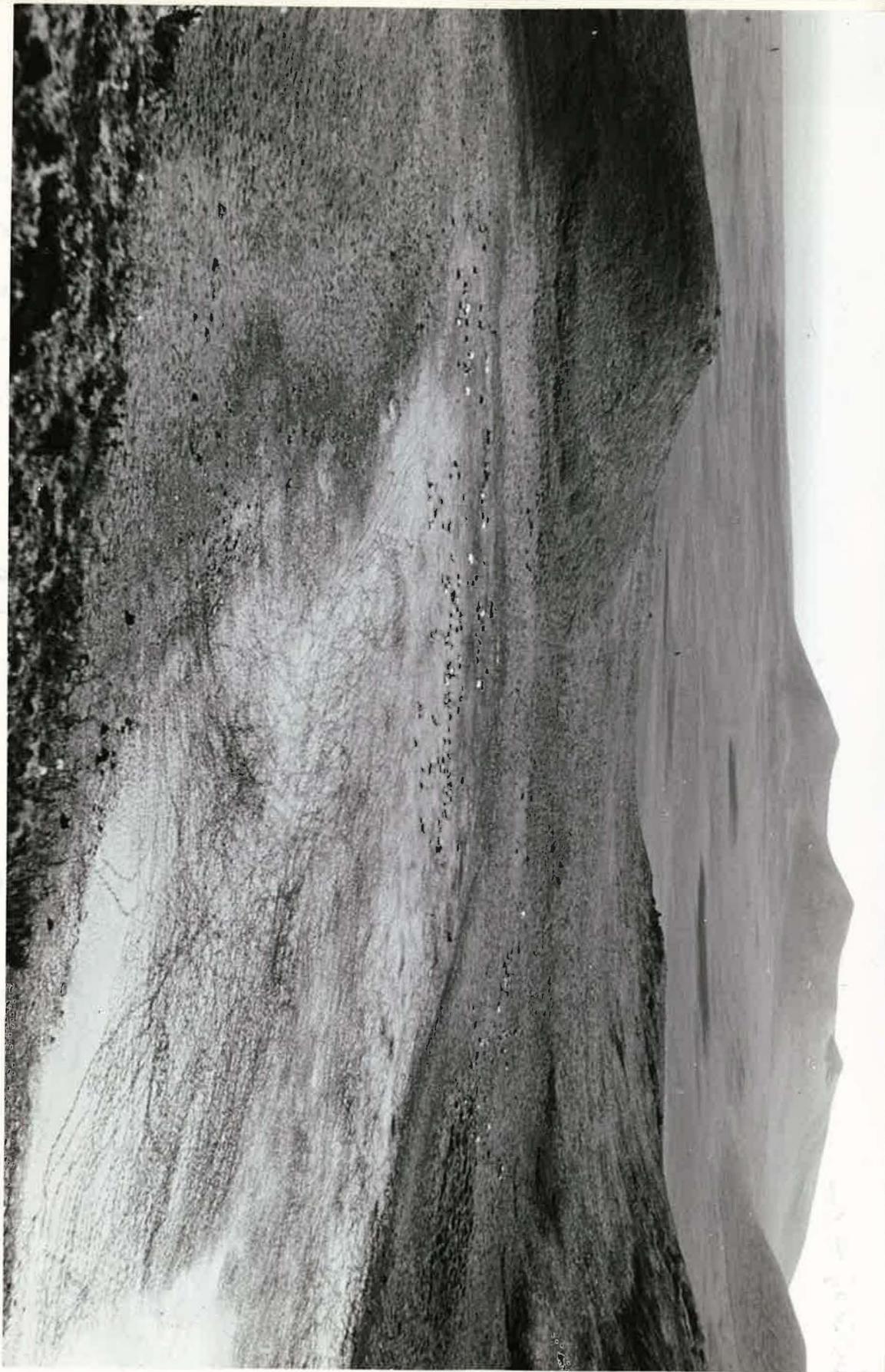


Figure 19. Reindeer herd, St. Paul Island, 17 August 1957. After a search of several hours, the herd was found here on the floor of Crater Lake (photoprint is reversed).

VI. LITERATURE CITED

Bartholomew, George A., and Ford Wilke. 1956. Body temperature in the northern fur seal, Callorhinus ursinus. Jour. Mamm. 37:327-337.

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VII. APPENDIX

Appendix Table A.

Age classification^{1/} of males in commercial kill, St. Paul Island, Alaska,
27 June to 10 August, 1957

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class ^{2/}			
				2	3	4	5	2	3	4	5
27 June	NEP	495	50	2	44	48	6	10	218	238	29
28	TLK	261	26	-	58	42	-	-	151	110	-
29	ZAP	1190	117	1	59	37	3	12	702	440	36
30	REEF	264	26	-	54	38	8	-	143	100	21
1 July	POL	366	40	-	40	50	10	-	146	183	37
Round total		2576	259					22	1360	1071	123
2 July	NEP	661	67	-	42	51	7	-	278	337	46
3	TLK	297	26	-	50	42	8	-	148	125	24
4	ZAP	1267	130	-	66	32	1	-	836	405	13
5	REEF	222	22	-	77	14	9	-	171	31	20
6	POL	409	41	2	49	47	2	8	201	192	8
Round total		2856	286					8	1634	1090	111
7 July	NEP	740	75	-	49	39	12	-	363	289	88
8	TLK	424	42	-	69	29	2	-	292	123	9
9	ZAP	807	81	1	51	43	5	8	412	347	40
10	REEF	570	51	-	47	51	2	-	268	291	11
11	POL	274	26	-	65	31	4	-	178	85	11
Round total		2815	275					8	1513	1135	159

Appendix Table A.
Age classification^{1/} of males in commercial kill, St. Paul Island, Alaska,
27 June to 10 August, 1957 (con.)

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class ^{2/}			
				2	3	4	5	2	3	4	5
12 July	NEP	1224	125	-	44	46	8	-	539	563	98
13	TLK	557	56	2	57	38	3	11	317	212	17
14	ZAP	1423	140	-	73	26	1	-	1039	370	14
15	REEF	305	31	-	64	36	-	-	195	110	-
16	POL	304	12	8	59	33	-	24	180	100	-
Round total		3813	364					35	2270	1355	129
17 July	NEP	909	93	-	67	32	1	-	609	291	9
18	TLK	530	53	-	64	36	-	-	339	191	-
19	ZAP	1436	144	1	81	17	1	14	1164	244	14
20	REEF	234	23	-	65	35	-	-	152	82	-
21	POL	492	49	2	69	29	-	10	339	143	-
Round total		3601	362					24	2603	951	23
22 July	NEP	998	101	1	69	28	2	10	689	279	20
23	TLK	767	76	-	78	21	1	-	598	161	8
24	ZAP	2457	264	1	76	22	1	25	1867	540	25
25	REEF	398	39	-	74	21	5	-	294	84	20
26	POL	653	67	2	80	18	-	13	522	118	-
Round total		5273	547					48	3970	1182	73

Appendix Table A.
 Age classification^{1/} of males in commercial kill, St. Paul Island, Alaska,
 27 June to 10 August, 1957 (con.)

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class ^{2/}			
				2	3	4	5	2	3	4	5
27 July	NEP	985	109	7	80	13	-	69	788	128	-
28	TLK	652	66	3	73	24	-	20	476	156	-
29	ZAP	1796	202	5	80	14	1	90	1437	251	18
30	REEF	370	34	3	73	24	-	11	270	89	-
31	POL	662	67	6	73	21	-	40	483	139	-
Round total		4465	478					230	3454	763	18
1 August	NEP	884	104	11	71	18	-	97	628	159	-
2	TLK	928	116	9	75	16	-	83	697	148	-
3	ZAP	1260	145	6	81	12	1	76	1021	151	12
4	REEF	496	70	14	68	16	2	69	337	79	11
5	POL	487	61	8	69	23	-	39	336	112	-
Round total		4055	496					364	3019	649	23

Appendix Table A.
Age classification^{1/} of males in commercial kill, St. Paul Island, Alaska,
27 June to 10 August, 1957 (con.)

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class ^{2/}			
				2	3	4	5	2	3	4	5
6 August	NEP	1669	213	8	77	14	1	134	1285	234	16
7	TLK	761	68	-	84	16	-	-	639	122	-
8	ZAP	1211	115	6	80	14	-	73	968	170	-
9	REEF	428	27	-	85	15	-	-	364	64	-
10	POL	532	39	13	74	13	-	69	394	69	-
Round total		4601	462					276	3650	659	16
Season total		34055 ^{3/}	3529					1015	23473	8855	675

^{1/} Age based on tooth ridge counts

^{2/} Where applicable, 6-year-old seals were included in the calculations but excluded from the table since they numbered only 37 for the season.

^{3/} Plus 997 males killed accidentally 11 through 20 August

Appendix Table B.
 Cumulative age classification of males in commercial kill, by day,
 St. Paul Island, Alaska
 27 June to 10 August 1957

Date	Rookery	Estimated kill from each age class				Total kill ^{1/}	Percent kill from each age class			
		2	3	4	5		2	3	4	5
27 June	NEP	10	218	238	29	495	2	44	48	6
28	TLK	10	369	348	29	756	1	49	46	4
29	ZAP	22	1071	788	65	1946	1	55	41	3
30	REEF	22	1214	888	86	2210	1	55	40	4
1 July	POL	22	1360	1071	123	2576	1	53	42	4
2	NEP	22	1638	1408	169	3237	1	51	43	5
3	TLK	22	1786	1533	193	3534	1	50	43	6
4	ZAP	22	2622	1938	206	4801	1	55	40	4
5	REEF	22	2793	1969	226	5023	-	56	39	5
6	POL	30	2994	2161	234	5432	-	55	40	5
7	NEP	30	3357	2450	322	6172	-	54	40	6
8	TLK	30	3649	2573	331	6596	-	56	39	5
9	ZAP	38	4061	2920	371	7403	-	55	39	6
10	REEF	38	4329	3211	382	7973	-	54	40	5
11	POL	38	4507	3296	393	8247	-	55	40	5
12	NEP	38	5046	3859	491	9471	-	53	41	5
13	TLK	49	5363	4071	508	10028	-	53	41	5
14	ZAP	49	6402	4441	522	11451	-	56	39	5
15	REEF	49	6597	4551	522	11756	-	56	39	5

Appendix Table B.
 Cumulative age classification of males in commercial kill, by day,
 St. Paul Island, Alaska
 27 June to 10 August 1957 (con.)

Date	Rookery	Estimated kill from each age class				Total kill ^{1/}	Percent kill from each age class			
		2	3	4	5		2	3	4	5
16 July	POL	73	6777	4651	522	12060	1	56	39	4
17	NEP	73	7386	4942	531	12969	-	57	38	4
18	TLK	73	7725	5133	531	13499	-	57	38	4
19	ZAP	87	8889	5377	545	14935	-	60	36	4
20	REEF	87	9041	5459	545	15169	-	60	36	4
21	POL	97	9380	5602	545	15661	-	60	36	3
22	NEP	107	10069	5881	565	16659	1	60	35	3
23	TLK	107	10667	6042	573	17426	1	61	35	3
24	ZAP	132	12534	6582	598	19883	1	63	33	3
25	REEF	132	12828	6666	618	20281	1	63	33	3
26	POL	145	13350	6784	618	20934	1	64	32	3
27	NEP	214	14138	6912	618	21919	1	64	32	3
28	TLK	234	14614	7068	618	22571	1	65	31	3
29	ZAP	324	16051	7319	636	24367	1	66	30	3
30	REEF	335	16321	7408	636	24737	1	66	30	3
31	POL	375	16804	7547	636	25399	1	66	30	3
1 August	NEP	472	17432	7706	636	26283	2	66	29	2
2	TLK	555	18129	7854	636	27211	2	67	29	2
3	ZAP	631	19150	8005	648	28471	2	67	28	3

Appendix Table B.
 Cumulative age classification of males in commercial kill, by day,
 St. Paul Island, Alaska
 27 June to 10 August 1957 (con.)

Date	Rookery	Estimated kill from each age class				Total kill ^{1/}	Percent kill from each age class			
		2	3	4	5		2	3	4	5
4 August	REEF	700	19487	8084	659	28967	2	67	28	2
5	POL	739	19823	8196	659	29454	3	67	28	2
6	NEP	873	21108	8430	675	31123	3	68	27	2
7	TLK	873	21747	8552	675	31884	3	68	27	2
8	ZAP	946	22715	8722	675	33095	3	69	26	2
9	REEF	946	23079	8786	675	33523	3	69	26	2
10	POL	1015	23473	8855	675	34055 ^{2/}	3	69	26	2

^{1/} Includes 37 six-year-olds

^{2/} Plus 997 males killed accidentally 11 through 20 August

Appendix Table C.

Number pregnant and non-pregnant among seals 4 or more years old
and 5 or more years old, St. Paul Island, 1957

Date	Daily kill	Daily sample	Daily sample less 2 & 3 yr. olds	Ages 4-10+		Daily sample less 2, 3 & 4 yr. olds	Ages 5-10+	
				preg.	non-preg.		preg.	non-preg.
27 June	5	5	5	4	1	5	4	1
28								
29	2	2	2	2		2	2	
30								
1 July	155	104	104	104		102	102	
2	7	7	7	7		7	7	
3	3	3	3	1	2	3	1	2
4	7	7	7	7		7	7	
5								
6	249	117	117	116	1	115	115	
7	13	12	12	12		12	12	
8	4	4	4	3	1	4	3	1
9	1	1	1		1	1		1
10								
11	592	198	198	193	5	198	193	5
12	80	42	41	39	2	40	38	2
13	1	1	1	1		1	1	
14	6	6	6	5	1	6	5	1
15								
16	397	150	149	144	5	148	143	5
17	106	92	92	90	2	92	90	2
18	37	32	32	23	9	31	22	9
19	43	38	38	23	15	34	21	13
20	1	1	1	1		1	1	
21	333	178	178	168	10	172	164	8
22	88	79	79	61	18	77	59	18
23	64	51	51	38	13	51	38	13
24	56	54	53	24	29	50	21	29
25	188	89	88	57	31	82	55	27
26	444	180	180	147	33	175	144	31
27	162	119	116	57	59	105	56	49
28	62	45	44	27	17	43	27	16
29	249	125	122	44	78	112	43	69
30	524	248	245	161	84	232	160	72
31	587	290	288	247	41	279	245	34

Appendix Table C.

Number pregnant and non-pregnant among seals 4 or more years old
and 5 or more years old, St. Paul Island, 1957 (con.)

Date	Daily kill	Daily sample	Daily sample less 2 &		Daily sample less 2, 3 &		Ages 5-10+	
			3 yr. olds	Ages 4-10+ preg. non-preg.	4 yr. olds	Ages 4-10+ preg. non-preg.	preg. non-preg.	preg. non-preg.
1 August	611	161	160	83	77	144	79	65
2	319	108	108	47	61	100	47	53
3	415	113	108	43	65	98	42	56
4	1934	309	298	187	111	270	180	90
5	1697	302	295	182	113	273	180	93
6	2910	398	385	159	226	338	156	182
7	827	148	147	54	93	128	54	74
8	560	143	141	53	88	118	50	68
9	1576	209	207	84	123	183	78	105
10	2105	296	289	139	150	258	135	123
11	2982	332	327	182	145	294	180	114
12	1774	202	194	71	123	161	70	91
13	1962	220	209	99	110	180	97	83
14	2491	294	286	145	141	243	139	104
15	2516	266	257	158	99	220	154	66
16	2708	221	214	148	66	190	145	45
17	984	112	109	33	76	88	33	55
18	1401	157	121	50	71	86	48	38
19	1549	180	172	75	97	128	69	59
20	1767	192	190	90	100	162	89	73
Total	37554	6643	6481	3888	2593	5849	3804	2045

Appendix Table D.

