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MARINE MAMMAL REPORT

By
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Volume XIII
Project Progress Report
Federal Aid in Wildlife Restoration
Projects W-17-3 (2nd half), W-17-4 and W-17-5 (1st half),
Jobs 8.6R, 8.7R and 8.8R

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(Printed May, 1973)

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Robert Pegau, Edward Muktoyuk and Carl Grauvogel, Alaska Department of Fish and Game; Capt. T. L. Roberge and crew of USCGC Glacier; crew and scientists of R/V Alpha Helix; Mr. Karl Lane; Dr. F. H. Fay, AHRC and Mr. Peter Shaughnessey, University of Alaska

Project Nos.: W-17-3 Project Title: Marine Mammal Investigations
W-17-4 and
W-17-5

Job No.: 8.6R Job Title: Spotted Seal Life History

Job No.: 8.7R Job Title: Analysis of Biological Aspects of the Marine Environment

Job No.: 8.8R Job Title: Data Analysis and Reporting of Investigations Conducted to Date

Period Covered: January 1, 1971 to December 31, 1972

SUMMARY

This report describes the major activities undertaken during the report period January, 1971 through December, 1972. The majority of activities centered around acquisition of data and specimen material, with their analysis and reporting planned for the coming report period. Information concerning seals tagged and released is included, as are several species status reports (as required by P.L. 92-522). Estimates of the seal harvest in northern Alaska during the calendar years 1971 and 1972 are included. The total hair seal harvest in 1971 was estimated to have been about 17,500 animals. The 1972 harvest was estimated to have been about 13,500 animals. Factors influencing success during these years are discussed.

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BACKGROUND

Comments concerning the broad background, or overview of marine mammal investigations in northern Alaska have been presented in previous reports and publications (i.e. Burns, 1970a). Remarks here will be limited to those pertinent to work conducted or completed during this report period.

I was on leave from the Department of Fish and Game, attending school at the University of Alaska, for six months of this report period.

A variety of bills were introduced in the Senate and House of Congress, dealing with protection of marine mammals. Of the 50 states, Alaska will be affected most by this legislation. Accordingly, significant effort was devoted to providing input, in various forms, to the diverse groups involved in the legislative process. Passage of the resulting "Marine Mammal Protection Act of 1972", on October 21, established the requirement for certain types of reports and other supporting material; a job which, in part, fell on the shoulders of a few people in the Department.

Notable success was achieved in obtaining ship support for marine mammal research in Bering Sea during both 1971 and 1972. Department members organized and led a research cruise on the USCGC *Glacier* during March and April, 1971 and participated in the cruise of the R/V *Alpha Helix* during 1972. Both expeditions required a considerable amount of time and effort. In addition to the ship expeditions indicated above, routine spring and summer field work was conducted in the Bering Strait region. A concerted effort was also made to obtain specimens of spotted seals from southeast Alaska, prior to the effective date of the new Marine Mammal Act. It was anticipated that the Act would greatly reduce the opportunity of acquiring necessary specimens and data; a concern that has proven correct.

Essentially, this report period was devoted to the acquisition and preliminary analysis of data. It is anticipated that much of this will be summarized and reported during the next report period.

OBJECTIVES

The objectives of the three jobs indicated above are as follows: (1) to provide information on age composition, growth, productivity, distribution, movements, food habits and other major aspects of the biology of spotted seals (*Phoca vitulina*). Also, to determine the ecological requirements of this species and its interspecific relationships with other ice-inhabiting species; (2) to determine the species composition and distribution of marine invertebrates and fishes in the Bering and Chukchi seas which are utilized by marine mammals, and to determine the use of these prey species by walruses, *Odobenus rosmarus*, ribbon seals, *Phoca (Histriophoca) fasciata*, ringed seals, *Phoca (Pusa) hispida*, spotted seals and bearded seals (*Erignathus barbatus*); (3) to prepare reports and publications on selected phases of the Arctic marine mammal investigations conducted to date; and (4) to assess the magnitude and characteristics of the seal harvest in northern Alaska.

PROCEDURES

Spotted Seal Life History

Spotted seals killed by Eskimo hunters were weighed, measured and autopsied whenever possible. Specimens necessary for determining various aspects of this species' natural history were collected for laboratory examination. These included reproductive organs and fetuses, skulls, jaws, claws, stomachs, a variety of soft tissues, parasites, eyes, blood samples, skin samples, etc. Samples of some soft tissues were subdivided for various purposes including analysis of fatty acids and determination of pesticide and heavy metal burdens.

Observations of spotted seals under natural conditions were recorded whenever possible. Three research cruises were undertaken during this report period. These included the cruise of the USCGC *Glacier*, during March-April, 1971, the cruise of the R/V *Alpha Helix* during March-April, 1972 and work aboard the MV *Heron* in November, 1972.

The first two cruises provided opportunity to observe ice-inhabiting spotted seals along the southern edge of the seasonal sea ice during the period when these seals are pupping, supporting nursing pups, and breeding. A limited number of seals were collected to provide material from this period of the year (March-April), as spotted seals are not normally available to Eskimo hunters.

Seal pups were tagged during both the *Glacier* and *Alpha Helix* cruises. This provided an excellent opportunity to determine growth in nursing pups. Subsequent recoveries of tagged animals also confirmed previous conclusions about movements of these seals.

During the cruises indicated above, observation logs were maintained. These will provide information about the geographical location, distribution and density of spotted seals along the cruise tracks.

Land breeding spotted seals were collected from Unalaska Island during part of the *Alpha Helix* cruise and from southeast Alaska during the *Heron* cruise. Data and specimens from these land breeding harbor seals will be processed to provide information on life history and ecology, as well as to study the relationships between the ice breeding and land breeding forms.

Analysis of Biological Aspects of the Marine Environment

Work on this project centered mainly around examination of food items utilized by the five pinniped species of the Bering Sea and of extensive collections of fishes and invertebrates obtained by the test fishing in different areas during the *Glacier* and *Alpha Helix* expeditions.

This involved the identification of fishes and invertebrates obtained by fishing with an otter trawl, recognition of diagnostic parts such as fish skeletons, otoliths or operculae of gastropods, and subsequent identification of these diagnostic parts in the food remains obtained from seals.

This study is a complex one requiring the cooperation of several experts familiar with the different groups of fishes and invertebrates. Of necessity, a large portion of the invertebrate material was turned over to investigators at the University of Alaska.

The procedures employed are designed to determine the food preferences of Bering Sea pinnipeds, particularly spotted seals, in relation to the total spectrum of marine fishes and invertebrates.

The Department of Fish and Game is also involved with the University of Alaska's ERTS (Earth Resource Technology Satellite) program. Our participation is as a user of data generated from this program with the objectives of determining seasonal characteristics of sea ice in the Bering, Chukchi and Beaufort seas, areal extent of the different ice zones, and the processes of seasonal formation and disintegration of the pack ice. This information is particularly relevant to studies of the seasonal movements, distribution and density of various pinniped species.

Satellite photographs were analyzed to describe extent of total ice cover, delineation of different ice zones and to follow the seasonal advance and retreat of ice.

Data Analysis and Reporting

This project was designed to set aside a minimum amount of documented work time for the preparation of reports and publications concerning the status of marine mammals and/or selected phases of investigations conducted to date. A disproportionate amount of time was devoted to this project in light of federal legislation concerning marine mammals,

the necessity of submitting species status reports and formulating a program which meets the requirements of the new legislation. Additionally, the Department of Fish and Game undertook the production of a book entitled, "Alaska's Wildlife and Habitat," which includes sections on the marine mammals.

Three papers were also prepared and accepted for publication during this report period (see Findings).

Additional activities under this project included preparation and presentation of papers at the 1971 and 1972 Alaska Science Conferences, and several lectures and seminars concerning marine mammals.

