Quarterly Report

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The natural history and ecology of the bearded seal (*Erignathus barbatus*) and the ringed seal (*Phoca* (*Pusa*) *hispida*)

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I. Task Objectives

1. Summarization and evaluation of existing literature and available unpublished data on reproduction, distribution, abundance, food habits and human dependence on bearded and ringed seals in the Bering, Chukchi and Beaufort Seas.

2. Acquisition of large amounts of specimen material required for an understanding of food habits in these two species.

3. Acquisition of additional data on productivity and growth rates.

4. Acquisition of baseline data on mortality and morbidity (including parasitology, diseases, predation and human harvest) of ringed and bearded seals.

5. Determination of population structure of bearded and ringed seals as indicated by composition of harvest taken by Eskimo subsistence hunters.

6. Initial assessment of regional differences in density and distribution of ringed and bearded seals in relation to geographic areas and, to a lesser extent, in relation to major habitat condition.

7. Acquisition of additional information on seasonal migrations.

II. Field Activities

A. Schedule

Date	Location	Purpose
March-April 1976	Cape Lisburne	Collection of specimen and survey of habitat
March-April 1976	Surveyor cruise	Collection of specimen and survey of habitat
May 1976	Point Hope	Collection of specimens
June 1976	Barrow	Seal and ice survey and collection of specimen
June 1976	Kotzebue	Seal survey of Kotzebue Sound

B. Scientific Party

Name	Affiliation	Role
John J. Burns	ADF&G	Principal Investigator
Thomas J. Eley	ADF&G	Principal Investigator
David James	ADF&G	Technician
Glenn Seaman	ADF&G	Technician
Edward Muktoyuk	ADF&G	Technician
Bonnie Friedman	ADF&G	Technician

C. Analytical Methods

From all specimens we endeavor to obtain weights, standard measurements, lower jaws, foreflipper claws, stomachs, reproductive tracts and intestines. We also obtained blubber, tissue, organ and blood samples as the situation permits.

The ages of seals are determined by examination of claw annuli (for animals six years and younger) and dentine or cementum annuli (for animals over six years of age). Growth rates are based on weight and standard measurements correlated with specimen age, sex and date and locality of collection. Species productivity and parasite burden are determined, respectively, through laboratory examinations of reproductive tracts and various organs and correlation of these data with age, sex, and date and locality of collection of each specimen.

Regional differences in seal density and distribution were assessed through aerial surveys following the methods of Burns and Harbo (1972, Arctic 25:279-290).

Analytical methods are discussed in detail in our Annual Report for FY-1976.

D. Sample Localities

1. Kotzebue Sound - Aircraft tracklines are shown in Fig. 1.

2. Cape Krusenstern to Barter Island - Aircraft tracklines are listed in Appendix 1.

III-IV. Results and Preliminary Interpretation

A. Specimens

During April to June, 1976, 76 ringed seals and 8 bearded seals were obtained from villages or collected by the Principal Investigators (Table 1). Measurements, jaws, claws, stomachs and reproductive tracts were obtained from all specimens. We also obtained blubber, tissue, organ and blood samples from most specimens. All of these specimens, and those of previous years, are being processed as rapidly as possible.

Table 1. Specimens obtained between April and June 1976.

Location	Male	Female	Unknown	Total
Barrow				
Ringed Seal	5	2	-	7
Cape Lisburne				
Ringed Seal	8		11	19
Bearded Seal	-	1	-	1
Point Hope				
Ringed Seal	37	7	3	47
Nome				
Ringed Seal	1	2	-	3
Bearded Seal	3	2	1	6
Surveyor				
Bearded Seal	1	-	-	1

B. Food Habits

See Quarterly Report of "Trophic relationships among ice inhabiting phocid seals" (RU #232).