71.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>27 June</u>										
Nullipara			1							1
Primipara pregnant				1	1					2
Multipara pregnant				1					1	2
<u>29 June</u>										
Primipara pregnant			1	1						2
<u>1 July</u>										
Primipara pregnant		2	11	8	4	1	1			27
Multipara pregnant			10	16	19	16	8	4	4	77
<u>2 July</u>										
Primipara pregnant			1	5						6
Multipara pregnant					1					1
<u>3 July</u>										
Primipara pregnant						1				1
Multipara non-pregnant								1	1	2
<u>4 July</u>										
Primipara pregnant			3							3
Multipara pregnant				1	1		1	1		4
<u>6 July</u>										
Nullipara		1								1
Primipara pregnant		1	13	5	1	1				21
Multipara pregnant			3	24	25	21	13	4	5	95
<u>7 July</u>										
Primipara pregnant			1	2						3
Multipara pregnant			3	3			1	1	1	9

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>8 July</u>										
Primipara										
pregnant				1						1
Multipara										
pregnant						1		1		2
non-pregnant									1	1
<u>9 July</u>										
Multipara										
non-pregnant								1		1
<u>11 July</u>										
Nullipara			1							1
Primipara										
pregnant			20	14	8		1		1	44
Multipara										
pregnant			17	35	39	31	13	6	8	149
<u>12 July</u>										
Nullipara			1							1
Primipara										
pregnant		1	2	1						4
Multipara										
pregnant			8	10	12	3	1		1	35
non-pregnant							1			1
<u>13 July</u>										
Primipara										
pregnant			1							1
<u>14 July</u>										
Primipara										
pregnant					1					1
Multipara										
pregnant				1		1	1	1		4
non-pregnant									1	1
<u>16 July</u>										
Nullipara			1	1						2
Primipara										
pregnant		1	13	4	1	1	1			21
non-pregnant			1	1	1					3
Multipara										
pregnant			1	11	35	30	25	15	6	123

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>17 July</u>										
Nullipara				1						1
Primipara pregnant			6	8	5	2				21
Multipara pregnant			5	28	24	8	2	1	1	69
non-pregnant									1	1
<u>18 July</u>										
Primipara pregnant		1	4							5
Multipara pregnant			2	3	4	7	1		1	18
non-pregnant				1				1	7	9
<u>19 July</u>										
Nullipara		1								1
Primipara pregnant		1	4	1						6
non-pregnant		1								1
Multipara pregnant		1	2	6	2	1	1		4	17
non-pregnant						2	1	3	7	13
<u>20 July</u>										
Multipara pregnant							1			1
<u>21 July</u>										
Nullipara		2	1		1					4
Primipara pregnant		4	28	13	1	1				47
Multipara pregnant			9	27	30	24	15	6	10	121
non-pregnant				1	1	1	2		1	6
<u>22 July</u>										
Nullipara			6	2	1					9
Primipara pregnant		2	11	2	1		1	1		18
Primipara non-pregnant			2	1	1					4
Multipara pregnant			11	17	6	5		1	3	43
non-pregnant						1			4	5

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>23 July</u>										
Nullipara			2	1						3
Primipara										
pregnant			8	3		1		1		13
non-pregnant				2						2
Multipara										
pregnant				4	6	5	5	3	2	25
non-pregnant				2	2		1		3	8
<u>24 July</u>										
Nullipara	1		2	1						4
Primipara										
pregnant		2	2	4	1					9
Multipara										
pregnant		1	1	5	2	3	1		2	15
non-pregnant				1	3	1	1	3	17	26
<u>25 July</u>										
Nullipara	1	4	1	3						9
Primipara										
pregnant		2	11	4	1					18
Multipara										
pregnant			4	14	5	6	5		5	39
non-pregnant				3	2	1	4		13	23
<u>26 July</u>										
Nullipara		2	9							11
Primipara										
pregnant		3	28	10	1		1		1	44
non-pregnant			4							4
Multipara										
pregnant			7	27	30	15	17	2	5	103
non-pregnant			1	4	5	4	1	1	2	18
<u>27 July</u>										
Nullipara	3	10	14	3		2				32
Primipara										
pregnant		1	19	3	1					24
non-pregnant				1						1
Multipara										
pregnant			4	8	7	4	1	3	6	33
non-pregnant				1	3	7	2	1	15	29

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>28 July</u>										
Nullipara	1	1	4							6
Primipara										
pregnant			3							3
non-pregnant				1						1
Multipara										
pregnant			4	2	5	2	1	2	8	24
non-pregnant							1		10	11
<u>29 July</u>										
Nullipara	3	9	12	1		1				26
Primipara										
pregnant		1	8	4	1					14
non-pregnant			3							3
Multipara										
pregnant			3	5	2	4	1		15	30
non-pregnant				2		7	3	3	37	52
<u>30 July</u>										
Nullipara	3	12	16	4						35
Primipara										
pregnant		1	26	11	3					41
non-pregnant			3							3
Multipara										
pregnant			6	27	18	17	8	9	35	120
non-pregnant			1	2	8	6	2	1	29	49
<u>31 July</u>										
Nullipara	1	7	13	2	1					24
Primipara										
pregnant	1	2	35	17	4	1				60
non-pregnant			1							1
Multipara										
pregnant			9	34	34	19	25	14	53	188
non-pregnant				2	1	2	3		9	17
<u>1 August</u>										
Nullipara	1	12	17	5	1					36
Primipara										
pregnant		2	17	3	1	1				24
non-pregnant				1						1
Multipara										
pregnant		2	1	15	14	5	10	2	10	59
non-pregnant				4	3	7	5	2	20	41

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>2 August</u>										
Nullipara		8	7	2						17
Primipara										
pregnant			6	7	2					15
non-pregnant				2						2
Multipara										
pregnant			1	5	4	2	2	6	12	32
non-pregnant			1	3	1	5	3		29	42
<u>3 August</u>										
Nullipara	4	9	7	2						23 ^{1/}
Primipara										
pregnant		1	8	1						10
non-pregnant			1	1						2
Multipara										
pregnant			1	5	8	2	6	1	10	33
non-pregnant				1	2	2	9	4	27	45
<u>4 August</u>										
Nullipara	11	21	25	3	1					61
Primipara										
pregnant		7	32	12	3	4				58
non-pregnant			1							1
Multipara										
pregnant			10	25	19	13	17	9	35	129 ^{2/}
non-pregnant			4	5	8	5	6	7	25	60
<u>5 August</u>										
Nullipara	5	20	31	9	1					66
Primipara										
pregnant		2	27	9	2	1				41
non-pregnant			1							1
Multipara										
pregnant			3	22	10	17	26	10	53	141
non-pregnant				3	3	5	9		31	51
<u>6 August</u>										
Nullipara	13	43	56	11	5					128
Primipara										
pregnant		3	38	21	1	1				64
non-pregnant			2	1	1				1	5
Multipara										
pregnant				12	14	16	9	9	35	95
non-pregnant				8	10	17	6	2	62	106

^{1/} Includes one 2 yr. old.

^{2/} Contains one 16 yr. old.

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total	
	3	4	5	6	7	8	9	10	10+		
<u>7 August</u>											
Nullipara	1	19	22	7	1						50
Primipara											
pregnant			12	8	1						21
Multipara											
pregnant			3	4	5	5	2	3		11	33
non-pregnant			1		3	2	5	8		24	44 ^{1/2}
<u>8 August</u>											
Nullipara	2	20	16								38
Primipara											
pregnant		3	5	2		1		1			12
non-pregnant					2						2
Multipara											
pregnant			2	3	8	1	7	7		13	41
non-pregnant				1	2	6	5	9		27	50
<u>9 August</u>											
Nullipara	2	16	30	2	1	1				1	53
Primipara											
pregnant		6	11	4	2						23
non-pregnant			1	2							3
Multipara											
pregnant			2	2	11	10	10	5		21	61
non-pregnant		2	1	3	6	10	8	2		37	69
<u>10 August</u>											
Nullipara	7	27	49	3		1				1	88
Primipara											
pregnant		4	24	5	1						34
non-pregnant			2	5							7
Multipara											
pregnant			6	17	16	13	20	7		26	105
non-pregnant				6	3	8	13	1		31	62
<u>11 August</u>											
Nullipara	5	31	44	6	2			1		1	90
Primipara											
pregnant		2	26	6	1						35
non-pregnant			1	1							2
Multipara											
pregnant			4	25	20	22	10	9		57	147
non-pregnant				6	4	7	3	4		34	58

^{1/2} Includes one 12 yr. old.

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total	
	3	4	5	6	7	8	9	10	10+		
<u>12 August</u>											
Nullipara	8	32	30	7		1					78
Primipara											
pregnant		1	15		1	1	1				19
non-pregnant			1								1
Multipara											
pregnant			3	6	6	6	4	4	23		52
non-pregnant				1	9	3	2		37		52
<u>13 August</u>											
Nullipara	11	26	25	5							67
Primipara											
pregnant		2	15	5	1	1					24
non-pregnant		1	1	2	1						5
Multipara											
pregnant			5	10	10	9	7	7	27		75
non-pregnant				6	5	5	1	6	26		49
<u>14 August</u>											
Nullipara	8	37	51	6	2	2					106
Primipara											
pregnant		5	27	9	3						44
non-pregnant				1							1
Multipara											
pregnant		1	6	8	16	14	14	5	37		101 ^{1/}
non-pregnant			2	3	5	3	4	2	22		42 ^{1/}
<u>15 August</u>											
Nullipara	8	33	32	3							77 ^{2/}
Primipara											
pregnant		3	35	4							42
Multipara											
pregnant		1	2	12	10	21	23	6	40		116 ^{3/}
non-pregnant			1	4	3	5	6		12		31

^{1/} Includes one 12 yr. old.

^{2/} Includes one 2 yr. old.

^{3/} Includes one 16 yr. old.

Appendix Table D.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. Paul Island, 27 June to 20 August, 1957 (con.)

	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>16 August</u>										
Nullipara	6	21	23	2		1				53
Primipara										
pregnant		3	22	15	1	6	2	1	1	51
non-pregnant				1	1					2
Multipara										
pregnant			4	13	9	8	7	9	47	97
non-pregnant					2	1	1	1	11	16
<u>17 August</u>										
Nullipara	3	21	21	4						49
Primipara										
pregnant			8	5	2	1				16
non-pregnant					1	1				2
Multipara										
pregnant			1	5	1	1	3		6	17
non-pregnant				1	5	5	5	2	10	28
<u>18 August</u>										
Nullipara	8	33	19	3	2					65
Primipara										
pregnant		2	9	1						12
non-pregnant			1				1			2
Multipara										
pregnant			3	7	5	4	1	7	11	38
non-pregnant				3	1		2		6	12
<u>19 August</u>										
Nullipara	8	38	34	4	1					85
Primipara										
pregnant		6	11	3	1					21
non-pregnant			1							1
Multipara										
pregnant			4	11	13	4	10	2	10	54
non-pregnant				5	2	2	4	2	4	19
<u>20 August</u>										
Nullipara	2	26	55	2		1	1			87
Primipara										
pregnant			40	5	1					46
non-pregnant		1	1							2
Multipara										
pregnant		1	8	7	4	9	11	3	1	44
non-pregnant				1		3	6	1	2	13
Total	127	632	1543	982	700	576	483	257	1303	6609

Appendix Table E.
 Reproductive condition of female seals sampled from commercial kill,
 by rounds and age, St. Paul Island, 1957 (con.)

	Age									Total	Percent
	3	4	5	6	7	8	9	10	10+		
7-11 July (con.)											
<u>Primipara</u>											
<u>Pregnant</u>											
number			21	17	8		1		1	48	22
percent			50	30	17		7		9		
<u>Multipara</u>											
<u>Pregnant</u>											
number			20	38	39	32	14	8	9	160	74
percent			48	68	81	97	86	89	82		
<u>Non-pregnant</u>											
number				1	1	1	1	1	1	6	3
percent				2	2	3	7	11	9		
Total			42	56	48	33	16	9	11	215	
12-16 July											
<u>Nullipara</u>											
number			2	1						3	>1
percent			7	3							
<u>Primipara</u>											
<u>Pregnant</u>											
number		2	16	5	2	1	1			27	14
percent		100	57	17	4	3	3				
<u>Non-pregnant</u>											
number			1	1	1					3	>1
percent			4	3	2						
<u>Multipara</u>											
<u>Pregnant</u>											
number			9	22	47	34	27	16	7	162	82
percent			32	76	94	97	94	100	88		
<u>Non-pregnant</u>											
number							1		1	2	1
percent							3		12		
Total		2	28	29	50	35	29	16	8	197	
17-21 July											
<u>Nullipara</u>											
number		3	1	1	1					6	2
percent		27	1	1	>1						

Appendix Table E.

Reproductive condition of female seals sampled from commercial kill,
by rounds and age, St. Paul Island, 1957 (con.)

	Age									Total	Percent	
	3	4	5	6	7	8	9	10	10+			
17-21 July (con.)												
Primipara												
Pregnant												
number		6	42	22	6	3					79	23
percent		55	69	25	9	>6						
Non-pregnant												
number		1									1	
percent		9										
Multipara												
Pregnant												
number		1	18	64	60	40	20	7	16		226	66
percent		9	30	72	88	87	87	64	50			
Non-pregnant												
number				2	1	3	3	4	16		29	9
percent				2	>1	>6	13	36	50			
Total		11	61	89	68	46	23	11	32		341	
22-26 July												
Nullipara												
number	2	6	20	7	1						36	8
percent	100	37	18	6	>1							
Primipara												
Pregnant												
number		9	60	23	4	1	2	2	1		102	22
percent		56	55	21	6	2	5	17	2			
Non-pregnant												
number			6	3	1						10	2
percent			5	3	>1							
Multipara												
Pregnant												
number		1	23	67	49	34	28	6	17		225	50
percent		7	21	61	73	81	76	50	30			
Non-pregnant												
number			1	10	12	7	7	4	39		80	18
percent			1	9	18	17	19	33	68			
Total	2	16	110	110	67	42	37	12	57		453	

Appendix Table E.
 Reproductive condition of female seals sampled from commercial kill,
 by rounds and age, St. Paul Island, 1957 (con.)

	Age									Total	Percent	
	3	4	5	6	7	8	9	10	10+			
27-31 July												
<u>Nullipara</u>												
number	11	39	59	10	1	3					123	15
percent	92	89	32	8	1	4						
<u>Primipara</u>												
Pregnant												
number	1	5	91	35	9	1					142	17
percent	8	11	49	27	10	1						
Non-pregnant												
number			7	2							9	1
percent			4	2								
<u>Multipara</u>												
Pregnant												
number			26	76	66	46	36	28	117		395	48
percent			14	58	75	64	76	85	54			
Non-pregnant												
number			1	7	12	22	11	5	100		158	19
percent			1	5	14	32	24	15	46			
Total	12	44	184	130	88	72	47	33	217		827	
1-5 August												
<u>Nullipara</u>												
number	21	70	87	21	3						203 ^{1/}	20
percent	100	83	43	14	4							
<u>Primipara</u>												
Pregnant												
number		12	90	32	8	6					148	15
percent		14	45	22	10	9						
Non-pregnant												
number			3	4							7	1
percent			>1	3								
<u>Multipara</u>												
Pregnant												
number		2	16	72	55	39	61	28	120		394 ^{2/}	40
percent		>2	8	50	66	56	66	68	48			
Non-pregnant												
number			5	16	17	24	32	13	132		239	24
percent			2	11	20	35	34	32	52			
Total	21	84	201	145	83	69	93	41	252		991	

^{1/} Includes one 2 yr.