Seal Harvest Assessment, 1971 and 1972

As in past years, assessment of magnitude of the annual seal harvests in northern Alaska was determined by a combination of procedures including analysis of bounty records (not available after July 1, 1972), reports from hunters and observations recorded by Department employees at various villages during different periods of the year.

The Marine Mammal Protection Act of 1972 (P.L. 92-522) became effective on December 21, 1972. This Act, in combination with the effective elimination of the seal bounty, may have eliminated the possibility of determining magnitude and characteristics of the annual seal harvests on a routine basis.

FINDINGS

Much of the activity during this report period centered around the acquisition of specimens and data, with, as yet, relatively limited analyses. Therefore, the following discussion is primarily about work accomplished rather than findings.

Spotted Seal Life History

All aspects of the spotted seal study were pursued during this report period. Specimens and data have been collected, as they were available, since 1963. However, much of this material was not examined due to emphasis on other programs. During this report period all material obtained prior to 1971 was examined and the data compiled. During 1971 and 1972 emphasis was placed on the acquisition of additional material for periods during which little or no data were available. The collection phase of this study was essentially completed in December, 1972, with the able assistance of Mr. Carl Grauvogel of Nome. Specific accomplishments during this report period included: 1) the examination of all reproductive tracts from both males and females; 2) histological preparation of tissue samples of specific interest; 3) age determination of all specimens; 4) preliminary correlation of age and growth parameters in this species; 5) partial completion of food habits study; 6) analysis of prenatal development based on specimens available in this study; and 7) compilation of available data on seasonal movements.

Two research cruises during this report period provided excellent opportunities of access to spotted seals during the times of pupping, nursing and breeding. These were the cruises of the USCGC *Glacier* and R/V *Alpha Helix*, referred to earlier.

Cooperation of the Coast Guard during the *Glacier* cruise enabled us to observe spotted seals, tag, measure and weigh pups and to collect specimens of scientific value.

During the period from 12 to 20 April, 55 seals were tagged. Weights, measurements and other data were obtained from all of the pups.

Fig. 1 shows the cruise track of the *Glacier* expedition and Table 1 summarizes data concerning seals that were tagged.

Two seals were subsequently taken by Eskimo hunters. The first, number 4629, was taken near Gambell, Alaska, approximately six months after it was tagged. The second, number 4625, was taken at Teller, approximately 18 months after being tagged as a newborn pup.

Nothing is known about the movements of these seals between the times of tagging and recapture. However, these recoveries are significant in that they confirm our previous conclusions (Burns, 1970b) about the wide dispersal of these seals. Seal number 4629 was recovered in the northwestern sector of Bering Sea, approximately 395 nautical miles from the tagging site. Seal number 4625 was in a fresh water river flowing into the northeastern sector of Bering Sea, approximately 500 nautical miles from the tagging site.

Some of the behavioral observations recorded during the *Glacier* cruise were incorporated into a paper published in 1972 (Burns, Ray, Fay and Shaughnessy).

The 1972 cruise of the R/V *Alpha Helix* was only partially successful from the standpoint of research on ice-breeding spotted seals. Unfavorable weather and ice conditions forced the ship to spend three weeks in the Aleutian Islands. Effectiveness of the ship while in the ice of Bering Sea was also greatly reduced because of weather and ice.

Nonetheless, many of the programs initiated on the previous *Glacier* cruise, including the tagging of pups and collection of selected animals, were continued. Table 2 is a listing of seals tagged from the *Alpha Helix*.

The final report for the spotted seal project is in preparation. Completion of the initial draft is anticipated during the next report period.

Analysis of Biological Aspects of the Marine Environment

Work continued on this project, but as yet has not been summarized. Food items from several seal species were collected, identified and quantified. During both the *Glacier* and *Alpha Helix* cruises, fishing

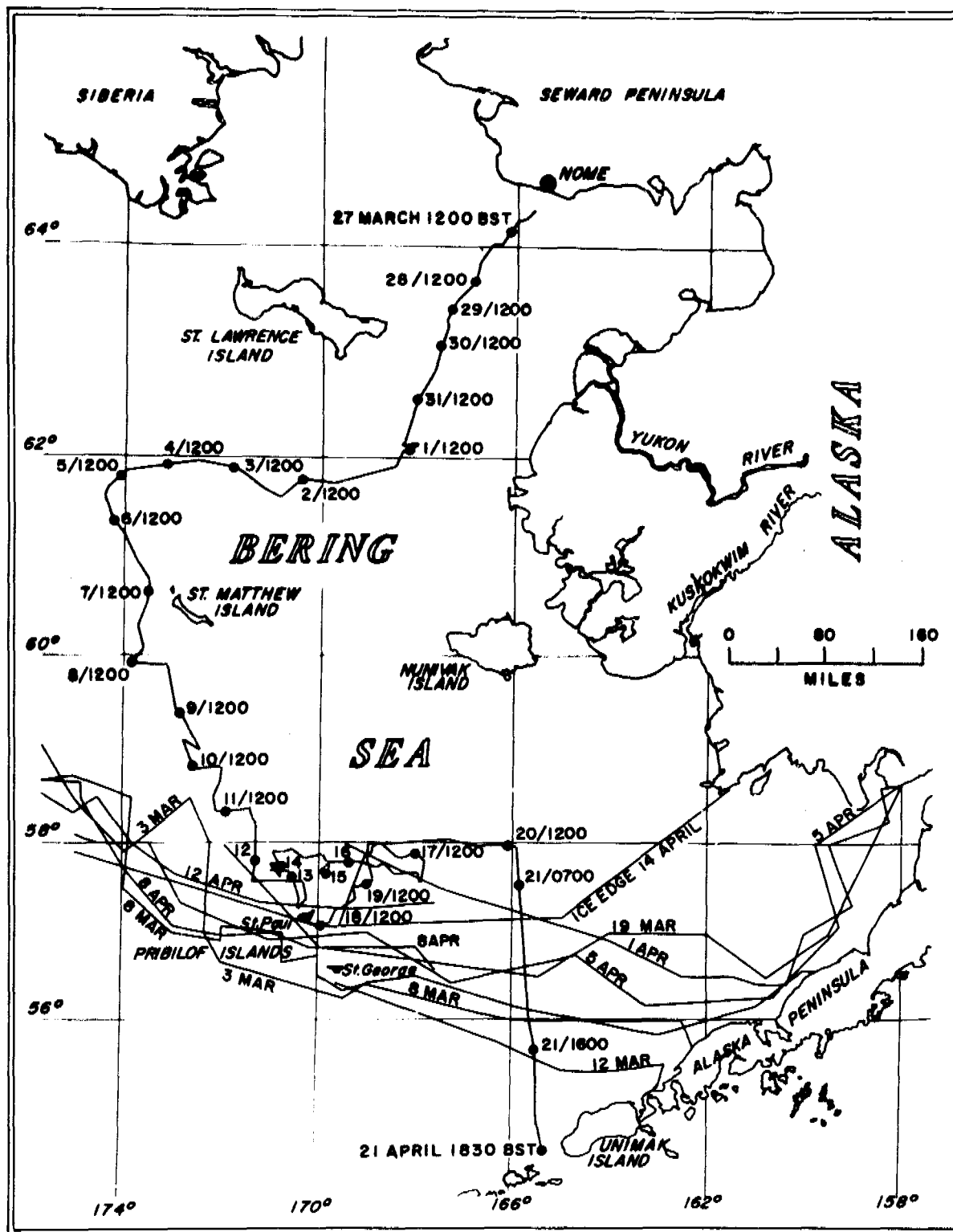


Fig. 1. Cruise track of the USCGC *Glacier* from 27 March to 21 April, 1971.

Table 1. Seals tagged - USCGC *Glacier* - April, 1971.