C. Seal Surveys

Ringed seals spend much of the year in the water or in subnivean lairs in the shorefast and moving pack ice. From late April until breakup in late June, ringed seals haul out on the ice on sunny days, and during this haul out period they undergo their annual molt. The hauling out period appears to take place largely on the shorefast ice and appears to reach a peak in mid-June just before breakup. This hauling out period appears to be the best time for aerial counts. However, the relationship between the number of molting seals hauled out in an area and the number of seals breeding in that same area is unknown.

Other marine mammals (primarily polar bear (Ursus maritimus), bearded seal, and belukha (Delphinapterus leucas)), although encountered in far less numbers than ringed seals, also are counted on these ringed seal surveys.

1. Kotzebue Sound and Hotham Inlet

In June, 23 transects totaling 689 square miles and 3 transects totaling 29 square miles were flown, respectively, over Kotzebue Sound and Hotham Inlet (Fig. 1). In Kotzebue

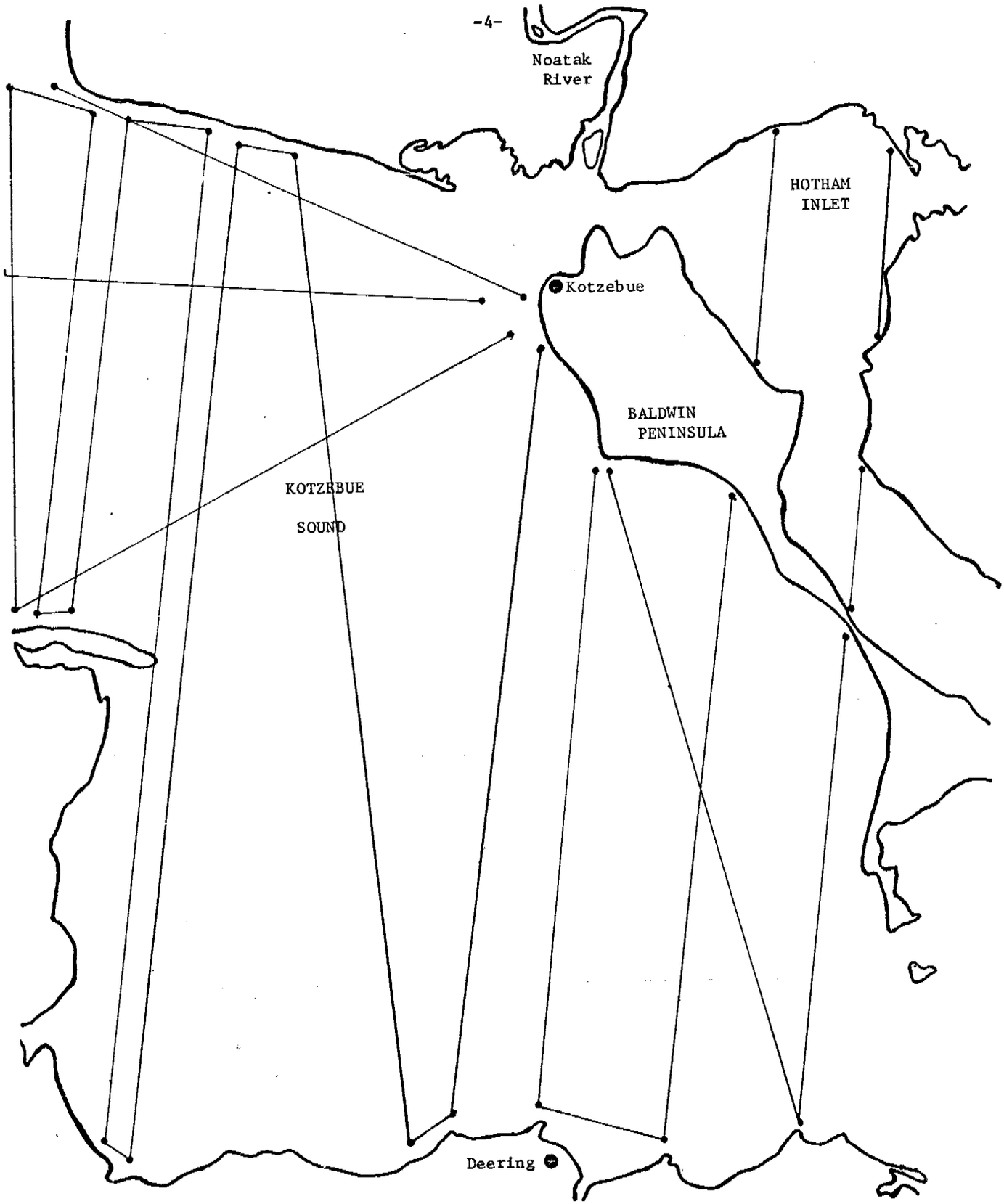

Figure 1. Seal survey tracks, Kotzebue Sound and Hotham Inlet, June, 1976.

Sound 504 ringed seals were observed, yielding an ecological density of 0.73 ringed seals per square mile of available habitat. In addition, one bearded seal and two spotted seals (Phoca vitulina largha) were observed in Kotzebue Sound. No seals were seen in Hotham Inlet.

The ecological density of ringed seals varied from 0.92 seals per square mile at the mouth of the Sound to 0.26 seals per square mile in the eastern portion of the Sound. The higher density of seals at the mouth was due to more stable ice conditions in this area. In the eastern portion of the Sound and in Hotham Inlet the ice had begun to break up due to warm weather and the influx of warm water from the Noatak, Kugruk, Kiwalik, Buckland, Selawik and Kobuk Rivers.

The ice cover in Kotzebue Sound was estimated to be 2,715 square miles and from the transects an ecological density of 0.73 seals per square mile was determined. Therefore, the estimated molting population of ringed seals is about 2000 animals.

2. Cape Krusenstern to Barter Island