^{2/} Includes one 16 yr.

Appendix Table E.

Reproductive condition of female seals sampled from commercial kill,
by rounds and age, St. Paul Island, 1957 (con.)

	Age									Total	Percent	
	3	4	5	6	7	8	9	10	10+			
6-10 August												
<u>Nullipara</u>												
number	25	125	173	23	7	2				2	357	30
percent	100	87	61	18	8	2				1		
<u>Primipara</u>												
Pregnant												
number		16	90	40	5	2		1			154	13
percent		11	32	>31	5	2		2				
Non-pregnant												
number			5	8	3					1	17	1
percent			2	6	3							
<u>Multipara</u>												
Pregnant												
number			13	38	54	45	48	31	106		335	28
percent			4	30	58	49	56	57	36			
Non-pregnant												
number		3	2	18	24	43	37	22	181		331 ^{1/}	28
percent		2	1	14	26	47	44	41	62			
Total	25	144	283	127	93	92	85	54	290		1194	
11-15 August												
<u>Nullipara</u>												
number	40	159	182	27	4	3	1			1	418 ^{2/}	32
percent	100	91	56	20	4	3	>1					
<u>Primipara</u>												
Pregnant												
number		13	118	24	6	2	1				164	12
percent		7	36	18	6	2	>1					
Non-pregnant												
number		1	3	4	1						9	1
percent		<1	1	2	1							
<u>Multipara</u>												
Pregnant												
number		2	20	61	62	72	58	31	184		491 ^{3/}	37
percent		>1	6	45	63	72	76	72	58			

^{1/} Includes on 12 yr.

^{2/} Includes one 2 yr.

^{3/} Includes one 16 yr.

Appendix Table E.
 Reproductive condition of female seals sampled from commercial kill,
 by rounds and age, St. Paul Island, 1957 (con.)

	Age									Total	Percent	
	3	4	5	6	7	8	9	10	10+			
11-15 August (con.)												
<u>Multipara</u>												
Non-pregnant												
number			3	20	26	23	16	12	131	232	^{1/}	18
percent			1	15	26	23	21	28	42			
Total	40	175	326	136	99	100	76	43	316	1315		
16-20 August												
<u>Nullipara</u>												
number	27	139	152	15	3	2	1			339		41
percent	100	91	57	15	6	4	2					
<u>Primipara</u>												
Pregnant												
number		11	90	29	5	7	2	1	1	146		18
percent		7	34	29	10	15	4	4	1			
Non-pregnant												
number		1	3	1	2	1	1			9		1
percent		1	1	1	3	2	2					
<u>Multipara</u>												
Pregnant												
number		1	20	43	32	26	32	21	75	250		30
percent		1	8	44	62	55	59	75	69			
Non-pregnant												
number				10	10	11	18	6	33	88		10
percent				10	19	24	33	21	30			
Total	27	152	265	98	52	47	54	28	109	832		

^{1/} Includes one 12 yr.

Appendix Table F.
Length of females sampled from commercial kill, by age,
St. Paul Island, 27 June to 20 August, 1957

Length in inches	Age									Total	
	3	4	5	6	7	8	9	10	10+		
37	number	2									2
	percent	1									
38	number	4			1						5
	percent	3									
39	number	11	3	1	2				1		18
	percent	9	<1								
40	number	28	20	19	3	1	1				72
	percent	22	3	1							1
41	number	39	109	89	27	4	1	1	2		272
	percent	31	17	6	3				1		4
42	number	20	169	211	78	18	10	9	4	6	525
	percent	16	27	14	8	3	2	2	2	<1	8
43	number	10	152	347	149	66	37	22	15	18	816
	percent	8	24	23	15	9	6	4	6	1	12
44	number	10	91	353	211	119	81	53	17	65	1000
	percent	8	14	23	22	17	14	11	6	5	15
45	number	2	59	282	226	180	119	94	46	157	1165
	percent	1	9	18	23	26	21	20	18	12	18
46	number	1	20	150	157	144	125	98	50	210	955
	percent	1	3	10	16	21	22	20	19	16	15
47	number		5	65	79	86	87	76	41	256	695
	percent		1	4	8	12	15	15	16	20	11
48	number			19	34	54	56	71	41	245	520
	percent			1	4	8	10	15	16	19	8
49	number		2	5	10	21	39	38	16	161	292
	percent			1	3	7	8	6	12	4	
50	number		2	1	5	5	13	13	12	93	144
	percent				1	2	3	5	7	2	
51	number			1		2	7	7	13	92	122
	percent					1	2	5	7	2	
Total		127	632	1543	982	700	576	482	257	1304	6603
Percent		2	9	23	15	11	9	7	4	20	

Appendix Table G.
Age classification of females in commercial kill,
St. Paul Island, 27 June to 20 August 1957 (con.)

Date	Rookery	Females killed	Daily Sample	Number in each age class of sample										Percent in each age class of sample										Estimated number killed from each age class									
				2	3	4	5	6	7	8	9	10	10+	3	4	5	6	7	8	9	10	10+	3	4	5	6	7	8	9	10	10+		
22 July	NEP	88	79			2	30	22	9	6	1	2	7	2.5	38	28	11	8	1	2.5	9			2	33	25	10	7	1	2	8		
23	TLK	64	51				10	12	8	6	6	4	5		19	23	16	12	12	8	10			12	15	10	8	8	5	6			
24	ZAP	56	54	1	3	5	11	6	4	2	3	19	2	6	9	20	11	7	4	6	35	1	4	5	11	6	4	2	3	20			
25	REEF	188	89	1	6	16	24	8	7	9		18	1	7	18	27	9	8	10	20	1	13	34	51	17	15	19		38				
26	POL	444	180		5	49	41	36	19	19	3	8		3	27	23	20	10	10	2	4		13	120	102	88	47	47	9	18			
Round total		840	453		2	16	110	110	67	42	37	12	57									2	32	204	204	131	81	77	19	90			
27 July	NEP	162	119	3	11	37	16	11	13	3	4	21	2	9	31	14	9	11	2	3	18	4	14	50	23	15	18	4	5	29			
28	TLK	62	45	1	1	11	3	5	2	2	2	18	2	2	25	7	11	4	4	4	40	1	1	15	4	7	3	3	3	25			
29	ZAP	249	125	3	10	26	12	3	12	4	3	52	2	8	21	10	2	10	3	2	42	6	20	52	24	6	24	7	6	104			
30	REEF	524	248	3	13	52	44	29	23	10	10	64	1	5	21	18	12	9	4	4	26	5	26	110	94	63	47	21	21	137			
31	POL	587	290	2	9	58	55	40	22	28	14	62	1	3	20	19	14	8	9	5	21	6	18	117	112	82	47	53	29	123			
Round total		1584	827		12	44	184	130	88	72	47	33	217									22	79	344	257	173	139	88	64	418			
1 August	NEP	611	161	1	16	35	28	19	13	15	4	30	1	10	22	17	12	8	9	2	19	6	61	135	104	73	49	55	12	116			
2	TLK	319	108		8	15	19	7	7	5	6	41		7	14	18	6	6	5	5	38		22	45	57	21	21	16	16	121			
3	ZAP	415	113	1	4	10	17	10	10	4	15	5	37	3	9	15	9	9	4	13	4	33	15	37	62	37	37	15	54	17	137		
4	REEF	1934	309		11	28	72	45	31	22	23	16	60	4	9	23	15	10	7	7	5	19	78	174	445	290	193	135	135	97	379		
5	POL	1697	300		5	22	62	43	16	23	35	10	84	2	7	21	14	5	8	12	3	28	34	119	356	237	85	136	204	51	475		
Round total		4976	991	1	21	84	201	145	83	69	93	41	252									133	413	1043	725	409	356	464	193	1228			
6 August	NEP	2910	398		13	47	96	53	31	34	15	11	98	3	12	24	13	8	8	4	3	25	87	349	699	378	233	233	116	87	728		
7	TLK	827	148		1	19	38	19	10	7	7	11	35	1	13	25	13	6	5	5	8	24	6	106	212	106	55	39	39	62	196		
8	ZAP	560	143		2	23	23	6	12	8	12	17	40	1	16	16	4	8	6	8	12	28	6	90	90	22	47	34	47	67	157		
9	REEF	1576	209		2	24	45	13	20	21	18	7	59	1	11	22	6	10	10	9	3	28	16	173	347	94	158	158	142	47	441		
10	POL	2105	296		7	31	81	36	20	22	33	8	58	2	10	27	12	7	7	11	3	20	42	219	575	257	147	147	234	63	421		
Round total		7978	1194		25	144	283	127	93	92	85	54	290									157	937	1923	857	640	611	578	326	1943			
11 August	NEP	2982	332		5	33	75	44	27	29	14	13	92	1	10	23	13	8	9	4	4	28	45	298	674	394	242	259	125	116	829		
12	TLK	1774	202		8	33	49	14	16	11	7	4	60	4	16	24	7	8	5	3	2	30	71	289	429	124	142	96	60	36	527		
13	ZAP	1962	220		11	29	46	28	17	15	8	13	53	5	13	21	13	8	7	3	6	24	98	257	412	249	151	133	71	118	473		
14	REEF	2491	294		8	43	86	27	26	19	18	7	59	3	15	29	9	9	7	6	2	20	67	364	730	229	219	162	152	60	501		
15	POL	2516	266	1	8	37	70	23	13	26	29	6	52	3	14	26	9	5	10	11	2	20	75	350	662	216	123	247	274	58	491		
Round total		11725	1315	1	40	175	326	136	99	100	76	43	316									356	1558	2907	1212	877	897	682	388	2821			

Appendix Table G.
Age classification of females in commercial kill,
St. Paul Island, 27 June to 20 August 1957 (con.)

Date	Rookery	Females killed	Daily Sample	Number in each age class of sample										Percent in each age class of sample										Estimated number killed from each age class									
				2	3	4	5	6	7	8	9	10	10+	3	4	5	6	7	8	9	10	10+	3	4	5	6	7	8	9	10	10+		
16 August	NEP	2708	219	6	24	49	31	13	16	10	11	59	3	11	22	15	6	7	4	5	27	81	298	596	406	163	190	108	135	731			
17	TLK	984	112	3	21	30	15	9	8	8	2	16	3	19	27	13	8	7	7	2	14	30	187	266	128	78	69	69	19	138			
18	ZAP	1401	129	8	35	32	14	8	4	4	7	14	6	27	25	11	6	3	3	6	13	84	379	350	154	84	42	42	84	182			
19	REEF	1549	180	8	44	50	23	17	6	14	4	14	4	24	28	13	9	3	8	2	8	70	380	434	201	139	46	124	31	124			
20	POL	1767	192	2	28	104	15	5	13	18	4	3	1	15	54	8	3	7	9	2	1	18	258	954	142	46	118	166	37	28			
Round total		8409	832	27	152	265	98	52	47	54	28	109											283	1502	2600	1031	510	465	509	306	1203		
Season total		37554	6609	2	127	632	1543	982	700	576	483	257	1303											953	4551	9373	4747	3201	2880	2599	1389	7816	

Estimates for
Ages 2 12 16 are included in grand
Number 14 13 18 Total 37554

Appendix Table H.

Cumulative age classification of females in commercial kill, by day,
St. Paul Island, Alaska, 27 June to 20 August, 1957

Date	Rookery	Number killed from age class									Total killed	Percent killed from age class								
		3	4	5	6	7	8	9	10	10+		3	4	5	6	7	8	9	10	10+
27 June	NEP			1	2	1				1	5			20	40	20				20
28	TLK																			
29	ZAP			2	3	1				1	7			29	43	14				14
30	REEF																			
1 July	POL		3	33	39	35	25	14	6	7	162		2	20	24	22	15	9	4	4
2	NEP		3	34	44	36	25	14	6	7	169		2	20	26	21	15	8	4	4
3	TLK		3	34	44	36	26	14	7	8	172		2	20	26	21	15	8	4	4
4	ZAP		3	37	45	37	26	15	8	8	179		2	20	26	21	15	8	4	4
5	REEF																			
6	POL		8	72	107	92	73	42	16	18	428		2	17	25	21	17	10	4	4
7	NEP		8	76	113	92	73	43	17	19	441		2	17	26	21	16	10	4	4
8	TLK		8	76	114	92	74	43	18	20	445		2	17	26	21	16	10	4	4
9	ZAP		8	76	114	92	74	43	19	20	446		2	17	26	21	16	10	4	4
10	REEF																			
11	POL		8	188	262	234	169	90	37	50	1038		1	18	25	22	16	9	4	5
12	NEP		10	210	284	257	174	94	37	52	1118		1	19	25	23	16	8	3	5
13	TLK		10	211	284	257	174	94	37	52	1119		1	19	25	23	16	8	3	5
14	ZAP		10	211	285	258	175	95	38	53	1125		1	19	25	23	16	8	3	5
15	REEF																			
16	POL		14	255	329	357	258	162	78	69	1522		1	17	22	23	17	11	5	4
17	NEP		14	268	371	391	270	164	79	71	1628		1	16	23	24	17	10	5	4
18	TLK		15	275	376	396	278	165	80	80	1665		1	16	23	24	16	10	5	5
19	ZAP		20	282	384	398	281	167	83	93	1708		1	16	23	24	16	10	5	5
20	REEF		20	282	384	398	281	168	83	93	1709		1	16	23	24	16	10	5	5
21	POL		30	352	461	461	331	201	93	113	2042		1	17	23	23	16	10	4	6
22	NEP		32	385	486	471	338	202	95	121	2130		2	18	23	22	16	9	4	6
23	TLK		32	397	501	481	346	210	100	127	2194		2	18	23	22	16	9	4	6
24	ZAP	1	36	402	512	487	350	212	103	147	2250		2	18	23	22	16	9	4	6
25	REEF	2	49	436	563	504	365	231	103	185	2438		2	18	23	21	15	9	4	8
26	POL	2	62	556	665	592	412	278	112	203	2882		2	19	23	21	14	10	4	7
27	NEP	6	76	606	688	607	430	282	117	232	3044		2	20	23	20	14	9	4	8
28	TLK	7	77	621	692	614	433	285	120	257	3106		2	20	23	20	14	9	4	8
29	ZAP	13	97	673	716	620	457	292	126	361	3355		3	20	21	18	14	9	4	11
30	REEF	18	123	783	810	683	504	313	147	498	3879		3	20	21	18	13	8	4	13
31	POL	24	141	900	922	765	551	366	176	621	4466	1	3	20	21	17	12	8	4	14
1 August	NEP	30	202	1035	1026	838	600	421	188	737	5077	1	4	20	20	17	12	8	4	14
2	TLK	30	224	1080	1083	859	621	437	204	858	5396	1	4	20	20	16	11	8	4	16
3	ZAP	45	261	1142	1120	896	636	491	221	995	5811	1	4	20	19	16	11	8	4	17

Appendix Table H.

Cumulative age classification of females in commercial kill, by day,
St. Paul Island, Alaska, 27 June to 20 August, 1957 (con.)