Tag #	Date	Species	Sex	Weight lbs.	Length inches	Std. Len. inches	Girth inches	Ice Type*	Position	Remarks
4601	12-4-71	<i>Phoca</i>	♂	38 1/2	35	-	-	Edge $\frac{7}{250}$	57°45' 171°21'	Pup w/2 adults
4602	12-4-71	<i>Phoca</i>	♀	45	40	-	-	Edge $\frac{7}{250}$	57°40' 171°21'	Pup w/2 adults
4603	12-4-71	<i>Phoca</i>	♂	33 1/2	36 1/4	-	-	Edge $\frac{7}{250}$	57°32' 171°05'	Pup w/2 adults
4604	4-13-71	<i>Phoca</i>	♂	49 1/2	36 3/4	-	-	Edge $\frac{8}{260}$	57°43' 170°54'	Pup w/2 adults
4605	4-13-71	<i>Histriophoca</i>	♀	27	34 3/4	-	-	Edge $\frac{8}{260}$	57°44' 170°50'	Pup w/ad female only
4606	4-13-71	<i>Phoca</i>	♀	59	41	-	-	Edge $\frac{8}{260}$	57°46' 170°53'	Pup w/2 adults
4607	4-13-71	<i>Phoca</i>	♀	31 3/4	36 1/8	-	-	Edge $\frac{8}{260}$	57°47' 170°52'	Pup w/2 adults
4608	4-13-71	<i>Phoca</i>	♂	44	39 1/8	-	-	Edge $\frac{7}{250}$	57°47' 170°58'	Pup w/2 adults
4609	4-14-71	<i>Phoca</i>	♂	72	41 1/2	-	-	Edge $\frac{7}{250}$	57°45' 170°50'	pup couldn't swim Pup w/2 adults
4610	4-14-71	<i>Phoca</i>	♂	46	38	37	28 1/2	Edge $\frac{7}{250}$	57°44' 170°47'	Pup w/2 adults
4611	Tag broke		-	-	-	-	-	-	-	-
4612	4-14-71	<i>Phoca</i>	♀	42 1/2	-	36 1/4	27 3/4	Edge $\frac{7}{250}$	57°36' 170°46'	Pup w/2 adults
4613	4-14-71	<i>Phoca</i>	♀	36 1/2	38 3/4	35	26 1/2	Edge $\frac{7}{250}$	57°50' 170°33'	Pup w/2 adults
4614	4-14-71	<i>Phoca</i>	♀	32 1/2	36 7/8	33	25 1/2	Edge $\frac{7}{250}$	57°50' 170°32'	Pup w/2 adults
4615	4-14-71	<i>Phoca</i>	♂	42 1/2	38 1/2	36 1/2	27 1/2	Edge $\frac{7}{250}$	57°50' 170°30'	umbilical attached Pup w/2 adults
4616	4-14-71	<i>Phoca</i>	♂	37 1/2	37	34 1/2	23 1/4	Edge $\frac{7}{250}$	57°48' 170°28'	Pup w/2 adults

Table 1. Continued.

Tag #	Date	Species	Sex	Weight lbs.	Length inches	Std. Len. inches	Girth inches	Ice Type*	Position	Remarks
4617	4-14-71	<i>Phoca</i>	♀	-	-	-	-	Edge $\frac{7}{250}$	57°48' 170°28'	Adult female Mother of above
4618	4-15-71	<i>Phoca</i>	♂	43 1/2	37 1/2	35 3/4	27 3/4	Edge $\frac{7}{250}$	57°47' 169°58'	Pup w/2 adults
4619	4-15-71	<i>Phoca</i>	♂	47	36 3/4	33	29 1/4	Edge $\frac{7}{250}$	57°46' 170°03'	Pup w/2 adults
4620	4-15-71	<i>Phoca</i>	♂	29	35 1/2	33 1/2	22 1/2	Edge $\frac{7}{250}$	57°45' 169°56'	Pup w/2 adults Umbilical attached
4621	4-15-71	<i>Phoca</i>	♂	34	36	34 1/2	23 1/2	Edge $\frac{7}{250}$	57°45' 169°56'	Pup w/2 adults
4622	4-15-71	<i>Phoca</i>	♀	37 1/2	38	37	27	Edge $\frac{7}{250}$	57°45' 169°56'	Pup w/2 adults
∞ 4623	4-15-71	<i>Phoca</i>	♀	29 1/2	35	32 1/4	22 3/4	Edge $\frac{7}{250}$	57°45' 169°52'	Pup w/2 adults
4624	4-15-71	<i>Phoca</i>	♀	-	-	-	-	Edge $\frac{7}{250}$	57°46' 169°49'	Adult female Mother of 4625
**4625	4-15-71	<i>Phoca</i>	♀	16 1/2	30	30 1/2	21	Edge $\frac{7}{250}$	57°46' 169°49'	Pup w/2 adults New born
4626	4-16-71	<i>Phoca</i>	♀	22 1/2	34 1/2	33	20	Edge $\frac{7}{250}$	57°46' 169°49'	Pup w/2 adults New born blood on ice
4627	4-16-71	<i>Phoca</i>	♂	19 1/2	35	33	20 1/4	Edge $\frac{7}{250}$	57°47' 169°34'	Pup w/2 adults New born blood & after birth
4628	4-16-71	<i>Phoca</i>	♂	24 1/2	33 1/4	31	21	Edge $\frac{7}{250}$	57°48' 169°35'	Pup w/2 adults
**4629	4-16-71	<i>Phoca</i>	♀	30 1/2	36 3/4	34 3/4	22 3/4	Edge $\frac{7}{250}$	57°97' 169°25'	Pup w/2 adults
4630	4-16-71	<i>Phoca</i>	♂	57 1/2	40 3/4	40	28	Edge $\frac{7}{250}$	57°48' 169°21'	Pup w/2 adults
4631	4-16-71	<i>Phoca</i>	♀	31 1/2	36	34 3/4	24	Edge $\frac{7}{250}$	57°49' 169°20'	Pup w/2 adults Red umbilical

Table 1. Continued.

Tag #	Date	Species	Sex	Weight lbs.	Length inches	Std. Len. inches	Girth inches	Ice Type*	Position	Remarks
4632	4-16-71	<i>Phoca</i>	♂	50 1/2	40 1/2	37	28 1/2	Edge $\frac{7}{250}$	57°46' 169°16'	Pup w/2 adults Red umbilical
4633	4-16-71	<i>Phoca</i>	♂	22	34	32 1/2	24	Edge $\frac{7}{250}$	57°47' 169°12'	Pup - only 1 adult present - new born
4634	4-16-71	<i>Phoca</i>	♀	24 1/2	35	32 1/2	25 1/2	Edge $\frac{7}{250}$	57°47' 169°10'	Pup w/2 adults New born
4635	4-16-71	<i>Phoca</i>	♀	37 1/2	36	33	25 3/4	Edge $\frac{7}{250}$	57°45' 169°07'	Pup w/2 adults
4636	4-16-71	<i>Phoca</i>	♂	44 1/2	36 1/2	34 1/4	29 1/4	Edge $\frac{7}{250}$	57°46' 168°56'	Pup w/2 adults
4637	4-17-71	<i>Phoca</i>	♀	23 1/2	32 1/4	30 1/2	21 1/4	Edge $\frac{5}{230}$	57°52' 168°05'	Pup w/2 adults New born
4638	4-17-71	<i>Phoca</i>	♀	-	-	-	-	Edge $\frac{4}{130}$	57°52' 168°27'	Adult female Mother of below
4639	4-17-71	<i>Phoca</i>	♀	18 1/2	31	29 1/2	19	Edge $\frac{4}{220}$	57°52' 168°27'	Pup w/2 adults New born Red umbilical
4640	4-17-71	<i>Phoca</i>	♀	22 1/2	34	34	22 1/4	Edge $\frac{4}{220}$	57°57' 168°58'	Pup w/2 adults New born Red umbilical
4641	4-18-71	<i>Phoca</i>	♂	47 1/2	38	35 1/2	30 3/4	Edge $\frac{7}{430}$	57°06' 169°43'	Pup w/2 adults
4642	4-18-71	<i>Phoca</i>	♀	-	-	-	-	Edge $\frac{7}{430}$	57°16' 169°30'	Adult female Mother of below
4643	4-18-71	<i>Phoca</i>	?	45 1/2	-	-	-	Edge $\frac{7}{430}$		No tag in sack No measurements
4644	4-19-71	<i>Phoca</i>	♂	32 1/2	36 1/2	34 1/2	24 1/4	Edge $\frac{5}{140}$	57°22' 169°12'	Pup w/2 adults
4645	4-19-71	<i>Phoca</i>	♀	44 1/2	39	35 3/4	27	Edge $\frac{5}{140}$	57°24' 169°13'	Pup w/2 adults 200 yds. from 4644
4646	4-19-71	<i>Phoca</i>	♀	20 1/2	33 1/2	29 1/4	20 1/4	Edge $\frac{5}{140}$	57°26' 169°15'	Pup w/2 adults New born