Two to five transects were flown in major geographic sections of coastline between Cape Krusenstern and Barter Island (Table 2). Data from these surveys are still being analysed and compared to survey data from previous years, however, several trends are apparent.

The highest densities of ringed seals are found in the Chukchi Sea and in areas of stable shorefast ice such as between Cape Lisburne and Point Lay and between Barrow and Wainwright. The higher densities in the Chukchi Sea are reflective of the better ice conditions and higher overall productivity of the Chukchi as compared to the Beaufort Sea.

3. Pack Ice Transects

The density of molting ringed seals in the moving pack ice is known to be less than the shorefast. This year transects were flown over the pack ice of Chukchi and Beaufort Seas to provide comparative data for our shorefast ice surveys. The data from these pack ice transects are still under analyses but the tentative findings are summarized at the bottom of Table 2.

It is obvious that densities of molting ringed seals are considerably less in the moving pack ice than in the shorefast ice. As was found in the shorefast ice, densities of ringed seals in the Chukchi Sea are 2 to 2.5 times higher than in the Beaufort Sea.

Table 2. Ringed seal surveys flown between Cape Krusenstern and Barter Island, Alaska, during June 1976.

Geographic Area	Miles Surveyed (naut. mi.^{2})	Ringed seals observed	Ringed seal density (per (naut. mi.^{2})	Species and numbers of other marine mammals observed
Cape Krusenstern to Point Hope	209	544	2.6	Erignathus barbatus, 19
Point Hope to Cape Lisburne	72	78	1.1	Odobenus rosmarus, 25 Ursus maritimus, 1
Cape Lisburne to Pt. Lay	82	461	5.6	Erignathus barbatus, 8
Pt. Lay to Wainwright	352	761	2.2	Erignathus barbatus, 6 Ursus maritimus, 2
Wainwright to Barrow	356	1560	4.4	Erignathus barbatus, 3
Barrow to Lonely	136	226	1.7	Erignathus barbatus, 3
Lonely to Oliktok	140	175	1.2	Erignathus barbatus, 3 Ursus maritimus, 3
Oliktok to Flaxman Island	158	255	1.6	Erignathus barbatus, 5
Flaxman Island to Barter Island	110	47	0.4	Erignathus barbatus, 4 Ursus maritimus, 1
Chukchi Sea (moving pack ice)	218	44	0.2	Erignathus barbatus, 22 Ursus maritimus, 6 Balaena mysticetus, 1 Whale sp., 2
Beaufort Sea (moving pack ice)	111	12	0.1	Odobenus rosmarus, 2 Balaena mysticetus, 1