Date	Rookery	Number killed from age class								Total killed	Percent killed from age class									
		3	4	5	6	7	8	9	10		10+	3	4	5	6	7	8	9	10	10+
4 August	REEF	123	435	1587	1410	1089	771	626	318	1374	7745	2	6	20	18	14	10	8	4	18
5	POL	157	554	1943	1647	1174	907	830	369	1849	9442	2	6	20	17	12	10	9	4	20
6	NEP	244	903	2642	2025	1407	1140	946	456	2577	12352	2	7	22	16	11	9	8	4	21
7	TLK	250	1009	2854	2131	1462	1179	985	518	2773	13179	2	8	22	16	11	9	7	4	21
8	ZAP	256	1099	2944	2153	1509	1213	1032	585	2930	13739	2	8	21	16	11	9	8	4	21
9	REEF	272	1272	3291	2247	1667	1371	1174	632	3371	15315	2	8	21	15	11	9	8	4	22
10	POL	314	1491	3866	2504	1814	1518	1408	695	3792	17420	2	9	22	14	10	9	8	4	22
11	NEP	359	1789	4540	2898	2056	1777	1533	811	4621	20402	2	9	22	14	10	9	7	4	23
12	TLK	430	2078	4969	3022	2198	1873	1593	847	5148	22176	2	9	23	14	10	8	7	4	23
13	ZAP	528	2335	5381	3271	2349	2006	1664	965	5621	24138	2	10	22	14	10	8	7	4	23
14	REEF	595	2699	6111	3500	2568	2168	1816	1025	6122	26629	2	10	23	13	10	8	7	4	23
15	POL	670	3049	6773	3716	2691	2415	2090	1083	6613	29145	2	11	23	13	9	8	7	4	23
16	NEP	751	3347	7369	4122	2854	2605	2198	1218	7344	31853	2	11	23	13	9	8	7	4	23
17	TLK	781	3534	7635	4250	2932	2674	2267	1237	7482	32837	2	11	23	13	9	8	7	4	23
18	ZAP	865	3913	7985	4404	3016	2716	2309	1321	7644	34238	3	11	23	13	9	8	7	4	22
19	REEF	935	4293	8419	4605	3155	2762	2433	1352	7788	35787	3	11	23	13	9	8	7	4	22
20	POL	953	4551	9373	4747	3201	2880	2599	1389	7816	37554	2	12	25	13	8	8	7	4	21

Appendix Table I.
 Projected reproductive condition of total female kill by round,
 based upon daily samples, St. Paul Island, 1957

Date	Nullipara	Primipara		Multipara		Cumulative All females	
		pregnant	non-preg.	pregnant	non-preg.	preg.	non-preg.
1 July	2	45		115		160	2
6	1	61		200	4	261	5
11	6	134		452	18	586	24
16	7	68	7	397	5	465	19
21	10	120		343	47	463	57
26	67	185	17	420	151	605	235
31	238	269	16	760	301	1029	555
5 August	995	747	50	1990	1194	2737	2239
10	2393	1037	80	2234	2234	3271	4707
15	3752	1407	117	4338	2111	5745	5980
20	3448	1514	84	2522	841	4036	4373
Total	10919	5587	371	13771	6906	19358	18196
Percent	29		16		55	52	48

Appendix Table J.
 Reproductive condition of female samples from commercial kill,
 by length, St. Paul Island, 27 June to 20 August, 1957

Length in inches		Nullipara	Primipara		Multipara		Total
			pregnant	non-preg.	pregnant	non-preg.	
37	number	3					3
	percent						
38	number	5					5
	percent						
39	number	15			3		18
	percent	1					
40	number	52	15	1	5		73
	percent	3	1	2			1
41	number	175	67	1	27	3	273
	percent	12	6	2	1		4
42	number	268	154	8	95	5	530
	percent	18	14	12	3		8
43	number	310	242	12	219	42	825
	percent	21	23	18	8	4	13
44	number	255	232	10	425	82	1004
	percent	17	22	15	15	7	15
45	number	219	190	16	563	183	1171
	percent	15	18	25	20	16	18
46	number	112	116	10	521	198	957
	percent	8	11	15	18	17	14
47	number	54	37	5	388	216	700
	percent	4	3	8	14	18	11
48	number	20	18	1	296	186	521
	percent	1	2	<2	10	16	8
49	number	7	2		164	120	293
	percent				6	10	4
50	number		3	1	75	67	146
	percent			>1	3	6	2
51	number		3		47	73	123
	percent				2	6	2
Total		1495	1079	65	2828	1175	6642
Percent		22	16	1	43	18	

Appendix Table K.
Field length of tagged females recovered from commercial kill,
by age, St. Paul Island, 27 June to 20 August 1957

Length	Age										Total	
	2	3	4	5	6	8	9	10	12	16		
39	number		3									3
	percent		100									
40	number	1	8	1	5							15
	percent	7	53	7	33							2
41	number		9	18	42	1						70
	percent		13	26	60	1						7
42	number		7	32	75		3					117
	percent		6	27	64		3					11
43	number		3	34	123	1	5	6	2			174
	percent		2	20	71		3	3	1			16
44	number		4	18	101	4	19	18	2		1	167
	percent		2	11	60	2	11	11	1		1	16
45	number		1	7	114	8	21	36	7			194
	percent			4	59	4	11	18	4			18
46	number			3	45	4	33	35	2			122
	percent			2	37	3	27	29	2			12
47	number			1	17	3	28	32	6			87
	percent			1	20	3	32	37	7			8
48	number			1	12	3	13	25	6	1		61
	percent			>1	20	5	21	41	10	<1		6
49	number				2		9	11	7			29
	percent				7		31	38	24			3
50	number				1		3	4	3	1		12
	percent				8		25	34	25	8		1
51	number						1	1				2
	percent						50	50				
52	number						1	1				2
	percent						50	50				
53	number										1	1
	percent										100	
Total		1	35	115	537	24	136	169	35	2	2	1056

Appendix Table L.
 Uterine horn of pregnancy in female samples from commercial kill,
 Pribilof Islands, 27 June to 20 August 1957

<u>Primipara</u>		<u>Multipara</u>	
<u>Horn</u>	<u>Number</u>	<u>Horn</u>	<u>Number</u>
<u>St. Paul Island</u>			
right	525	right	1370
left	547	left	1464
<u>St. George Island</u>			
right	108	right	337
left	92	left	351
<u>both islands</u>			
right	633	right	1707
left	639	left	1815

Appendix Table M.
 Vibrissal color of female samples from commercial kill,
 by length, St. Paul Island, 27 June to 20 August, 1957

Length in inches	Vibrissal color			Total
	black	black & white	white	
37	number	3		3
	percent	-		-
38	number	5		5
	percent	1		-
39	number	13	4	18
	percent	2	-	-
40	number	47	20	73
	percent	6	1	1
41	number	117	124	273
	percent	15	6	4
42	number	179	275	530
	percent	23	13	8
43	number	181	402	825
	percent	23	19	13
44	number	117	459	1005
	percent	15	22	15
45	number	78	399	1171
	percent	10	19	18
46	number	33	253	957
	percent	4	12	14
47	number	10	107	700
	percent	1	5	11
48	number	2	44	521
	percent	-	2	8
49	number	2	15	293
	percent	-	1	4
50	number		6	146
	percent		-	4
51	number		2	123
	percent		-	3
Total		787	2110	3746
Percent		12	32	56

Appendix Table N.
Vibrissal color of female samples from commercial kill,
by age, Pribilof Islands, 27 June to 20 August, 1957

Vibrissal color	Age									Total
	3	4	5	6	7	8	9	10	10+	
<u>St. Paul</u>										
Black										
number	123	343	270	39	3	2				782 ^{1/}
percent	16	44	34	5	-	-				12
Black and white										
number	3	277	1073	471	159	74	19	5	20	2101
percent	-	13	51	22	8	4	1	-	1	32
White										
number	1	12	200	472	538	500	463	2252	1288	3726
percent	-	-	5	13	14	13	12	7	34	56
Total	127	632	1543	982	700	576	482	257	1308	6609
Percent	2	10	23	15	10	9	7	4	20	
<u>St. George</u>										
Black										
number	28	65	27	3						125 ^{2/}
percent	22	52	22	2						6
Black and white										
number	11	172	273	94	16	8	3	1	5	583
percent	2	29	47	16	3	1	1	-	1	29
White										
number		13	120	224	160	129	107	75	471	1299
percent		1	9	17	12	10	8	6	37	65
Total	39	250	420	321	176	137	110	76	476	2007
Percent	2	12	21	16	9	7	5	4	24	

^{1/} Includes 2 two-year-olds.

^{2/} Includes 2 two-year-olds.

Appendix Table O.
 Vibrissal color of female samples from commercial kill,
 by reproductive condition, Pribilof Islands,
 27 June to 20 August, 1957

	Nullipara	Primipara		Multipara		Total
		pregnant	non-preg.	pregnant	non-preg.	
<u>St. Paul</u>						
Black						
number	594	174	4	15		787
percent	40	16	6	1		12
Black and white						
number	807	703	44	493	63	2110
percent	54	65	68	17	5	32
White						
number	94	202	17	2321	1112	3746
percent	6	19	26	82	95	56
Total	1495	1079	65	2829	1175	6643
Percent	22	16	1	43	18	
<u>St. George</u>						
Black						
number	110	8	4	2	1	125
percent	19	4	6	1	-	6
Black and white						
number	348	114	20	72	32	586
percent	61	57	30	10	7	29
White						
number	115	78	43	614	451	1301
percent	20	39	64	89	93	65
Total	573	200	67	688	484	2012
Percent	29	10	3	34	24	

Appendix Table P.
 Vibrissal color of female samples from commercial kill,
 by length, St. George Island, 27 June to 20 August, 1957

Length in inches		Vibrissal color			Total
		black	black & white	white	
40	number	6	2		8
	percent	5	-		-
41	number	14	18	4	36
	percent	11	3	-	2
42	number	32	91	46	169
	percent	26	16	4	8
43	number	27	112	59	198
	percent	22	19	4	10
44	number	19	148	162	329
	percent	15	25	12	16
45	number	22	132	263	417
	percent	17	23	20	21
46	number	5	50	301	356
	percent	4	9	23	18
47	number		25	220	245
	percent		4	17	12
48	number		6	132	138
	percent		1	10	7
49	number		2	71	73
	percent		-	6	4
50	number			34	34
	percent			3	2
51	number			9	9
	percent			1	-
Total		125	586	1301	2012
Percent		6	29	65	

Appendix Table Q.
Age classification^{1/} of males in commercial kill, St. George Island, Alaska,
27 June to 10 August, 1957

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class			
				2	3	4	5	2	3	4	5
27 June	ZAP	369	37	-	44	46	10	-	162	170	37
28	North	257	27	4	52	40	4	10	134	103	10
29	East	165	17	-	53	47	-	-	87	78	-
30	Staraya	121	13	-	46	46	8	-	56	56	9
1 July	North	109	11	9	36	46	9	10	39	50	10
Round total		1021	105					20	478	457	66
2 July	ZAP	259	26	-	54	46	-	-	140	119	-
3	North	113	12	-	25	67	8	-	28	76	9
4	East	188	17	-	29	65	6	-	55	122	11
5	Staraya	98	9	-	33	67	-	-	32	66	-
6	North	130	12	-	42	58	-	-	55	75	-
Round total		788	76					-	310	458	20
7 July	ZAP	232	24	-	67	25	8	-	155	58	19
8	North	90	9	-	56	44	-	-	50	40	-
9	East	213	22	-	55	41	4	-	117	87	9
10	Staraya	84	9	-	11	56	33	-	9	47	28
11	North	95	10	-	50	50	-	-	47	48	-
Round total		714	74					-	378	280	56

Appendix Table Q.

Age classification^{1/} of males in commercial kill, St. George Island, Alaska,
27 June to 10 August, 1957 (con.)

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class			
				2	3	4	5	2	3	4	5
12 July	ZAP	265	26	-	54	35	11	-	143	93	29
13	North	104	11	-	64	36	-	-	67	37	-
14	East	342	34	6	56	29	9	21	191	99	31
15	Staraya	147	15	-	27	67	6	-	40	98	9
16	North	144	15	-	40	40	20	-	57	58	29
Round total		1002	101					21	498	385	98
17 July	ZAP	454	45	-	56	40	4	-	254	182	18
18	North	126	13	-	69	31	-	-	87	39	-
19	East	251	26	-	65	31	4	-	163	78	10
20	Staraya	136	14	-	50	29	21	-	68	39	29
21	North	175	17	-	53	35	12	-	93	61	21
Round total		1142	115					-	665	399	78
22 July	ZAP	305	29	-	45	41	14	-	137	125	43
23	North	167	17	-	29	65	6	-	48	109	10
24	East	691	68	4	61	32	3	28	421	221	21
25	Staraya	221	21	5	57	38	-	11	126	84	-
26	North	206	21	-	57	43	-	-	117	89	-
Round total		1590	156					39	849	628	74

Appendix Table Q.
 Age classification^{1/} of males in commercial kill, St. George Island, Alaska,
 27 June to 10 August, 1957 (con.)

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class			
				2	3	4	5	2	3	4	5
27 July	ZAP	561	56	5	73	20	2	28	410	112	11
28	North	118	13	-	69	31	-	-	81	37	-
29	East	512	49	-	82	18	-	-	420	92	-
30	Staraya	211	21	5	76	10	9	11	160	21	19
31	North	157	16	6	38	50	6	9	60	79	9
Round total		1559	155					48	1131	341	39
1 August	ZAP	405	50	12	80	6	2	49	324	24	8
2	North	129	19	26	37	37	-	34	48	47	-
3	East	484	51	6	72	16	6	29	349	77	29
4	Staraya	239	33	3	79	18	-	7	189	43	-
5	North	251	68	12	76	9	3	30	191	22	8
Round total		1508	221					149	1101	213	45

Appendix Table Q.

Age classification^{1/} of males in commercial kill, St. George Island, Alaska,
27 June to 10 August, 1957 (con.)

Date	Rookery	Males killed	Tooth sample size	Percent in each age class				Estimated number killed from age class			
				2	3	4	5	2	3	4	5
6 August	ZAP	654	69	19	74	7	-	124	484	46	-
7	North	132	32	19	69	9	3	25	91	12	4
8	East	570	84	14	76	7	3	80	433	40	17
9	Staraya	237	22	14	64	18	4	33	152	43	9
10	North	125	23	13	65	22	-	16	81	28	-
Round total		1718	230					278	1241	169	30
Season total		11042 ^{2/}	1233					555	6651	3330	506

^{1/} Age based on tooth ridge counts

^{2/} Plus 154 males killed accidentally 11 through 20 August.

Appendix Table R.
 Cumulative age classification of males in commercial kill, by day,
 St. George Island, Alaska
 27 June to 10 August 1957

Date	Rookery	Estimated kill from each age class				Total kill	Percent kill from each age class			
		2	3	4	5		2	3	4	5
27 June	ZAP	-	162	170	37	369	-	44	46	10
28	North	10	296	273	47	626	2	47	44	7
29	East	10	383	351	47	791	1	49	44	6
30	Staraya	10	439	407	56	912	1	48	45	6
1 July	North	20	478	457	66	1021	2	47	45	6
2	ZAP	20	618	576	66	1280	2	48	45	5
3	North	20	646	652	75	1393	1	46	47	6
4	East	20	701	774	86	1581	1	44	49	6
5	Staraya	20	733	840	86	1679	1	44	50	5
6	North	20	788	915	86	1809	1	44	50	5
7	ZAP	20	943	973	105	2041	1	46	48	5
8	North	20	993	1013	105	2131	1	47	47	5
9	East	20	1110	1100	114	2344	1	47	47	5
10	Staraya	20	1119	1147	142	2428	1	46	47	6
11	North	20	1166	1195	142	2523	1	46	47	6
12	ZAP	20	1309	1288	171	2788	1	47	46	6
13	North	20	1376	1325	171	2892	1	48	46	5
14	East	41	1567	1424	202	3234	1	49	44	6
15	Staraya	41	1607	1522	211	3381	1	48	45	6

Appendix Table R.
 Cumulative age classification of males in commercial kill, by day,
 St. George Island, Alaska
 27 June to 10 August 1957 (con.)