Table 1. Continued.

Tag #	Date	Species	Sex	Weight lbs.	Length inches	Std. Len. inches	Girth inches	Ice Type*	Position	Remarks
4647	4-19-71	<i>Phoca</i>	?	25 1/2	35 1/4	32	21 1/2	Edge $\frac{7}{250}$	57°29' 169°15'	Pup w/2 adults
4648	4-19-71	<i>Phoca</i>	?	19 1/2	32 1/2	28 1/2	21 1/2	Edge $\frac{7}{250}$	57°30' 169°07'	Pup w/2 adults
4649	4-19-71	<i>Phoca</i>	♀	30 1/2	33 1/2	31 1/2	25 1/2	Edge $\frac{7}{250}$	57°30' 169°08'	Pup w/2 adults
4650	4-19-71	<i>Phoca</i>	♂	27 1/2	34 1/2	32 1/2	24	Edge $\frac{6}{240}$	57°33' 168°53'	Pup w/2 adults
4651	4-19-71	<i>Phoca</i>	♂	24 1/2	37	34	21 1/2	Edge $\frac{6}{240}$	57°36' 168°52'	Pup w/2 adults
10 4652	4-19-71	<i>Phoca</i>	♀	-	-	-	-	Edge $\frac{6}{240}$	57°43' 168°54'	Adult female Mother of 4653
4653	4-19-71	<i>Phoca</i>	♀	34 1/2	35	32 1/2	26 3/4	Edge $\frac{6}{240}$		Pup w/2 adults
4654	4-19-71	<i>Phoca</i>	♂	35 1/2	36	33 1/2	25	Edge $\frac{5}{230}$	57°48' 168°59'	Pup w/2 adults
4655	4-19-71	<i>Histiophoca</i>	♂	32 1/2	36	34 1/4	26	Edge $\frac{5}{230}$	57°54' 168°58'	Pup w/female only
4656	4-20-71	<i>Phoca</i>	♂	25 1/2	35 1/2	33 3/4	24 3/4	Edge $\frac{7}{250}$	57°58' 166°30'	Pup w/female only

* Standard U. S. Coast Guard designation of sea ice indicating total area of sea covered by ice (complete cover = 8), and type of ice present. First number in denominator indicates proportion of new ice; second numeral, ice of medium thickness; and third numeral, heavy or multi-year ice.

**Subsequently recovered.

Table 2. Seals tagged - *Alpha Helix* - April, 1972.

Tag #	Date	Species	Sex	Weight lbs.	Length inches	Girth inches	Ice Type*	Position	Remarks
5301	4-24-72	<i>Phoca</i>	?	42	-	-	Edge $\frac{3}{030}$	56°25.5' 166°33'	W/2 adults
5302	4-24-72	<i>Phoca</i>	♂	53	37 1/4	29	Edge $\frac{3}{030}$	56°25.5' 166°33'	Pup w/2 adults
5306	4-25-72	<i>Phoca</i>	Tag broke						
5307	4-25-72	<i>Phoca</i>	♂	44	36	26	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5308	Tag broke								
5309	4-25-72	<i>Phoca</i>	♂	83	41 1/2	36 1/2	Edge $\frac{4}{040}$	57°38' 166°17'	Swam away w/parents After tagged Moulting heavily
5310	4-25-72	<i>Phoca</i>	♂	48	36 1/2	28 1/2	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5311	4-25-72	<i>Phoca</i>	♀	53	36 1/2	30	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5312	4-25-72	<i>Phoca</i>	♂	53	38	31	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5313	4-25-72	<i>Phoca</i>	♀	63	39 1/2	30	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5314	4-25-72	<i>Phoca</i>	♂	62	39 1/2	29 1/2	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5315	4-25-72	<i>Phoca</i>	♀	47	36	26	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5316	4-25-72	<i>Phoca</i>	♀	45	36	25	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5317	4-25-72	<i>Phoca</i>	♂	48	36	26	Edge $\frac{4}{040}$	57°38' 166°17'	Pup w/2 adults
5318	4-26-72	<i>Phoca</i>	?	51	37 1/4	28 1/2	Edge $\frac{3}{030}$	57°22' 167°21'	Pup w/2 adults

Table 2. Continued.

Tag #	Date	Species	Sex	Weight lbs.	Length inches	Girth inches	Ice Type*	Position	Remarks
5319	Tag broke								
5320	4-26-72	<i>Phoca</i>	♀	59	37	31	Edge $\frac{4}{040}$	57°22' 167°21'	Pup w/2 adults
5321	4-26-72	<i>Phoca</i>	♂	61	39	33	Edge $\frac{4}{040}$	57°22' 167°21'	Pup w/2 adults Molting nose & flippers
5322	4-26-72	<i>Phoca</i>	♀	64	40	35 1/2	Edge $\frac{4}{040}$	57°22' 167°21'	Pup w/2 adults No molt
5323	4-26-72	<i>Phoca</i>	♂	74	41	33 1/2	Edge $\frac{4}{040}$	57°22' 167°21'	Only mother present No molt
5324	4-26-72	<i>Phoca</i>	♂	39	37	25 1/2	Edge $\frac{4}{040}$	57°22' 167°21'	Pup w/2 adults
5325	4-27-72	<i>Phoca</i>	♂	72	42	33	Edge $\frac{4}{040}$	56°53' 167°11'	Pup w/2 adults No appreciable molt
5326	4-27-72	<i>Phoca</i>	♀	50	38	29 1/2	Edge $\frac{4}{040}$	56°53' 167°11'	Pup all alone
5398	4-26-72	<i>Phoca</i>	♀	52	38	30	Edge $\frac{3}{030}$	57°22' 167°21'	Pup w/2 adults
5399	4-25-72	<i>Histiophoca</i>	♀	-	-	-	Edge $\frac{3}{030}$	57°38' 166°17'	Pup swam away before it could be captured
5400	4-25-72	<i>Phoca</i>	♀	-	-	-	Edge $\frac{3}{030}$	57°38' 166°17'	Mother of 3314

*Standard U. S. Coast Guard designation of sea ice indicating total area of sea covered by ice (complete cover = 8), and type of ice present. First number in denominator indicates proportion of new ice; second numeral, ice of medium thickness; and third numeral, heavy or multi-year ice.

was accomplished using an otter trawl in those areas where marine mammals were abundant. The objective of this test fishing was to determine the array of fishes and benthos available to marine mammals in light of what items were actually consumed by the different seal species.

Almost all of the fishes have been identified. Many of the invertebrates were sent to specialists and identifications are not yet available. Identification of fresh caught fishes and the soft invertebrates is necessary. From these, potentially diagnostic parts such as skeletons, otoliths, operculae, spines, etc., were removed to provide reference material for identification of similar remains in seal stomachs. Dr. John E. Fitch, California Department of Fish and Game, has provided identifications of otoliths from some fish species.