D. Data Management

Throughout the quarter we have moved rapidly forward with data management. Measurement and food habits data from ringed seals collected at Wainwright during 1975 have been submitted to NODC. Measurements of specimens collected during this quarter (Table 1) have been formated and await keypunching. The data from the seal surveys conducted this quarter are being formated at this time.

V. Recommendations

Various tissue samples (hide and blubber, striated muscle, liver, heart, etc.) have been obtained from many seal specimens and these tissue samples have been wrapped in aluminum foil and frozen. These tissue samples could now be analyzed for important environmental pollutants such as chlorinated hydrocarbons, petrochemicals and heavy metals. However, there are no personnel within ADF&G qualified to conduct analyses for pollutants.

The tissue samples have been collected over several years and thereby provide baseline data that are impossible to duplicate. We recommend that the OCSEAP arrange to have these tissue samples analyzed for environmental pollutants. A delay may result in a loss of the specimens due to age or to the omnipresent electrical power failures during the Alaskan winter.

VI. Estimate of Funds Expended

100	Salaries and wages	$58,705.33
200	Travel	6,252.43
300	Contractual	5,664.51
400	Commodities	3,731.62
500	Equipment	163.58
		$74,517.47

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Appendix I. Flight tracks, Cape Krusenstern to Barter Island.

Geographic Area	Date	Start Coordinates		Stop Coordinates	
Cape Krusenstern to Point Hope	10 June 1976	68°20'N	166°55'W	67°07'N	163°49'W
	12 June 1976	67°07'N	163°53'W	68°20'N	166°57'W
Point Hope to Cape Lisburne	10 June 1976	68°54'N	166°07'W	68°20'N	166°55'W
	12 June 1976	68°20'N	166°57'W	68°48'N	166°18'W
Cape Lisburne to Point Lay	12 June 1976	68°48'N	166°18'W	69°45'N	163°14'W
Point Lay to Wainwright	10 June 1976	70°40'N	160°06'W	70°01'N	162°44'W
	12 June 1976	69°45'N	163°14'W	70°41'N	160°15'W
	16 June 1976	70°38'N	160°17'W	69°47'N	163°15'W
	16 June 1976	69°41'N	163°05'W	70°38'N	160°01'W
Wainwright to Barrow	10 June 1976	71°18'N	156°48'W	70°40'N	160°06'W
	12 June 1976	70°41'N	160°15'W	71°18'N	156°48'W
	16 June 1976	71°22'N	156°42'W	70°38'N	160°17'W
	16 June 1976	70°38'N	160°01'W	71°22'N	156°48'W
Barrow to Lonely	15 June 1976	71°23'N	156°42'W	70°59'N	153°16'W
	15 June 1976	71°04'N	153°16'W	71°21'N	156°35'W
Lonely to Oliktok	15 June 1976	70°59'N	153°16'W	70°37'N	149°53'W
	15 June 1976	70°42'N	149°53'W	71°04'N	153°16'W
Oliktok to Flaxman Island	15 June 1976	70°37'N	149°53'W	70°24'N	146°03'W
	15 June 1976	70°29'N	146°03'W	70°37'N	149°53'W
Flaxman Island to Barter Island	15 June 1976	70°24'N	146°03'W	70°08'N	143°35'W
	15 June 1976	70°08'N	143°35'W	70°24'N	146°03'W