Date	Rookery	Estimated kill from each age class				Total kill	Percent kill from each age class			
		2	3	4	5		2	3	4	5
16 July	North	41	1664	1580	240	3525	1	47	45	7
17	ZAP	41	1918	1762	258	3979	1	48	44	7
18	North	41	2005	1801	258	4105	1	49	44	6
19	East	41	2168	1879	268	4356	1	50	43	6
20	Staraya	41	2236	1918	297	4492	1	50	43	6
21	North	41	2329	1979	318	4667	1	50	42	7
22	ZAP	41	2466	2104	361	4972	1	50	42	7
23	North	41	2514	2213	371	5139	1	49	43	7
24	East	69	2935	2434	392	5830	1	50	42	7
25	Staraya	80	3061	2518	392	6051	1	51	42	6
26	North	80	3178	2607	392	6257	1	51	42	6
27	ZAP	108	3588	2719	403	6818	1	53	40	6
28	North	108	3669	2756	403	6936	1	53	40	6
29	East	108	4089	2848	403	7448	1	55	38	6
30	Staraya	119	4249	2869	422	7659	2	55	37	6
31	North	128	4309	2948	431	7816	2	55	37	6
1 August	ZAP	177	4633	2972	439	8221	2	56	36	6
2	North	211	4681	3019	439	8350	3	56	36	5
3	East	240	5030	3096	468	8834	3	57	35	5

Appendix Table R.
 Cumulative age classification of males in commercial kill, by day,
 St. George Island, Alaska
 27 June to 10 August 1957 (con.)

Date	Rookery	Estimated kill from each age class				Total kill	Percent kill from each age class			
		2	3	4	5		2	3	4	5
4 August	Staraya	247	5219	3139	468	9073	3	57	35	5
5	North	277	5410	3161	476	9324	3	58	34	5
6	ZAP	401	5894	3207	476	9978	4	59	32	5
7	North	426	5985	3219	480	10110	4	59	32	5
8	East	506	6418	3259	497	10680	5	60	30	5
9	Staraya	539	6570	3302	506	10917	5	60	30	5
10	North	555	6651	3330	506	11042 ^{1/}	5	60	30	5

^{1/} Plus 154 males killed accidentally 11 through 20 August

Appendix Table S.

Number pregnant and non-pregnant among seals 4 or more years old
and 5 or more years old, St. George Island, 1957

Date	Daily kill	Daily sample	Daily sample less 2 & 3 yr. olds	Ages 4-10+		Daily sample less 2, 3 & 4 yr. olds	Ages 5-10+	
				preg.	non-preg.		preg.	non-preg.
27 June to 11 July	No females 4 and older killed.							
12	2	2	2		2	2		2
13								
14	3	4	4	1	3	4	1	3
15								
16								
17	1	1	1		1	1		1
18	3	3	3	3		3	3	
19	7	7	7	5	2	7	5	2
20								
21	6	6	6	6		5	5	
22	3	2	2	1	1	2	1	1
23	3	2	2	1	1	2	1	1
24	6	6	6	3	3	5	3	2
25								
26	8	8	8	5	3	8	5	3
27	12	12	12	7	5	12	7	5
28	9	8	8	5	3	8	5	3
29	9	9	9	3	6	6	3	3
30	9	8	8	3	5	8	3	5
31	25	20	20	8	12	16	6	10
1 August	112	51	51	27	24	48	27	21
2	74	29	29	11	18	23	11	12
3	113	41	40	17	23	36	17	19
4	140	46	46	17	29	43	17	26
5	526	110	108	35	73	86	33	53
6	235	120	116	30	86	95	30	65
7	552	126	125	41	84	109	40	69
8	341	75	71	13	58	57	13	44
9	139	48	47	15	32	44	15	29
10	558	111	108	57	51	85	54	31
11	556	105	102	44	58	89	43	46
12	1093	138	136	79	57	128	79	49
13	604	125	124	64	60	113	64	49
14	610	129	126	59	67	114	59	55

Appendix Table S.

Number pregnant and non-pregnant among seals 4 or more years old
and 5 or more years old, St. George Island, 1957 (con.)

Date	Daily kill	Daily sample	Daily sample less 2 & 3 yr. olds	Ages 4-10+		Daily sample less 2, 3 & 4 yr. olds	Ages 5-10+	
				preg.	non-preg.		preg.	non-preg.
15 August	765	154	154	92	62	147	91	56
16	573	117	112	41	71	97	41	56
17	741	66	66	37	29	62	37	25
18	684	143	140	67	73	116	67	49
19	618	129	123	63	60	101	63	38
20	718	50	48	26	22	37	25	12
Total	9858	2011	1970	886	1084	1719	874	845

Appendix Table T.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. George Island, 27 June to 20 August 1957

	Age										Total	
	2	3	4	5	6	7	8	9	10	10+		
10 July												
Nullipara		1										1
12 July												
Multipara non-pregnant											2	2
14 July												
Primipara pregnant				1								1
Multipara non-pregnant						1		1		1		3
17 July												
Multipara non-pregnant										1		1
18 July												
Multipara pregnant					1			1		1		3
19 July												
Primipara pregnant						1						1
Multipara pregnant				1		3						4
Multipara non-pregnant										2		2
21 July												
Primipara pregnant			1	3								4
Multipara pregnant								1		1		2
22 July												
Multipara pregnant						1						1
Multipara non-pregnant										1		1
23 July												
Nullipara				1								1
Multipara pregnant								1				1
24 July												
Nullipara			1	1								2
Multipara pregnant						1		1		1		3
Multipara non-pregnant										1		1

Appendix Table T.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. George Island, 27 June to 20 August 1957 (con.)

	Age										Total	
	2	3	4	5	6	7	8	9	10	10+		
<u>26 July</u>												
Nullipara				1								1
Primipara pregnant				2								2
Multipara pregnant					2			1				3
non-pregnant						1				1		2
<u>27 July</u>												
Primipara pregnant				2								2
Multipara pregnant							1		1	3		5
non-pregnant										5		5
<u>28 July</u>												
Primipara non-pregnant					1							1
Multipara pregnant					2		1	1		1		5
non-pregnant							1			1		2
<u>29 July</u>												
Nullipara			3									3
Multipara pregnant					1					2		3
non-pregnant									1	2		3
<u>30 July</u>												
Primipara non-pregnant					1							1
Multipara pregnant								1		2		3
non-pregnant								1		3		4
<u>31 July</u>												
Nullipara			2	7								9
Primipara pregnant			2	1	1							4
Multipara pregnant				1	2				1			4
non-pregnant						1				2		3
<u>1 August</u>												
Nullipara			2	2						1		5
Primipara non-pregnant			1									1
Multipara pregnant					1	6	5	6	2	7		27
non-pregnant					1		2	3	3	9		18

Appendix Table T.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. George Island, 27 June to 20 August 1957 (con.)

	Age										Total	
	2	3	4	5	6	7	8	9	10	10+		
2 August												
Nullipara			6	2	1							9
Primipara												
pregnant				6								6
non-pregnant					1							1
Multipara												
pregnant					2				1	2		5
non-pregnant					1	1	1		5			8
3 August												
Nullipara		1	4	5	2							12
Primipara												
pregnant				1								1
Multipara												
pregnant					3	1	2	1		9		16
non-pregnant					3				1	8		12
4 August												
Nullipara			3	4	1							8
Primipara												
pregnant				2								2
Multipara												
pregnant				2	4	1		1		7		15
non-pregnant					2	4	1	1	2	11		21
5 August												
Nullipara		2	17	13	1							33
Primipara												
pregnant			2	2	2							6
non-pregnant			3	2	2							7
Multipara												
pregnant					4	5	5	4	2	9		29
non-pregnant					6	5	3	5	5	11		35
6 August												
Nullipara		4	21	16	2							43
Primipara												
pregnant				1	1							2
non-pregnant						1						1
Multipara												
pregnant				4	6	2	5	2	3	6		28
non-pregnant					6	5	6	6	6	17		46

Appendix Table T.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. George Island, 27 June to 20 August 1957 (con.)

	Age										Total	
	2	3	4	5	6	7	8	9	10	10+		
<u>7 August</u>												
Nullipara		1	15	15	1							32
Primipara												
pregnant				1	5	5	1					12
non-pregnant					1	1						2
Multipara												
pregnant					3	4	7	1	2	3	9	29
non-pregnant						9	6	9	5	5	17	51
<u>8 August</u>												
Nullipara		4	14	18	2							38
Primipara												
pregnant					3	1						4
non-pregnant					1	1						2
Multipara												
pregnant						3	2		1	1	2	9
non-pregnant						6	3	1	5		7	22
<u>9 August</u>												
Nullipara				3	5	1						9
Primipara												
pregnant						2						2
non-pregnant				1			1					2
Multipara												
pregnant						4	3		1	2	3	13
non-pregnant						3	5	2	2	1	9	22
<u>10 August</u>												
Nullipara	1	2	20	9								32
Primipara												
pregnant				3	6	4						13
non-pregnant					1	1						2
Multipara												
pregnant					5	6	8	5	4	2	14	44
non-pregnant						4	1	2		1	12	20
<u>11 August</u>												
Nullipara		2	13	14	3							32
Primipara												
pregnant				1	8	3	1					13
non-pregnant					2	4	3				1	10
Multipara												
pregnant					1	4	5	8	3	1	9	31
non-pregnant						2	3	1	3	1	8	18

Appendix Table T.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. George Island, 27 June to 20 August 1957 (con.)

	Age										Total
	2	3	4	5	6	7	8	9	10	10+	
12 August											
Nullipara		2	8	13	2						25
Primipara											
pregnant				11	5	2	2				20
non-pregnant				2	2			1			5
Multipara											
pregnant				5	7	6	10	4	3	24	59
non-pregnant					2	3	2		3	19	29
13 August											
Nullipara		1	11	21	3	1		1			38
Primipara											
pregnant				8	8	1					17
non-pregnant				3							3
Multipara											
pregnant				3	16	6	4	6		12	47
non-pregnant					2	2	4	3	3	6	20
14 August											
Nullipara		3	12	16	4						35
Primipara											
pregnant				10	8	1					19
non-pregnant					1	1					2
Multipara											
pregnant				5	13	7	6	1	1	7	40
non-pregnant					4	2	5	2	2	18	33
15 August											
Nullipara			6	20	6	1	2				35
Primipara											
pregnant			1	11	3	4	1				20
non-pregnant					3	1	3				7
Multipara											
pregnant				4	8	6	8	7	5	34	72
non-pregnant					3	2		2		13	20
16 August											
Nullipara		5	14	19	2						40
Primipara											
pregnant				3	1						4
non-pregnant			1	2	6						9
Multipara											
pregnant				2	7	7	3	3	3	12	37
non-pregnant					3	3	1	5	1	14	27

Appendix Table T.

Reproductive condition of female seals sampled from commercial kill,
by date and age, St. George Island, 27 June to 20 August 1957 (con.)

	Age										Total
	2	3	4	5	6	7	8	9	10	10+	
<u>17 August</u>											
Nullipara			4	8	2						14
Primipara											
pregnant				1	6	1					8
non-pregnant				1	1		1				3
Multipara											
pregnant				2	4	2	5	3		13	29
non-pregnant						1		1	3	7	12
<u>18 August</u>											
Nullipara		3	23	23	7						56
Primipara											
pregnant				5	1	3					9
non-pregnant			1		1	1	1				4
Multipara											
pregnant				1	11	8	6	1	1	30	58
non-pregnant					2	3	1	1		9	16
<u>19 August</u>											
Nullipara	1	6	20	17	2						46
Primipara											
pregnant				13	4	2					19
non-pregnant			2	1	1						4
Multipara											
pregnant				2	12	6	6	3	1	14	44
non-pregnant					4	1	2		2	7	16
<u>20 August</u>											
Nullipara		2	10	1	3						16
Primipara											
pregnant			1	5	1						7
Multipara											
pregnant				2	2	2	1	3	2	7	19
non-pregnant					1	1			1	5	8

Appendix Table U.

Reproductive condition of female seals sampled from commercial kill,
by rounds and age, St. George Island, 1957

	Age							Total	Percent	
	3	4	5	6	7	8	9			10
27 June-1 July										
No females killed										
2-6 July										
No females killed										
7-11 July										
<u>Nullipara</u>										
number	1								1	100
percent	100									
Total	1								1	
12-16 July										
<u>Primipara</u>										
<u>Pregnant</u>										
number			1						1	17
percent			100							
<u>Multipara</u>										
<u>Non-pregnant</u>										
number					1		1		3	83
percent					100		100		100	
Total					1		1		3	6
17-21 July										
<u>Primipara</u>										
<u>Pregnant</u>										
number	1	3			1				5	18
percent	100	75			25					
<u>Multipara</u>										
<u>Pregnant</u>										
number			1	1	3		2		2	53
percent			25	100	75		100		40	
<u>Non-pregnant</u>										
number									3	29
percent									60	
Total	1	4	1	4			2		5	17

Appendix Table U.
 Reproductive condition of female seals sampled from commercial kill,
 by rounds and age, St. George Island, 1957 (con.)

	Age								Total	Percent	
	3	4	5	6	7	8	9	10			10+
22-26 July											
<u>Nullipara</u>											
number		1	3							4	22
percent		100	60								
<u>Primipara</u>											
Pregnant											
number			2							2	11
percent			40								
<u>Multipara</u>											
Pregnant											
number				2	2		3		1	8	45
percent				100	67		100		25		
Non-pregnant											
number					1				3	4	22
percent					33				75		
Total		1	5	2	3		3		4	18	
27-31 July											
<u>Nullipara</u>											
number		5	7							12	21
percent		71	64								
<u>Primipara</u>											
Pregnant											
number		2	3	1						6	10
percent		29	27	13							
Non-pregnant											
number				2						2	4
percent				25							
<u>Multipara</u>											
Pregnant											
number			1	5		2	2	2	8	20	35
percent			9	62		67	67	67	38		
Non-pregnant											
number					1	1	1	1	13	17	30
percent					100	33	33	33	62		
Total		7	11	8	1	3	3	3	21	57	

Appendix Table U.

Reproductive condition of female seals sampled from commercial kill,
by rounds and age, St. George Island, 1957 (con.)

	Age									Total	Percent	
	3	4	5	6	7	8	9	10	10+			
1-5 August												
<u>Nullipara</u>												
number	3	32	26	5						1	67	24
percent	100	84	63	14						1		
<u>Primipara</u>												
<u>Pregnant</u>												
number		2	11	2							15	6
percent		5	27	6								
<u>Non-pregnant</u>												
number		4	2	3							9	3
percent		11	5	7								
<u>Multipara</u>												
<u>Pregnant</u>												
number			2	14	13	12	12	5	34		92	33
percent			5	38	56	63	57	31	43			
<u>Non-pregnant</u>												
number				13	10	7	9	11	44		94	34
percent				35	44	37	43	69	56			
Total	3	38	41	37	23	19	21	16	79		277	
6-10 August												
<u>Nullipara</u>												
number	11	73	63	6							154 ^{1/}	32
percent	100	94	68	8								
<u>Primipara</u>												
<u>Pregnant</u>												
number		4	15	13	1						33	7
percent		5	16	18	3							
<u>Non-pregnant</u>												
number		1	3	3	2						9	2
percent		1	3	4	4							
<u>Multipara</u>												
<u>Pregnant</u>												
number			12	23	22	11	10	11	34		123	26
percent			13	32	49	36	36	46	36			
<u>Non-pregnant</u>												
number				28	20	20	18	13	62		161	33
percent				38	44	64	64	54	64			
Total	11	78	93	73	45	31	28	24	96		480	

^{1/} Includes one 2 yr.