During 1972 the Alaska Department of Fish and Game also became involved in the ERTS-1 (Earth Resource Technology Satellite) program. Photo-imagery from this satellite provides the opportunity to study characteristics of sea ice on a year-round seasonal basis. Preliminary analysis of available data indicates that this program has tremendous application to other studies of marine mammal ecology in general. Considerable effort will be devoted to this aspect of the project during the next report period.

During November, 1972, a brief cruise in waters near Juneau, Alaska, was made at the invitation of Mr. Karl Lane. Specimens, including fetuses, were obtained from 21 seals representing the land-breeding subspecies *Phoca vitulina richardii*. These specimens, important as a source of comparative material, were acquired prior to December 21 when the new "Marine Mammal Protection Act of 1972" took effect. It was thought (apparently correctly) that difficulties would arise in obtaining material after implementation of the Bill.

Data Analysis and Reporting

As stated in the objectives, this project was instituted to document and set aside time required for the preparation of reports and publications on selected phases of the Arctic marine mammal investigations conducted to date. Formulation, passage and eventual implementation of the "Marine Mammal Protection Act of 1972," P.L. 92-522, greatly affected marine mammal management in the State of Alaska. Accordingly, considerable effort was devoted to formulation of recommendations at all stages of legislative proceedings relative to these bills. Additional work was required to meet the mandates of the final bill which was signed into law on October 21, 1972.

This law requires, among other things, the submission of species status reports. These were prepared by Department members and submitted, along with other supporting information, to the Departments of Commerce and Interior. Reports concerning the ice inhabiting seals were prepared and are included as part of this job report:

Species Status Reports

1. Ice breeding spotted seal (*Phoca vitulina largha*).

Distribution and Migration: It is clear today that both ice-breeding and land-breeding populations of spotted seals occur in the Bering Sea. The land-breeding seals occur primarily along the north coast of the Alaska Peninsula and Aleutian Islands, while the ice-breeding form occupies a wide range, depending upon season, throughout the northern Bering and Chukchi seas. Work in progress at the moment indicates that, based on morphological differences, the two types of spotted seals can be easily identified. We are concerned here with the *largha* or ice-breeding form. *Largha* seals are seasonally dependent upon sea ice for the birth and nurture of their pups. During winter and early spring the entire population is concentrated along the southern edge of the seasonal pack ice, usually in central Bering Sea. These seals move northward and toward the coasts as the seasonal retreat and disintegration of sea ice progresses. During the ice-free summer and early fall they occur along the entire coast of northern Alaska. The spotted seal is the dominant near-shore seal during ice-free seasons of the year, and is replaced by the ringed seal when ice is present.

Abundance and Trends: No satisfactory method of accurately censusing *largha* seals has been attempted to date. Indirect methods and relative indices of abundance indicate that the population level of this species is high and probably stable. Three ship expeditions (1968, 1971 and 1972) revealed that during the pupping and breeding seasons adults and pups are relatively evenly distributed throughout the ice front zone in groups composed of an adult male, adult female and her pup. These groups are rarely closer than 0.25 km to each other. Nonbreeding and subadult seals occupy the same area but seldom haul out on the ice at this time of year. A population estimate by the Alaska Department of Fish and Game, based on field observations and relative abundance in comparison with other species, indicates a minimum population of 200,000 to 250,000 seals. Soviet estimates indicate the *largha* population at 450,000 animals. Annual harvests by both Americans and Soviets are around 7,000 per year, far below the maximum sustained yield.

General Biology: *Largha* seals are of medium size; large adults of both sexes weigh between 114 and 136 kg. Pups weigh between 9.5 and 11.8 kg and are about 84 cm long at birth. Adult seals pair up in March for the duration of the breeding season, and a white-coated pup is born to each pair, on the ice, from late March to mid-April. The pup is suckled for about four weeks, in which time its weight is tripled. Males become sexually mature at 4 to 5 years of age; females at 3 or 4 years. Breeding is annual, and the gestation period (including delayed implantation) is about 10.5 months. These seals are monogamous. Maximum longevity is at least 35 years. Although isolated in pairs during the breeding season, adults are gregarious at other times. The diet of these seals is quite varied depending upon season and location, including primarily pelagic, demersal and anadromous fishes, cephalopods and crustaceans.

Pathology: Very few cases of severe pathology have been observed in

largha seals. Almost all adult seals have anisakid round worms and corynosomid acanthocephalans. Occasionally, high infestations of anopluran lice are observed. This seems to be associated with the occurrence of filarial heart worms, the lice perhaps serving as the vector. Toxoplasma has been reported in captive animals, but its presence in wild seals is as yet unverified. Pesticide residues are present in these seals at relatively low levels: DDE, 0.15 to 0.45 ppm on fat; DDD, 0.053 to 0.10 ppm; DDT, 0.18 to 0.26 ppm. The presence of PCB's ranged from 1.11 to 1.85 ppm. Mercury accumulations in a sample of ten seals averaged 0.89 micrograms/gram of wet liver tissue, 0.41 in kidney, 0.21 in muscle and 0.34 in depot fat. Severely scarred animals are frequently encountered, particularly during the spring. This is probably normally associated with fighting during the breeding season.

Ecological Problems: Competition presently exists between these seals and man with respect to commercially important fishes (i.e., herring, smelt, whitefish and salmon) and with respect to fishing gear. In some parts of their range spotted seals have been found to contribute to high worm infections of fish, notably gadids, and control measures have been exercised. This is not a problem in northern Alaska at present. Mineral development, notably for oil and gas, poses the most serious direct and indirect threats to spotted seals. These seals are extremely responsive to disturbance and will leave a hauling area after only minor harrassment. Continual disturbance from people or equipment, or poorly chosen flight routes for aircraft could render extensive areas of coastline unsuitable for these seals to haul out. The indirect effects of oil and gas development pose the most serious potential threat through reduction of primary production and incorporation of contaminants into food webs.

Allocation Problems: On an international level, no allocation problems exist at present. The combined U. S. and Soviet harvests are approximately 7,000 spotted seals per year, well within the biological productivity of this species. On a national level, implementation of Public Law 92-522 has designated rights to specific users based on ethnic background, denying these rights to other users. Therefore, in the United States, at present, management (including utilization) is no longer based on biological productivity of this species.

Regulations: The State of Alaska permitted hunting of *largha* seals in Game Management Units 17, 18, 22, 23 and 26 (the coast of Alaska north of approximately 58°30'N) with no restrictions of season or bag limit. Hunting is actually controlled by regional climatic conditions and availability of seals. At most coastal locations these seals are available mainly during the spring and fall migrations. Some *largha* seals are taken during the summer months, primarily on the major islands. Average annual harvest by Alaskan residents is around 3,000 animals. A permit is required for the export of raw hides. A \$3 bounty (in actuality a form of welfare to native hunters) was paid for the scalp of each seal submitted to the state. This bounty, authorized by the Alaska Legislature, is still in effect; however, no funds for payment have been allocated.