Appendix Table U.

Reproductive condition of female seals sampled from commercial kill,
by rounds and age, St. George Island, 1957 (con.)

	Age									Total	Percent	
	3	4	5	6	7	8	9	10	10+			
11-15 August												
<u>Nullipara</u>												
number	8	49	85	18	2	2	1				165	26
percent	100	96	54	16	2	4	3					
<u>Primipara</u>												
<u>Pregnant</u>												
number		2	48	27	9	3					89	14
percent		4	30	23	16	5						
<u>Non-pregnant</u>												
number			7	10	5	3	1		1		27	4
percent			5	9	9	5	3		1			
<u>Multipara</u>												
<u>Pregnant</u>												
number			18	48	30	36	21	10	86		249	38
percent			11	41	52	64	64	53	57			
<u>Non-pregnant</u>												
number				13	12	12	10	9	64		120	18
percent				11	21	22	30	47	42			
Total	8	51	158	116	58	56	33	19	151		650	
16-20 August												
<u>Nullipara</u>												
number	16	70	68	17							172 ^{1/}	34
percent	100	93	63	20								
<u>Primipara</u>												
<u>Pregnant</u>												
number		1	27	13	6						47	9
percent		2	25	15	15							
<u>Non-pregnant</u>												
number		4	4	9	1	2					20	4
percent		5	4	11	2	7						
<u>Multipara</u>												
<u>Pregnant</u>												
number			9	36	25	21	13	7	76		187	37
percent			8	42	61	78	65	50	64			
<u>Non-pregnant</u>												
number				10	9	4	7	7	42		79	16
percent				12	22	15	35	50	36			
Total	16	75	108	85	41	27	20	14	118		505	

^{1/} Includes one 2 yr.

Appendix Table V.
 Length of female samples from commercial kill, by age,
 St. George Island, 27 June to 20 August, 1957

Length in inches	Age									Total	
	3	4	5	6	7	8	9	10	10+		
40	number	2	2	2							8 ^{1/}
	percent	5	1	1							
41	number	10	11	10	4					1	36
	percent	26	4	2	1						2
42	number	17	58	59	18	3	6	1		6	168
	percent	44	23	14	6	2	5	1		1	8
43	number	9	64	73	35	6	4	3	2	2	198
	percent	23	26	17	11	3	3	3	3		10
44	number	1	58	121	71	27	16	11	4	18	327
	percent	3	23	29	22	15	12	10	5	4	16
45	number		46	107	92	41	36	16	13	66	417
	percent		19	26	29	23	26	14	17	14	21
46	number		10	30	55	57	36	32	23	112	355
	percent		4	7	17	33	26	29	30	24	18
47	number		1	17	29	27	22	25	13	109	243
	percent			4	9	15	16	23	17	23	12
48	number			1	15	12	11	12	15	72	138
	percent				5	7	8	11	20	15	7
49	number				1	3	2	7	6	54	73
	percent					2	2	6	8	11	4
50	number				1		3	3		27	34
	percent						2	3		6	2
51	number									9	9
	percent									2	
	Total	39	250	420	321	176	136	110	76	476	2006
	Percent	2	12	21	16	8	7	6	4	24	

^{1/} Includes two 2-year-old females.

Appendix Table W.
Age classification of females in commercial kill,
St. George Island, 27 June to 20 August, 1957 (con.)

Date	Rookery	Females killed	Daily sample	Number in each age class of samples									Percent in each age class of sample						Estimated number killed from each age class											
				3	4	5	6	7	8	9	10	10+	3	4	5	6	7	8	9	10	10+	3	4	5	6	7	8	9	10	10+
1 Aug.	Zapadni	112	51		3	2	2	6	7	9	5	17		6	4	4	12	14	17	10	33		7	4	4	14	16	19	11	37
2	North	74	29		6	8	5	1	1		6	2		21	28	17	3	3		21	7		16	21	12	2	2		16	5
3	East	113	41	1	4	6	8	1	2	1	1	17	2	10	15	20	2	5	2	2	42	2	11	17	23	2	6	2	2	48
4	Staraya	140	46		3	8	7	5	1	2	2	18		7	18	15	11	2	4	4	39		10	25	21	15	3	6	6	54
5	North	526	110	2	22	17	15	10	8	9	7	20	2	20	16	14	9	7	8	6	18	10	105	84	74	47	37	42	32	95
Round total		965	277	3	38	41	37	23	19	21	21	74										12	149	151	134	80	64	69	67	239
6 Aug.	Zapadni	235	120	4	21	21	15	8	11	8	9	23	3	18	18	12	7	9	7	7	19	7	42	42	28	17	21	17	17	44
7	North	552	126	1	16	24	20	14	10	7	8	26	1	13	19	16	11	8	5	6	21	6	72	105	88	61	44	27	33	116
8	East	341	75	4	14	22	13	5	1	6	1	9	5	19	29	17	8	1	8	1	12	17	65	99	58	27	3	27	3	42
9	Staraya	139	48		4	5	10	9	2	3	3	12		8	11	21	19	4	6	6	25		11	15	29	26	7	8	8	35
10	North	558	111	2	23	21	15	9	7	4	3	26	2	21	19	13	8	6	4	3	23	11	117	106	73	45	33	22	17	128
Round total		1825	480	11	78	93	73	45	31	28	24	96										41	307	367	276	176	108	101	78	365
11 Aug.	Zapadni	556	104	2	14	25	16	12	9	6	2	18	2	13	24	15	12	9	6	2	17	11	72	134	83	67	50	33	11	95
12	North	1093	138	2	8	31	18	11	14	5	6	43	1	6	23	13	8	10	4	4	31	11	66	251	142	87	109	44	44	339
13	East	604	125	1	11	35	29	10	8	10	3	18	1	9	28	23	8	6	8	3	14	6	55	169	139	48	36	48	18	85
14	Staraya	610	129	3	12	31	30	11	11	3	3	25	3	9	24	23	8	8	3	3	19	18	55	147	140	49	49	18	18	116
15	North	765	154		7	35	23	14	14	9	5	47		5	23	15	9	9	6	3	30		38	176	115	69	69	46	23	229
Round total		3628	650	8	52	157	116	58	56	33	19	151										46	286	877	619	320	313	189	114	864
16 Aug.	Zapadni	573	117	5	15	26	19	10	4	8	4	26	4	13	22	16	8	4	7	4	22	23	74	126	92	46	23	40	23	126
17	North	741	66		4	12	13	4	6	4	3	20		6	18	20	6	9	6	5	30		44	134	148	44	67	44	37	223
18	East	684	143	3	24	29	22	15	8	2	1	39	2	17	20	15	10	6	2	1	27	14	116	137	103	68	41	14	7	184
19	Staraya	618	129	6	22	33	23	9	8	3	3	21	5	17	26	18	7	6	2	2	16	31	105	161	111	44	37	12	12	99
20	North	718	50	2	11	8	7	3	1	3	3	12	4	22	16	14	6	2	6	6	24	29	158	115	100	43	14	43	43	173
Round total		3334	505	16	76	108	84	41	27	20	14	118										97	497	673	554	245	182	153	122	805
Season total		9859 ^{1/}	2011 ^{2/}	39	253	420	321	176	136	111	81	472										197	1249	2092	1596	830	670	521	384	2309

^{1/} Includes 11 two-year-olds.

^{2/} Includes 2 two-year-olds.

Appendix Table X.
 Cumulative age classification of females in commercial kill, by day,
 St. George Island, Alaska, 27 June to 20 August 1957

Date	Rookery	Number killed from age class								Total killed	Percent killed from age class									
		3	4	5	6	7	8	9	10		10+	3	4	5	6	7	8	9	10	10+
27 June to 9 July		No females killed																		
10 July	Staraya	1									1	100								
11	North	1									1	100								
12	Zapadni	1								2	3	33							67	
13	North	1								2	3	33							67	
14	East	1		1		1		1		3	7	14	14		14			14	44	
15	Staraya	1		1		1		1		3	7	14	14		14			14	44	
16	North	1		1		1		1		3	7	14	14		14			14	44	
17	Zapadni	1		1		1		1		4	8	12	13		12			13	50	
18	North	1		1	1	1		2		5	11	9	9	9	9			18	46	
19	East	1		2	1	5		2		7	18	6	11	6	27			11	39	
20	Staraya	1		2	1	5		2		7	18	6	11	6	27			11	39	
21	North	1	1	5	1	5		3		8	24	4	4	21	4	21		12	34	
22	Zapadni	1	1	5	1	6		3		10	27	4	4	18	4	22		11	37	
23	North	1	1	7	1	6		4		10	30	3	3	23	3	20		13	35	
24	East	1	2	8	1	7		5		12	36	3	8	22	3	19		14	31	
25	Staraya	1	2	8	1	7		5		12	36	3	8	22	3	19		14	31	
26	North	1	2	11	3	8		6		13	44	2	4	25	7	18		14	30	
27	Zapadni	1	2	13	3	8	1	6	1	21	56	2	3	23	5	14	2	11	2	38
28	North	1	2	13	7	8	3	7	1	23	65	1	3	20	11	12	5	11	2	35
29	East	1	5	13	8	8	3	7	2	27	74	1	7	18	11	11	4	9	3	36
30	Staraya	1	5	13	9	8	3	9	2	33	83	1	6	16	11	9	4	11	2	40
31	North	1	10	24	13	9	3	9	3	36	108	1	9	22	12	8	3	8	3	34
1 August	Zapadni	1	17	28	17	23	19	28	14	73	220	1	8	13	8	10	9	13	6	32
2	North	1	33	49	29	25	21	28	30	78	294	1	11	17	10	8	7	10	10	26
3	East	3	44	66	52	27	27	30	32	126	407	1	11	16	13	7	7	6	8	31
4	Staraya	3	54	91	73	42	30	36	38	180	547	1	10	17	13	8	5	6	7	33
5	North	13	159	175	147	89	67	78	70	275	1073	1	15	16	14	8	6	7	7	26
6	Zapadni	20	201	217	175	106	88	95	87	319	1308	2	15	17	13	8	7	7	7	24
7	North	26	273	322	263	167	132	122	120	435	1860	2	15	17	14	9	7	7	6	23
8	East	43	338	421	321	194	135	149	123	477	2201	2	15	19	14	9	6	7	6	22
9	Staraya	43	349	436	350	220	142	157	131	512	2340	2	15	19	15	9	6	7	5	22
10	North	54	466	542	423	265	175	179	148	640	2892	2	16	19	15	9	6	6	5	22



Appendix Table X.
 Cumulative age classification of females in commercial kill, by day,
 St. George Island, Alaska, 27 June to 20 August 1957 (con.)

Date	Rookery	Number killed from age class									Total killed	Percent killed from each age class								
		3	4	5	6	7	8	9	10	10+		3	4	5	6	7	8	9	10	10+
11 August	Zapadni	65	538	676	506	332	225	212	159	735	3448	2	16	20	15	9	6	6	5	21
12	North	76	604	927	648	419	334	256	203	1074	4541	2	13	20	14	9	7	6	5	24
13	East	82	659	1096	787	467	370	304	221	1159	5145	2	13	21	15	9	7	6	4	23
14	Staraya	100	714	1243	927	516	419	322	239	1275	5755	2	12	22	16	9	7	5	4	23
15	North	100	752	1419	1042	585	488	368	262	1504	6520	2	12	22	16	9	7	5	4	23
16	Zapadni	123	826	1545	1134	631	511	408	285	1630	7093	2	12	22	16	9	7	5	4	23
17	North	123	870	1679	1282	675	578	452	322	1853	7834	2	12	22	16	9	7	5	4	23
18	East	137	986	1816	1385	743	619	466	329	2037	8518	2	12	22	16	9	7	5	4	23
19	Staraya	168	1091	1977	1496	787	656	478	341	2136	9130	2	12	22	16	9	7	5	4	23
20	North	197	1249	2092	1596	830	670	521	384	2309	9848 ^{1/}	2	13	21	16	8	7	5	4	24

^{1/} Plus 11 two-year-olds.

Appendix Table Y.
 Projected reproductive condition of total female kill by round,
 based upon daily samples, St. George Island, 1957

Date	Nullipara	Primipara		Multipara		Cumulative All females	
		pregnant	non-preg.	pregnant	non-preg.	preg.	non-preg.
1 July							
6							
11	1						1
16		1			4	1	4
21		5		9	3	14	3
26	4	3		9	4	12	8
31	13	7	3	22	19	29	35
5 August	232	58	29	318	328	376	589
10	584	128	36	475	602	603	1222
15	943	508	145	1379	653	1887	1741
20	<u>1134</u>	<u>300</u>	<u>133</u>	<u>1234</u>	<u>533</u>	<u>1534</u>	<u>1800</u>
Total	2911	1010	346	3446	2146	4456	5403
Percent	29		14		57	45	55

Appendix Table Z.

Reproductive condition of female samples from commercial kill,
by length, St. George Island, 27 June to 20 August, 1957

Length in inches		Nullipara	Primipara		Multipara		Total
			pregnant	non-preg.	pregnant	non-preg.	
40	number	6	2				8
	percent	1	1				
41	number	26	5		3	2	36
	percent	5	2				2
42	number	105	29	5	28	2	169
	percent	18	15	8	4		8
43	number	111	41	10	22	14	198
	percent	19	21	15	3	3	10
44	number	137	52	15	87	38	329
	percent	24	26	22	13	8	16
45	number	135	41	19	144	78	417
	percent	24	21	29	21	16	21
46	number	35	19	11	153	138	356
	percent	6	10	16	22	29	18
47	number	14	9	7	136	78	244
	percent	2	5	10	20	16	12
48	number	3	2		61	72	138
	percent	1	1		9	15	7
49	number	1			40	32	73
	percent				6	7	4
50	number				11	23	34
	percent				2	5	2
51	number				2	7	9
	percent					1	
	Total	573	200	67	687	484	2011
	Percent	29	10	3	34	24	



Appendix Table BB.
Numbers, pregnant and non-pregnant, in samples
of female seals, Pribilof Islands, 1957

<u>St. Paul Island</u>			
<u>Rookery</u>	<u>Pregnant</u>	<u>Non-pregnant</u>	
Zapadni	363	504	
Tolstoi	276	364	
Lukanin-Kitovi	22	44	
Reef	710	618	
Polovina	1692	582	
Northeast Point	844	624	
Total	3907	2736	6643

<u>St. George Island</u>			
Zapadni	150	258	
North	400	419	
East	175	247	
Staraya	162	200	
Total	887	1124	2011

Appendix Table CC.
Field length of tagged 3 year old male seals by time of recovery
Pribilof Islands, 1957

Date	Length in inches								Total	
	39	40	41	42	43	44	45	46		48
27 June			2	2	1					5
28	1				3		1			5
29		1	1	3	1	2				8
30				1						1
1 July		2								2
Total	1	3	3	6	5	2	1			21
2 July		1		2						3
3		3		3						6
4		2	1	5	3	1	1			13
5					2					2
6						1				1
Total		6	1	10	5	2	1			25
7 July			2	1	1					4
9			1	5	1					7
10				1						1
11			1		1					2
Total			4	7	3					14
12 July			4	2	3	2	2			13
13		1	1	2	3	1	1			9
14	1		1	1	9	2	1			15
15					1					1
16			1	1	2					4
Total	1	1	7	6	18	5	4			42
17 July			2	5	3	1	3			14
18			1	2	1					4
19			2	3	4	4	2			15
20		1		1	1					3
21					1					1
Total		1	5	11	10	5	5			37

Appendix Table CC.
Field length of tagged 3 year old male seals by time of recovery
Pribilof Islands, 1957 (con.)

Date	Length in inches									Total
	39	40	41	42	43	44	45	46	48	
22 July		1	3	2	4	1				11
23			1	3		1				5
24			3	6	3	6	7	1		26
25				2	3					5
26						5	1			6
Total		1	7	13	10	13	8	1		53
27 July		1	5	6	7	4	1			24
28				2	2	1	2			7
29			2	6	4	6	2			20
30					1	1	1			3
31		1		2		1	1			5
Total		2	7	16	14	13	7			59
1 August		2		2	4	2			1	11
2			2	5	1	1				9
3			3	7	2	1	2			15
4			1	4		1				6
5			1	3						4
Total		2	7	21	7	5	2		1	45
6 August		1	2	8	4	3		1		19
7			5	3	4	7	1			20
8			2	3	4	2	2			13
9				2						2
10			1	3	3		1			8
Total		1	10	19	15	12	4	1		62
11 August			1							1
14					1					1
Total			1		1					2
17 August		1		1						2
19								1		1
Total		1		1				1		3
Total	2	18	52	110	88	57	32	3	1	363

Appendix Table DD.
Field length of tagged 4 year old male seals by time of recovery
Pribilof Islands, 1957

Date	Length in inches									Total
	41	42	43	44	45	46	47	48	49	
27 June			1		1					2
28	1			2						3
29		1	4	1	1					7
30			1							1
1 July		2	1	3						6
Total	1	3	7	6	2					19
2 July	1	1		1						3
3				1	2	1				4
4		1		3						4
5						2				2
6				1		1				2
Total	1	2		6	2	4				15
7 July		1		1	2					4
8						2				2
9			2		2					4
10					1					1
Total		1	2	1	5	2				11
12 July	1	1	2	3	1	1	2	2		13
13		1			1					2
14				1					1	2
16			1							1
Total	1	2	3	4	2	1	2	2	1	18
17 July			1	2	1					4
18				2	1	2				5
19				2						2
20			1		1					2
21				2		2				4
Total			2	8	3	4				17

Appendix Table DD.
Field length of tagged 4 year old male seals by time of recovery
Pribilof Islands, 1957-(con.)

Date	Length in inches									Total
	41	42	43	44	45	46	47	48	49	
22 July	1	2	1	2	2					8
23		1	1	2	1	2				7
24				2	4	1	1			8
25		1		1						2
26				1	1					2
Total	1	4	2	8	8	3	1			27
27 July			1	1	1	1				4
29			1	1	1					3
Total			2	2	2	1				7
1 August					2		1			3
2				2	2		1			5
3					1	1				2
4						1				1
5				1						1
Total				3	5	2	2			12
6 August					2	2		1		5
7						1				1
8			1		1	1	1			4
9					1					1
10			1				1			2
Total			2		4	4	2	1		13
12 August			1							1
13					1					1
Total			1		1					2
Total	4	12	21	38	34	21	7	3	1	141

Appendix Table EE.
Field length of tagged 3 year old female seals by time of recovery
Pribilof Islands, 1957

Date	Length in inches							Total
	39	40	41	42	43	44	45	
30 July		1						1
Total		1						1
3 August							1	1
4		2				1		3
5		1						1
Total		3				1	1	5
6 August	1							1
9			1			1		2
10		1	1	2				4
Total	1	1	2	2		1		7
11 August			1					1
12		1	1					2
13	1		1	1	1			4
14		1		1				2
15			1	1	1			3
Total	1	2	4	3	2			12
16 August	1	1	1		1			4
18			2	1		1		4
19						1		1
20				1				1
Total	1	1	3	2	1	2		10
Total	3	8	9	7	3	4	1	35

Appendix Table FF.
Field length of tagged 4 year old female seals by time of recovery
Pribilof Islands, 1957

Date	Length in inches									Total
	40	41	42	43	44	45	46	47	48	
27 July					1					1
Total					1					1
3 August					1				1	2
4		2	1	2						5
5		1	1							2
Total		3	2	2	1				1	9
6 August		2		1	1	1				5
7			1		2					3
9	1		1	4	2					8
10		2	5	5	1					13
Total	1	4	7	10	6	1				29
11 August			3							3
12		1	3	3	1	1				9
13		1	2	2	1	2				8
14		2	3	2	1					8
15		2	4	4	2	2				14
Total		6	15	11	5	5				42
16 August				1						1
17			1	3	1		1			6
18		3	1		1					5
19		1	2	1	2	1	2	1		10
20		1	4	6	1					12
Total		5	8	11	5	1	3	1		34
Total	1	18	32	34	18	7	3	1	1	115

Appendix Table GG.
 Length classes of tagged 3-year-old male seals,
 by rookery of recovery, Pribilof Islands, 1957

Length in inches	Rookery of recovery							St. George Island				Grand total
	St. Paul Island			REEF	POL	Total	No.	Ea.	STAR	ZAP		
	NEP	TOL	L-K				ZAP					
39		1		1		2					2	
40	6	4		3	1	3	17	1			18	
41	21	4	5	15	1	4	50	1	1		52	
42	25	14	3	35	9	8	94	5	4	2	5	110
43	23	7	7	28	9	7	81		3		4	88
44	10	10	1	23	2	7	53		1		3	57
45	5	2	1	14	1	3	26	2	3		1	32
46				1	1		2				1	3
47												
48											1	1
Total	90	42	17	120	24	32	325	9	12	2	15	363

Appendix Table HH.
 Length classes of tagged 4-year-old male seals,
 by rookery of recovery, Pribilof Islands, 1957

Length in inches	Rookery of recovery							St. George Island				Grand total
	St. Paul Island				REEF	POL	Total	No.	Ea.	STAR	ZAP	
41	2		1							3		
42	5	1	1	2		2	11			1		12
43	6	2		8	2	3	21					21
44	10	6	3	9		8	36	1		1		38
45	10	5	2	8	2	1	28	3		1	2	34
46	3	5	3	2	3	3	19	1			1	21
47	3	1		2		1	7					7
48	3						3					3
49				1			1					1
Total	42	20	10	32	7	18	129	5	3	4		141

Appendix Table II.
 Length classes of tagged 3-year-old female seals,
 by rookery of recovery, Pribilof Islands, 1957

Length in inches	Rookery of recovery							St. George Island				Grand total
	St. Paul Island				REEF	POL	Total	No.	Ea.	STAR	ZAP	
	NEP	TOL	L-K	ZAP								
39	2			1			3					3
40	1	1			4	2	8					8
41	2	1		3	1	2	9					9
42				1		4	5	1	1			7
43	1			1		1	3					3
44				1	3		4					4
45									1			1
Total	6	2	-	7	8	9	32	-	2	1	-	35

Appendix Table JJ.
Length classes of tagged 4-year-old female seals,
by rookery of recovery, Pribilof Islands, 1957

Length in inches	Rookery of recovery										Grand total	
	St. Paul Island					St. George Island						
	NEP	TOL	L-K	ZAP	REEF	POL	Total	No.	Ea.	STAR	ZAP	
40					1		1					1
41	2	1		4	5	6	18					18
42	3	5		2	7	14	31		1			32
43	2	6		2	9	15	34					34
44	2	3		3	5	4	17	1				18
45	1	1		2	1	2	7					7
46		1			2		3					3
47					1		1					1
48				1			1					1
Total	10	17	-	14	31	41	113	1	1	-	-	115

Appendix Table KK.
Estimate of Escapement of Fur Seal Bachelors
from Commercial Harvest

D. G. Chapman

Summary

1. The average escapement for the Pribilofs for 1950-1955 is estimated to be:

3-year males	30,933	or	39.7%	of the age group
4-year males	6,302	or	23.8%	of the age group

2. The estimate of the escapement for the Pribilofs for 1956 is

3-year males	7,433
4-year males	7,648

These estimates are made in the same manner as those given previously and elsewhere in this report. The 4-year male escapement is high because the larger part of such escapement is through-the-season escapement, and in 1956 this was presumably larger than normal since the 4-year male class returned in greater numbers than normal. Hence this compensated for the small post season escapement because of the extended killing season. On the other hand the extension of the killing season apparently sharply reduced the 3-year male escapement.

3. The estimates of the percent escaping are subject to a very large sampling error--any single 3-year estimate may be in error by

as much as +20 percent in absolute magnitude and a 4-year estimate by +8 percent.

4. Aside from the large sampling errors which are inherent in the method, the post season escapement estimates appear to be reasonably satisfactory.

5. The through-the-season escapement estimates need further study to determine their validity and reliability. It may be desirable to consider methods of getting data to do so--in particular to study the possibility of killing for tags again as was done in 1950-1951.

6. A comparison of the estimates of the 3-year male escapement with the harvest of 4-year males shows that on the average the estimates are low by 3,654. This could be due to sampling error, or it may also mean there is a source of negative bias in the methods used.

7. The largest contribution to the deficiency in the estimates is due to the 1955-1956 comparison (the average deficiency for the five earlier years is 1,289). The strong showing of the 1952 year class as 4-year olds (a kill of 93.4 percent in excess of the average 4-year male kill for 1951-1955) was not only not anticipated, but it is not yet possible to explain its occurrence.

Introduction

The estimation of the numbers of three- and four-year males that escape the commercial harvest was begun in "A Population Study of the Alaska Fur-seal Herd" Special Scientific Report - Wildlife No. 12 - June 1954 [hereafter referred to as I] and continued in the unpublished report "A Further Note on the Alaska Fur-seal Population" 1955 (which will be referred to as II).

The escapement of bachelors consists of two components - the post-season escapement of those bachelors that arrive on the Pribilof Islands after the commercial harvest has been terminated, and the through-the-season escapement of those males that are outside the established size limits. These limits are from 41" - 45" in length though some animals are taken outside these limits.

A. Post-season escapements - St. Paul Island

1. Estimates

The post-season escapement for both three- and four-year olds has been estimated by fitting a normal curve to the returns of tagged animals, or to the returns as measured by the commercial harvest; from this is determined the proportion of the population in the "tail" of the distribution beyond the final day of killing.

This method of estimation involves a number of problems, both major and minor. The primary major problem is the choice of fitted

curve. Some discussion of this point was given in I (see p. 60). Minor problems are the varying dates for both the beginning and the end of the commercial harvest. Thus the numbers for the first round are partially cumulative, though the degree of accumulation may vary from year to year. Also the last round has occasionally ^{been} ~~be~~ incomplete, or there has been a partial post-season round. The additional information from such partial post-season kills is difficult to use.

In II, careful study was given to validating the estimates of over-all escapement. However, in 1956 the kill of males was continued until August 15 so that an empirical check can be made on the estimates made in the same way as for 1950-1955; i. e., from the records up to the end of July. Further, some attention has been given to the evaluation of the sampling error in these estimates. This is discussed below.

Table 1a. 3-Year Male Post-Season Escapement ^{1/}

Year	Based on commercial kill (no. of 3-year males estimated from tooth samples)	Based on returns of tagged animals	Average
1950	0.21	0.24	0.225
1951 ^{2/}	0.43	0.41	0.42
1952	0.26	0.24	0.25
1953	0.47	----	0.47
1954	0.39	----	0.39
1955	0.31	0.28	0.295
Average	0.345		0.342

Table 1b. 4-year Male Post-Season Escapement ^{1/}

Year	Based on commercial kill (no. of 4-year males estimated from tooth samples)	Based on returns of tagged animals	Average
1950	0.15	----	0.15
1951 ^{2/}	0.05	.06	0.056
1952	0.04	0.04	0.04
1953	0.16	0.14	0.15
1954	0.04	----	0.04
1955	0.11	----	0.11
Average	0.092		0.091

^{1/} The tabled figure is the estimated proportion of the killable sizes or tagged animals respectively that do not return to the hauling grounds before the close of the commercial harvest. For 1950-1955 the closing dates were July 27, July 29, July 27, July 29, July 27, July 31 respectively.

^{2/} The figures for 1951 have been revised from those given in II, p. 3. There the 2-day post-season kill was neglected.

2. Analysis of 1956 Returns

Since the commercial harvest of males in 1956 was continued until August 15 (15-19 days beyond the end of the season in the previous years) we have a check on the estimation procedure.

Below are shown estimates of the "escapement" that would have been made had the season terminated on July 26 (at the end of the round 6 and 1 day earlier than the end of the season in 1950, 1952, 1954) and also those that would have been made had the season ended on July 31, as it did in 1955.

Table 2

Comparison of Estimates and Observations of
Returns in Killable-Size Class, 1956

Age Class	Estimate of total returns based on returns up to July 26	Estimate of total returns based on returns up to July 31	Actual returns up to August 15	Estimate of total returns based on returns to August 15
Threes	30,479	35,787	38,270	40,743
Fours	27,895	29,750	31,448	31,556

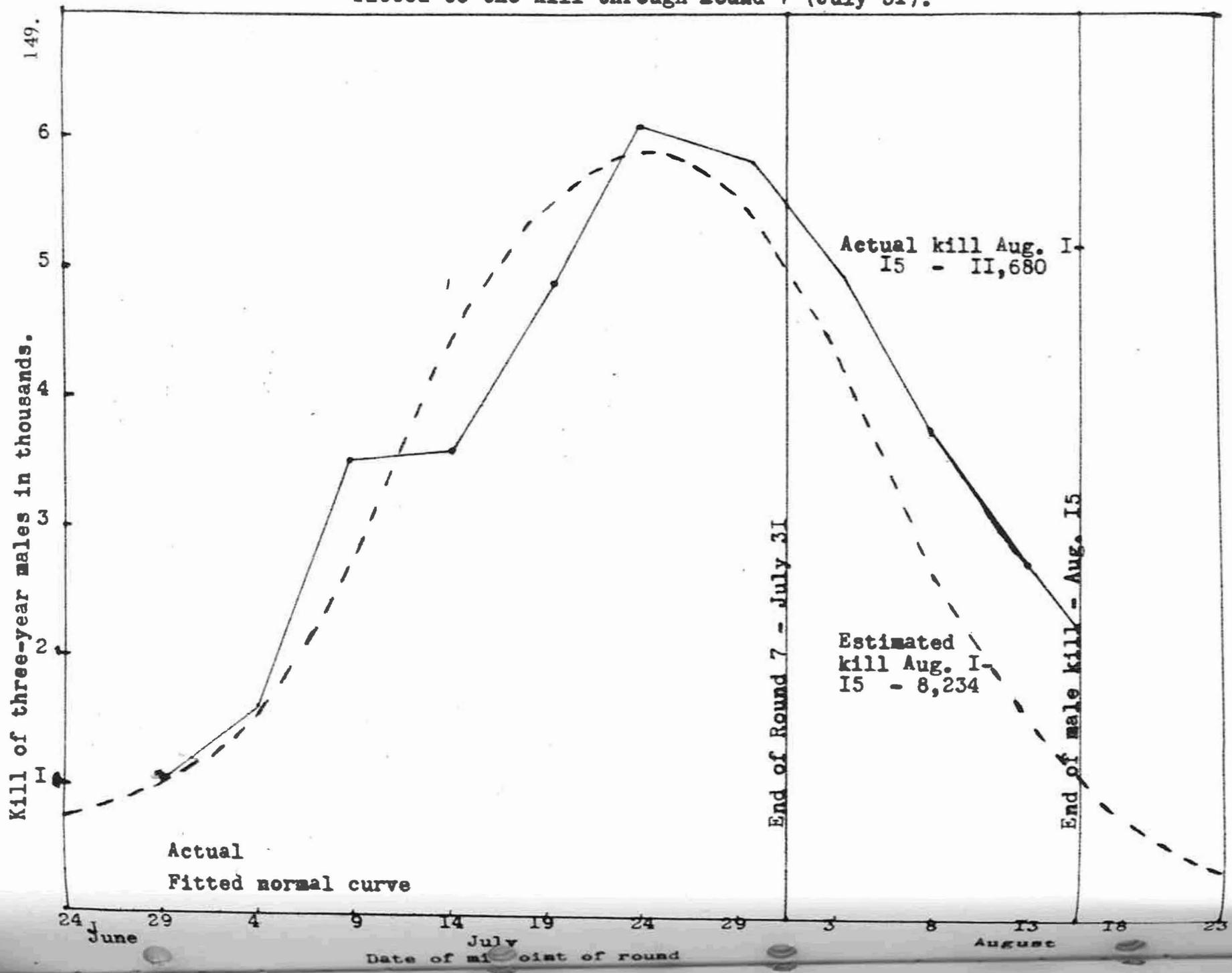
The estimates are low by 5-10,000 (threes) and 2-4,000 (fours).