Current Research and Funding: Research of *largha* seals conducted by U. S. nationals during FY 72 included: three weeks of a six-week

research cruise of the R/V *Alpha Helix* operated by the Scripps Institute of Oceanography; ongoing programs of investigation by the Alaska Department of Fish and Game; the Alaska Sea Grant Program, in cooperation with the University of Alaska; and segments of other studies supported by Sea Grant and the U. S. Department of Health, Education and Welfare. These investigations were addressed to questions including: population identification, utilization, distribution and movements, reproductive biology, food habits, growth, ecology, social behavior and physiology. The agencies and institutes engaged in spotted seal research, or directly involved in providing essential technical or logistic support for it, and their estimated expenditures to this end in FY 72 were:

NSF through Scripps Institute (operation of R/V <i>Alpha Helix</i> - 3 weeks)	35,700
NSF through Scripps Institute (support of scientific crew - 3 weeks)	35,000 (?)
ADF&G (assessment, natural history, ecology, harvest: 1 biologist full-time, 3 biologists part-time)	26,000
Alaska Sea Grant - University of Alaska (1 student full-time, 1 student part-time, support of other programs)	<u>13,000</u>
	109,700±

Funding for research and management of *largha* seals during FY 73 will probably be considerably less due to the intermittent nature of research cruises and uncertainties imposed by passage of Public Law 92-522.

2. Ribbon Seal (*Phoca fasciata*).

Distribution and Migration: Based on geographic considerations, ribbon seals are separable into two groups, the Okhotsk and the Bering-Chukchi "populations." Nothing is known about exchange between these groups. However, based on the lack of physical barriers and the apparent continuity of suitable habitat, it is probable that exchange does occur. In the latter group the center of abundance is in central Bering Sea. As with *largha* seals, ribbon seals are seasonally dependent upon sea ice for the birth and nurture of their pups. During winter and early spring the entire population is concentrated along the southern edge of the seasonal ice. Concentrations of both spotted and ribbon seals can be located in the ice front zone during March through early June. However, in most years, by the time the ice edge is receding north through Bering Strait, there are only a small number of ribbon seals associated with it, although spotted seals are numerous. All evidence to date indicates that ribbon seals are pelagic, mainly in Bering Sea, during ice-free seasons.

Abundance and Trends: No satisfactory method of accurately censusing ribbon seals in the Bering Sea has been attempted to date. Indirect methods and relative indices of abundance indicate that the population

level of this species is relatively low and has been markedly reduced during the last 10 years. This reduction is attributed to commercial hunting by the Soviet far-eastern sealing fleet. In recent years, Soviet regulations have accorded increased protection to this species. U. S. nationals harvest very few of these animals. A population estimate by the Alaska Department of Fish and Game, based on field observations and relative abundance in comparison with other species, indicates a population probably not exceeding 100,000 animals. Soviet estimates indicate a population of 80,000 to 90,000 seals.

General Biology: Ribbon seals are of medium size; adults of both sexes averaging about 155 cm long and 80 kg in weight. There is a marked seasonal change in weight. The largest animal examined to date was a 23-year-old female, obtained in late-March and supporting a near-term fetus. This seal was 179.7 cm long, girth was 114.3 cm, blubber thickness 6.1 cm and weight 148.2 kg. Pups are born as whitecoats during late-March to mid-April and average about 10.0 kg and 80 cm. Lactation lasts about four weeks, in which time their weight is tripled. Males become sexually mature between 3 and 5 years of age; females between 2 and 4. Breeding is annual, and the gestation period (including delayed implantation) is probably around 10.5 months. Maximum longevity is 22 to 26 years. The diet of these seals during late winter and early spring (in the ice edge zone) is similar to that of the spotted seal, including primarily pelagic and demersal fishes, cephalopods, and small crustaceans.

Pathology: Little is known about the pathology of this seal. Several different parasites have been recovered from animals autopsied for this purpose, but specific identifications are as yet incomplete. It appears that ribbon seals are the hosts for anisakid round worms, corynosomid acanthocephalans, filarial heart worms and anopluran lice. No information is available at present concerning pesticide residues or heavy metals, but it is assumed they would be similar to values found in spotted seals.

Ecological Problems: Little competition is known to exist between ribbon seals and man for fishery resources. These seals seldom frequent coastal areas. Commercial hunting has reduced the population of these seals, and measures have been taken to reduce the annual harvest by Soviet commercial sealers. In Alaska, the harvest is usually less than 250 ribbon seals per year. Mineral development poses the most serious threat to these seals through reduction of primary production of the marine system, direct mortality to juvenile fishes important to ribbon seals, and incorporation of contaminants into food webs.

Allocation Problems: None at present.

Regulations: The State of Alaska permitted hunting of ribbon seals in Game Management Units 17, 18, 22, 23 and 26 (the coast of Alaska north of approximately 58°30'N) with no restrictions of season or bag limit. Hunting is actually controlled by regional climatic conditions and availability of seals. At most coastal locations these seals are available mainly during the spring and fall migrations. Average annual

harvest by Alaskan residents is around 250 animals. A permit is required for the export of raw hides. A \$3 bounty (in actuality a form of welfare to native hunters) was paid for the scalp of each seal submitted to the state. This bounty, authorized by the Alaska Legislature, is still in effect; however, no funds for payment have been allocated.

Current Research and Funding: During FY 72 no research or management programs were specifically directed toward ribbon seals. However, work (including natural history and harvest assessment) was conducted in conjunction with other programs of the Alaska Department of Fish and Game (see expenditures indicated for spotted seals). In view of the uncertainties imposed by passage of P.L. 92-522, work on ribbon seals (mainly harvest assessment and selective biological sampling) as well as the other seal species may be greatly reduced. Any investigations of this species are contingent upon the availability of a suitable, ice reinforced research vessel.

3. Pacific Bearded Seal (*Erignathus barbatus*).

Distribution and Migration: Bearded seals are usually solitary animals which occur throughout the wide area of seasonal ice cover. In late winter and early spring they occur from the southern edge of the ice pack in Bering Sea, north to the solid cover of the polar pack ice. They do not occur in areas of unbroken, land-fast ice. However, at this time of year most of the bearded seal population is south of Bering Strait, whereas during late summer and early fall they are distributed along the edge of the polar pack ice. Thus, the marked seasonal migrations are associated with the advance and retreat of ice. Bearded seals do not normally come ashore on land.

Abundance and Trends: As with the other phocid seals of the Bering and Chukchi seas, no satisfactory method of accurately censusing bearded seals has been attempted to date. Indirect methods and relative indices of abundance of this widely distributed seal indicate that the population level is high and relatively stable. Soviet estimates place the population level of Pacific bearded seals (those occurring in the East-Siberian, Chukchi, Bering, Okhotsk and Japanese seas) at 450,000 animals. Estimates by the Alaska Department of Fish and Game indicate a population of 300,000 animals in the Bering and Chukchi seas (the population which migrates seasonally into the East-Siberian and Beaufort seas). Annual harvests by both Americans and Soviets, in the Bering and Chukchi seas, are around 8,000 to 10,000 animals. Although bearded seals are mainly solitary, they do congregate in favorable areas.

General Biology: This is the largest phocid seal of the western Arctic and sub-Arctic. Some adult females are slightly larger than males, but for the most part, the sexes appear similar in size. Large adults attain a weight during winter in excess of 340 kg. From June through September adult seals weigh from 215 to 240 kg. The average length of adults is about 236 cm. Females bear a single pup, usually during late April or early May. Pups at birth are about 31 kg and 132 cm long. Their weight is increased about three-fold by the end of the 12- to 18-day nursing period. The gestation period is 10.5 months, including 2.5 months of

delayed implantation. Some females ovulate at 3 years of age, but reproductive maturity is not attained until they are 5 or 6 years old. Males become sexually mature at 6 or 7 years. The incidence of pregnancy in adult females is around 85 percent, and the sex ratios of samples from Alaska consistently show slightly more females than males in the population. These seals eat a wide variety of invertebrates and some demersal fishes found on the rich, shallow Bering-Chukchi platform. Although the variety of foods is large, the main items include crabs, shrimp, clams, and amphipods. The greatest volume of food found in a single stomach was about 5.5 liters.