A graphical illustration of the deficiency of the estimate of the 3-year curve based on returns up to July 31 is shown on page 149.

3. Sampling Error of the Post-Season Escapement

As was pointed out in II (page 12) it is not possible to evaluate the sampling error directly, but it is possible to determine its approximate magnitude by indirect methods. One way of approaching this problem is to study the escapement estimates by separate hauling grounds. The variation between such estimates is the basis of one estimate of the sampling error. This has been done not only for the 1954 and 1955 3-year-old data but also for the theoretical escapements of 1956 after

Comparison of kill of three-year males through Aug. 15, 1956 with normal curve fitted to the kill through Round 7 (July 31).



July 26 and July 31 respectively--the former date corresponding to that of 1954 and the latter to 1955. The results are shown in Table 3 below

Table 3

Estimated Post-season escapement as per cent of total returns of killable-size class of 3-year-old males by hauling grounds for 1954-1955-1956

Hauling ground	1954	1956 after July 26	1956 <u>actual</u> July 27- Aug. 15	1955	1956 after July 31	1956 <u>actual</u> Aug. 1- Aug. 15
Northeast Point	0.33	0.75	0.60	0.27	0.67	0.40
Polovina	0.39	0.22	0.42	0.24	0.15	0.30
Reef	0.64	0.25	0.48	0.91	0.34	0.26
Zapadni	0.39	0.20	0.39	0.20	0.17	0.25
Tolstoi-Lukanin-Kitovi	0.34	0.33	0.37	0.71	0.11	0.29
Weighted Average ^{1/}	0.39	0.35	---	0.35	0.30	---
Estimate based on combined returns (from Table 1A)	0.39	0.32	0.46	0.31	0.26	0.31

^{1/} The percent escapement of each hauling ground is weighted by the number of returns on which the escapement estimate is based.

The table indicates the extreme variation in the estimates of escapement both between different hauling grounds and the same hauling ground in different years.

The standard deviation of the estimates in 1954, 1955, and 1956 (after July 31) are 0.127, 0.323, and 0.230 respectively. The average of these is 0.227. From this we can estimate the standard deviation of the estimate for all St. Paul, which is approximately the mean of the five hauling ground estimates as $\frac{0.227}{\sqrt{5}} = 0.1015$.

By quite remarkable coincidence this agrees to the fourth decimal with the standard deviation of the St. Paul estimates from 1950-1955 (as given in table 1a, column 1). It might be expected that this latter standard deviation would be larger than the sampling error of the estimates since any real year-to-year variation would tend to increase it.

In any case, if the sampling error of any single estimate is taken to be 0.10 then an approximate 95 percent confidence interval for the 1956 "escapement" after July 31 is $.26 \pm 2(.10)$; i. e., 0.06 to .46. The estimated returns in the killable size class, based on the 26,590 that were harvested up to July 31 was seen in Table 2 to be 35,787. The approximate 95 percent confidence interval for this class is 29,000 to 49,000. The latter figure is well above the actual kill to August 15 (38,290) and the estimated total returns in the killable size class (40,734).

The estimates of post-season escapement of four-year males on St. Paul Island can be treated in the same way. An estimate of the standard deviation of the escapement estimates obtained from the 1950-1955 figures is 0.056. A complete study has not been made of the variances between hauling grounds but the standard deviations for 1954 is 0.049 while for 1956 (after July 31) is 0.126. The average of these is 0.087 so that the estimate of the standard deviation of the whole escapement from this internal variation would be $\frac{0.087}{\sqrt{5}}$; i. e., 0.039.

The proportion of 4-year male returns after July 31, 1956, (in the killable-size class) was estimated by our method to be 0.04 and this yielded a total numerical return for the whole season of 29,750. Since the standard deviation is so large relative to the actual estimate, it is difficult to give a precise confidence interval. However, taking 0.04 as the approximate standard error, a rough upper value to the proportion of returns after July 31 is 0.12 and thus to the total returns is 32,454.

Consequently, while it is necessary to be on the lookout for sources of negative bias in the post-season escapement escapes, it has not yet been demonstrated that the discrepancies so far observed are more than sampling errors of highly variable estimates. It is perhaps of some interest to point out that if the 1950-1955 average escapement estimates (34.5 percent and 9.2 percent for 3's and 4's

respectively) are applied to the 1956 kill up to July 31 we get estimated total returns of 40,593 (3's) and 31,454 (4's)--each differing less than 200 from the estimated total returns. In view of the fact that this is an ex post facto agreement, not much weight should be attached to it.

B. Through-the-season escapement--St. Paul Island

The 1950 and 1951 estimates of this escapement were made possible by the kill of all tagged seals in these years. Subsequently, this has not occurred and other approaches have been sought. One method has been based again on estimating the tails of truncated normal frequency distributions, in this case, the size distribution being used. Since it is necessary to work with a known age group, the method can only be used in those years when a substantial tagged group was passing through the commercial harvest. The estimates by these several methods are tabulated below in tables 4a and 4 b.

Table 4a
3-year-male through-the-season escapement^{1/}

Method year	Comparison of tagged and tag-lost recoveries	Comparison of incomplete tail tag recoveries and complete kill	Estimation of of size frequency distribution	Average
1950	.09	.09	.15	.11
1951		.08	.10	.09
1952			.01	.01
1955			0	0
1956			.03	.03
Average				.08

Table 4b
4-year-male through-the-season escapement^{1/}

Method year	Comparison of tagged and tag-lost recoveries	Comparison of tag recoveries and complete kill	Estimation of incomplete tail of size frequency distribution	Average
1951	.15	.16	0 ^{2/}	.155 ^{3/}
1952			.31	.31
1953			.12	.12
1956			.06	.06
Average				.161

1/ The tabled figure is the estimated proportion of the age class that escape the commercial harvest because they are outside the established killable size range.

2/ The truncation estimate is actually negative in this instance.

3/ Zero estimate is not used.

The estimates in Table 4 raise several questions and in particular that of the reliability of the truncation estimates, based as they are on the five observations from 41" to 45". The estimates of escapement of 3-year males seem to be extremely low for the years 1952, 1955, and 1956. However, an examination of the total group of tagged animals by size reveals that there is a substantial difference in the size composition in these years, as compared with 1950 and 1951. In particular, it is seen that the modal group at 41" or 42" in the earlier years has shifted to 43" in each of the later frequency distributions.

Table 5
Comparison of tagged 3-year males by size 1950-1956

Year of recovery		Completely represented classes		Incompletely represented classes		
		1950	1951	1952	1955	1956
Killable sizes	Size 37"	5	4	0	0	0
	38"	6	6	0	0	1
	39"	27	33	1	1	2
	40"	116	125	21	23	21
	41"	346	<u>307</u>	98	75	115
	42"	<u>360</u>	287	229	259	179
	43"	241	283	<u>281</u>	<u>361</u>	<u>227</u>
	44"	91	143	151	294	109
	45"	33	49	31	141	37
	46"	15	16	5	30	8
	47"		6	2	5	2
Subtotal 41"-45"		1071	1069	790	1130	667
Total		1240	1259	819	1189	701

The undersized animals averaged 49 percent of the 41" class in 1950 and 1951 while the oversized animals averaged 45 percent of the 45" class for these two years. Extrapolating these percentages to 1952, 1955, and 1956, estimates of escapement of 4, 3, and 5

percent are obtained. In absolute magnitude these do not differ greatly from the values given in table 1a. This point is discussed further in Section C.

More serious is the failure of the truncation method to give a meaningful value for the 4-year male escapement (through-the-season) in 1951. However, the estimates for the years 1952, 1953, and 1956, when no other method is available, happen to average out to be almost identically equal to the average of the 1951 estimates by the more reliable methods. Table 6 shows a comparison of the size distribution of tagged 4-year males.

This table shows a similar phenomenon as table 5, a shift to larger sizes from 1952 on, at least as indicated by the greater preponderance in the 45" class. In view of the fact that this occurred in 1952 for both size classes, it is perhaps pertinent to ask whether or not it could have been partly or totally due to some shift in emphasis (conscious or unconscious) of the commercial sealing crew.

There is one further comparison of interest. This is seen in table 7 which compares the means and standard deviations of the different age groups for 1950 through 1956 (where information was available from tag recoveries). Subsequent to 1951, estimates are based on truncated frequency distributions.

Table 6
Comparison of tagged 4-year males by size 1951-1956

Year of recovery	Size	Completely represented class	Incompletely represented classes			
		1951 Tagged	1951 Tag lost	1952	1953	1956
	40"	1	1			5
Killable sizes	41"	8	8	2	3	23
	42"	32	20	9	21	82
	43"	77	55	38	66	279
	44"	86	<u>75</u>	86	152	428
	45"	<u>95</u>	47	<u>157</u>	<u>201</u>	<u>439</u>
		46"	70	25	43	70
	47"	41	16	16	34	68
	48"	27	3	4	9	20
	49"	14	4	2	3	7
	50" and up	9			2	
Subtotal	41"-45"	298	205	292	443	1251
Total		460	254	357	561	1519

Table 7
Comparison of mean length and standard deviation
for 3- and 4-year males 1950-1956

Year class	3-year-olds		4-year-olds		Average increase in length
	Mean	S. D.	Mean	S. D.	
1947	41.90	1.39	44.93	2.00	3.03
1948	42.09	1.54	45.28	1.36	3.19
1949	42.68	1.16	44.85	1.29	2.17
1952	43.18	1.27	44.45	1.38	1.27
1953	43.55	1.31	---	---	---

The shift to higher average sizes in the 1949 year class and later classes is seen in the data of the 3-year males but not in the four-year-olds. The growth increment seems reasonable for the earlier years but unreasonably small for the 1952 class. This is the class which returned in unusually large numbers as 4-year olds (see table 8, *infra* p. 159). The small apparent growth increment and the large 4-year returns are both consistent with a large escapement of small threes in 1955, but there was no indication of this in either type of escapement. The several standard deviations are quite comparable though the value for the 4-year old group surviving from the 1947 year class (2.00) is somewhat out of line.

In view of the uncertainties in the present through-the-season escapement estimates and the difficulty of validating the comparability of the different methods, it seems hardly of any value to

attempt to estimate standard deviations of the estimates.

C. Total escapement estimates

1. St. Paul Island

As indicated in II (page 15) it appears that it is preferable to use an average escapement estimate for all years rather than individual ones even though we know there must be year to year variations in the various escapements.

Table 8
Estimated 4-year male escapement--St. Paul Island

	<u>Estimated kill of 4-year males</u>	<u>Estimated escapement</u>
1950	16,043	5,010
1951	19,658	6,139
1952	15,699	4,903
1953	12,502	3,904
1954	15,365	4,798
1955	18,083	5,647
Average	16,225	5,067
1956 ^{1/}	31,448	2,122

^{1/} Since the 1956 commercial harvest continued until August 15, this estimate is based on the 1956 escapement estimates alone and not on the 1950-1955 average values.

The average post-season escapement of 4-year males (table

1a) is estimated as 9.2 percent, while the through-the-season escapement average is 16.1 percent. Combining these yields, a total escapement (estimated) of 23.8 percent for 1950-1955.

The average escapement estimate (5,067) is very well in agreement with the figures in II and well below the maximal estimates given there as determined from the population dynamics of the harem and idle bull classes. If we take an upper limit of $.092 + 2(.037) = 0.17$ as an estimate of post-season escapement and combine this with the through-the-season escapement of 16.1, yielding a total escapement (proportion) of .304, the average escapement from 1950-1955 in numbers is 7,087.

The average post-season escapement of 3-year-males was estimated to be 34.5 percent, and the through-the-season escapement 8 percent. The total escapement is then estimated at 39.7 percent.

The average under-estimate of the three-year male escapement is in fact larger than the 2,162 indicated in table 9, for no allowance has been made for natural mortality during the year. If this is added in (using the 6 percent figure estimated in I, p. 38) the average deficiency is 3,654. This is small in comparison with the sampling error (an average escapement of $21,216 + 3,654 = 24,870$ would mean an average percent escapement of 43.6). On the other hand, if we regard this deficiency as an error in the method, it appears

that the estimates fall short on the average by 17.2 percent. If this "correction" is applied to the average 4-year escapement, this estimate is increased from 5,067 to 5,938.

Table 9
Escapement of 3-year males 1950-1955 compared
with kill and escapement of 4-year males of the following year

Year	(1) 3-year male kill	(2) 3-year male escape- ment	(3) 4-year male kill of following year	(4) 4-year male escape- ment of following year	(2)-[(3)+(4)]
1950	31,746	20,902	19,658	6,139	-4,895
1951	30,014	19,761	15,699	4,903	- 841
1952	27,995	18,432	12,502	3,904	2,026
1953	40,506	26,669	15,365	4,798	6,506
1954	32,350	21,299	18,083	5,647	-2,431
1955	30,733	20,235	31,448	2,122	-13,335
Average	32,224	21,216	18,792	4,586	-2,162

2. All-Pribilof escapement

In 1956, tagging was begun on St. George Island. When these tagged animals return as 3- and 4-year olds and are taken in the commercial harvest, it will be possible to make a similar study of escapement for St. George Island. It will then be desirable to make separate post-season escapement estimates for St. George Island,

utilizing the estimated returns of 3- and 4-year olds based on the tooth samples used for age determination. At the present time such estimates would only give some subsidiary information in connection with the evaluation of sampling errors (A 3 above).

Consequently, until more information for St. George is available, it is necessary to continue the procedure used in I and II--all estimates for St. George are found by extrapolation from those on St. Paul. In this case the commercial harvest figures form the basis for such an extrapolation. More precisely, for the period 1950-1956 the St. Paul kill of males was 80.4 percent of the total all-Pribilof kill.

Hence, we estimate that the average 1950-1955 all-Pribilof escapement of three-year-males was

$$\frac{24,870}{0.804} = 30,933$$

and the average 1950-1955 all-Pribilof escapement of four-year males was

$$\frac{5,067}{0.804} = 6,302$$