Pathology: Few cases of severe pathology have been observed in bearded seals. Almost all adults have heavy burdens of anisakid round worms and lesser numbers of corynosomid acanthocephalans. Anopluran lice are also common, usually in low numbers. On two occasions unthrifty animals have been found which were unable to move away from Eskimo hunters. Both seals had been laying on the ice long enough that they had melted out deep depressions. Neither of these seals were killed by the hunters due to their poor condition. Pesticide residues are probably present in these seals at relatively low levels, as judged by their presence in other seals of this region. Mercury accumulations in a sample of four bearded seals averaged 1.91 micrograms/gram of wet liver tissue, 0.38 in kidney, 0.15 in muscle and 0.02 in depot fat. Severely scarred animals are common.

Ecological Problems: Bearded seals utilize some prey species presently of interest to man. Most notable of these are the pandalid and crangonid shrimps and lithode crabs. These seals do not directly compete for commercially important fish species and pose no threat from the standpoint of damage to fishing gear. They are the final host for anisakid worms which infect fishes. However, this is not a problem in northern Alaska at present. Mineral development, notably for oil and gas, poses the most serious threat to bearded seals through the rapid introduction of petrochemical pollutants into bottom sediments and benthic organisms.

Allocation Problems: On an international level no allocation problems exist at present. The combined U. S. and Soviet harvests are approximately 8,000 to 10,000 seals per year, well within the biological productivity of this species. Unfortunately, hunting loss is high and should be reduced. On a national level, implementation of Public Law 92-522 has designated rights to specific users, based on ethnic background, denying these rights to other users. Therefore, in the United States, at present, management (including utilization) is no longer based on biological productivity of this species.

Regulations: Prior to implementation of P.L. 92-522, the State of Alaska permitted the taking of bearded seals, without limit, during the periods June 30-July 31 and October 15-April 30 in Game Management Units 9 and 10 (Alaska Peninsula and Aleutian Islands). In Game Management Units 17, 18, 22, 23 and 26 (north of 58°38'N) there were no restrictions as to season or bag limit. Hunting is actually controlled by regional climatic conditions and availability of seals. At most coastal locations these seals are available mainly during their spring and fall migrations and

during the summer months in northern Alaska. The average annual harvest by Alaskan residents is usually less than 3,000 animals. A permit is required for the export of raw hides. A \$3 bounty was paid for the scalp of each seal submitted to the state. This bounty, authorized by the Alaska Legislature, is still in effect; however, no funds for payment have been allocated.

Current Research and Funding: During FY 72 no research or management programs were specifically directed toward bearded seals. However, work (including natural history and harvest assessment) was conducted in conjunction with other programs of the Alaska Department of Fish and Game (see expenditures indicated for spotted seals). In view of the uncertainties imposed by passage of P.L. 92-522, work on bearded seals (mainly harvest assessment and selective biological sampling) as well as the other seal species may be greatly reduced.

4. Ringed Seal (*Phoca hispida*).

Distribution and Migration: The ringed seal has a wide general range throughout the areas of seasonal ice cover in the Bering and Chukchi seas and extending north into the permanent ice of the Polar Basin. In the Bering and Chukchi seas the majority of ringed seals occupy those regions covered by extensive land-fast ice, in winter. However, non-breeding adults and juveniles may occur anywhere in the ice-covered areas. The association of ringed seals with sea ice results in marked seasonal migrations of animals wintering in the Bering and Chukchi seas and relatively little movement of those seals residing in more northerly areas. The ringed seal is the dominant near-shore seal during months when sea ice is present and is replaced by the spotted seal during ice-free months. A small proportion of the population, mainly juveniles, may remain in ice-free areas during summer.

Abundance and Trends: No satisfactory method of accurately censusing ringed seals, throughout their range, has been attempted to date. A census of ringed seals in areas of land-fast ice along the north coast of Alaska was undertaken in 1970. This census indicated that the density of resident ringed seals varied, depending on region, ranging from 5.36 per square mile in the Chukchi Sea between Point Lay and Wainwright, to 1.06 seals per square mile in the Beaufort Sea between Oliktok and Flaxman Island. Indirect methods and relative indices of abundance indicate that the population level of this species in the Bering and Chukchi seas is high and probably stable. Soviet estimates of the population level of this seal are difficult to evaluate due to their recognition of three subspecies whose ranges overlap. They estimate the population of *P. h. hispida*, the Arctic Ocean population (including the Chukchi Sea) at 5 to 6 million; *P. h. krascheninikovi*, (the western Bering Sea population) at 12,000 animals; and *P. h. ochotensis*, (which extends into Bering Sea) at 800,000 to 1,000,000 animals. Estimates by the Alaska Department of Fish and Game, of the Bering-Chukchi Seas population, indicate about 250,000 ringed seals. Annual harvests by both Soviets and Americans, in the Bering and Chukchi seas, are between 12,000 and 16,000 seals. Almost all of these are taken by shore-based hunters as these seals are not numerous in areas where commercial

sealing vessels operate.

General Biology: The ringed seal is the smallest of our northern seals. Adults of both sexes are about 125 cm, and about 68 kg. Occasionally, much larger individuals are encountered, these usually being females. There is a marked seasonal change in weight; heaviest animals occurring in mid- to late winter. Pups are born as whitecoats during late March to early April in a birth lair in an ice pressure ridge or under drifted snow. The size of newborn pups in the Bering Sea is 58 cm and about 4.0 kg. The pup is suckled for 4 to 6 weeks during which time it more than triples its birth weight. During this nursing period the adult females supporting pups are restricted with respect to the radius of their activities. Males become sexually mature between 6 and 8 years of age, females between 5 and 7. Breeding is annual, and the gestation period (including delayed implantation) is about 10.5 months. These seals are probably monogamous. Maximum longevity exceeds 35 years. Ringed seals tend to be solitary, except that they congregate in areas favorable for feeding, along extensive tide cracks in land-fast ice, and during seasonal migration. The diet of these seals is very variable depending on location and water depth. Major food items in western Alaska include mysids, amphipods, euphausiids, shrimps, saffron cod, polar cod and sculpin.

Pathology: As with the other phocids of the Bering-Chukchi region, very few cases of severe pathology have been observed. Internal parasites are common and include, among other things, anisakid round worms, corynosomid acanthocephalans and anopluran lice. An unidentified campulid trematode has been reported. Pesticide and heavy metal residues have been analyzed. In a sample of 23 seals of various ages residue levels in depot fats were as follows: DDE, 0.12 to 0.71 ppm (wet basis); DDD, 0.068 to 0.32 ppm; DDT, 0.15 to 0.56 ppm; PCB's, 0.55 to 2.25 ppm. Mercury accumulations in a sample of 16 seals averaged 1.33 micrograms per gram of liver (wet tissue), 0.41 in kidney, 0.16 in muscle and 0.33 in depot fat. Severely scarred animals are frequently encountered in spring. This is probably normally associated with fighting during the breeding season.

Ecological Problems: None at present. The seasonal movements and distribution of this seal are such that it does not compete with man for other resources of commercial or subsistence importance. In fact, this seal is the most dependable and important source of food in most northern coastal villages. This seal is mostly solitary and its wide distribution along the coasts and reduced densities in areas where hunting ships can operate does not readily permit the possibility of overexploitation. However, mineral development, notably for oil and gas, poses the most serious threat to these animals through reduced primary productivity of the marine system and rapid introduction of petrochemical pollutants into bottom sediments and the various organisms upon which this seal depends.

Allocation Problems: On an international level, no allocation problems exist at present. The combined American and Soviet harvests are approximately 12,000 to 16,000 seals per year, well within the biological

productivity of this species. On a national level, implementation of Public Law 92-522 has designated rights to specific users, based on ethnic background, denying these rights to other users. Therefore, in the United States, at present, management (including utilization) is no longer based on biological productivity of this species.

Regulations: Prior to implementation of P.L. 92-522, the State of Alaska permitted the taking of ringed seals, without limit, during the period June 30-July 31 and October 15-April 30 in Game Management Units 9 and 10 (Alaska Peninsula and Aleutian Islands). In Game Management Units 17, 18, 22, 23 and 26 (north of 58°30'N) there were no restrictions as to season or bag limit. Hunting is actually controlled by regional climatic conditions and availability of seals. At most coastal locations these seals are available during the entire period when sea ice is present near coastal and island villages. This is the most important species to subsistence hunters. The average annual harvest by Alaskan residents is between 9,000 and 13,000 animals per year. A permit is required for the export of raw hides. A \$3 bounty was paid for the scalp of each seal submitted to the state. This bounty, authorized by the Alaska Legislature, is still in effect; however, no funds for payment have been allocated.

Current Research and Funding: During FY 72 no research or management programs were specifically directed toward ringed seals. However, work (including natural history and harvest assessment) was conducted in conjunction with other programs of the Alaska Department of Fish and Game (see expenditures indicated for spotted seals). In view of the uncertainties imposed by passage of P.L. 92-522, work on ringed seals (mainly harvest assessment and selective biological sampling) as well as the other seal species may be greatly reduced.

Scientific papers which were prepared and/or published during this report period included:

- 1) Burns, J. J., G. C. Ray, F. H. Fay and P. D. Shaughnessy. 1972. Adoption of a strange pup by the ice-inhabiting harbor seal, *Phoca vitulina largha*. J. Mammal. 53(3):594-598.
- 2) Burns, J. J., and S. J. Harbo, Jr. 1972. An aerial census of ringed seals, northern coast of Alaska. Arctic 25(4):279-290.
- 3) Burns, J. J., and J. E. Morrow. The Alaskan Arctic marine mammals and fisheries. Fifth International Congress: Arctic Oil and Gas. Le Havre, France (in press).

Presentations prepared and delivered at scientific conferences during this report period included:

- 1) Burns, J. J. 1971. Biology of the ribbon seal, *Phoca (Histriophaca) fasciata* (Zimmermann) in Bering Sea. 22nd Alaska Sci. Conf., Fairbanks, Aug. 1971.

- 2) Burns, J. J. and F. H. Fay. 1972. Comparative biology of Bering Sea harbor seal populations. 23rd Alaska Sci. Conf., Fairbanks, Aug. 1972.
- 3) Galster, W. and J. J. Burns. 1972. Accumulation of pesticides in Alaskan marine mammals. 23rd Alaska Sci. Conf., Fairbanks, Aug. 1972.

A number of seminars and lectures, covering the Department's marine mammal studies, were presented; most in connection with courses at the University of Alaska.

Preparation of the publication "Alaska's Wildlife and Habitat" involved the efforts of a great many Department members, this writer included. Preparation of the text and distribution of maps concerning the ice inhabiting pinnipeds consumed a significant amount of time.

Seal Harvest Assessment, 1971 and 1972

As indicated in the procedures, several approaches have been used to assess magnitude of the annual seal harvest in western and northern Alaska. In past years, analysis of bounty records provided the basis for estimating this annual harvest. In addition, data obtained by field personnel and from various associated studies (i.e. anthropological investigations in specific villages) have been compiled to estimate the total annual harvest of seals.

The total human population of coastal settlements extending from Platinum to Kaktovik (Barter Island) during 1970, was approximately 15,100 people (Federal Field Committee for Development Planning in Alaska, Community Inventory-Alaska, 1971). With the exceptions of the settlements of Nome, Kotzebue and Barrow, a majority of these people are dependent, to a considerable extent, upon marine mammal resources.

Since about 1966, bounty records have proven unreliable as far as providing any real indication of the annual hair seal harvest. This stems basically from the fact that many seal hunters did not consider the \$3.00 bounty as sufficient incentive for them to bother saving, preparing and submitting seal scalps for bounty. Additionally, there have been several changes in law relating to payment of bounties and many hunters were of the opinion that the bounty was completely removed. As a result, the number of seal scalps submitted for bounty during 1971 and the first half of 1972 was far below the actual number of seals taken. Additionally, funds for payment of bounty on seals were not available after July 1, 1972. Accordingly, no claims were accepted after that date.

Table 3 indicates the harvest of seals in 1965, as indicated by actual bounty records, the village census figures for 1970, the reported harvest for 1971 (as indicated by bounty records) and the estimated seal harvests for the period covered by this report (1971 and 1972).

The calendar year 1971 was a very favorable one for seal hunters in

Table 3. The 1971 and 1972 harvest of hair seals in northern Alaska as indicated by a) bounty records, and b) estimated harvests. Reported seal harvest for 1965 and village census figures for 1970 are included for reference.

Village	Reported Seal Harvest 1965 ¹	Village Population 1970 ²	Reported Harvest 1971	Estimated Seal Harvest 1971 ³	Estimated Seal Harvest 1972 ³
Platinum	0	55	0	20	0
Goodnews Bay	0	218	0	200	100
Qumhagak	0	340	0	150	100
Eek	0	186	0	150	150
Tuntutuliak	0	158	0	100	75
Kwigillingok	0	148	0	100	75
Kipnuk	0	325	0	185	100
Chefornak	0	146	0	125	100
Nightmute	0	127	0	80	50
Mekoryuk	1,332	249	10	1,000	800
Toksook Bay	0	257		100	100
Tununak	0	274	0	400	300
Hooper Bay	1,046	490	269	1,400	1,200
Chevak	629	387	87	300	150
Scammon Bay	319	166	0	200	150
Alukanuk	0	265	0	70	50
Kwiguk (Emonak)	0	439	0	15	15
Stebbins	401	231	0	250	150
St. Michael	0	207	0	100	75
Unalakleet	173	434	20	300	300
Skaktoolik	321	151	0	300	200
Koyuk	172	122	9	150	150
Elim	0	174	0	150	150
Golovin	230	117	38	50	50
White Mountain	0	87	42	50	30
Solomen	0	74	0	25	15
Nome	815	2,488	67	250	250
Gambell	893	372	888	1,200	800
Savoonga	621	364	708	1,500	1,000
Northeast Cape	0	124	0	20	0
Teller	320	220	204	350	200
Brevig Mission	729	123	182	350	200
Wales	761	131	183	300	150
Little Diomed	210	84	279	300	250
Shishmaref	6,604	267	1,244	2,000	1,500
Deering	180	85	0	50	50
Buckland	0	104	0	50	40
Kotzebue	1,131	1,696	12	300	150
Noatak	0	293	0	40	30
Kivalina	827	188	108	350	250
Point Hope	2,016	386	341	2,000	1,800

Table 3. Continued.

Village	Reported Seal Harvest 1965 ¹	Village Population 1970 ²	Reported Harvest 1971	Estimated Seal Harvest 1971 ³	Estimated Seal Harvest 1972 ³
Wainwright	345	315	0	250	250
Barrow	114	2,104	0	1,800	1,600
Kaktovik	0	123	0	70	70
Miscellaneous	826	-	-	400	300
Total	21,015	15,115	4,691	17,540	13,525

¹No seals were bountied from several villages in the Yukon-Kuskokwim Delta due to absence of a bounty agent, or lack of information about the bounty.

²Village census figures (with exceptions of Solomen and Northeast Cape) from Federal Field Committee for Development Planning in Alaska, Anchorage, 1971.

³Estimates based on known seasonal harvests at some villages, reports of interested residents, and estimates by investigators residing in or visiting various villages.

⁴Estimated human population in 1970.

northern Alaska. Unusually extensive and heavy sea ice formed during the winter of 1970-71. The process of spring breakup was prolonged and sea ice persisted along the coast much later than usual. This situation resulted in greater availability of seals to hunters for a longer period of time during the important spring season. The winter of 1971-72 was an unprecedented repeat of similar ice conditions, which favorably affected both the fall hunting success in 1971 and success during the spring of 1972. However, the fall and early winter of 1972 were poor due to warm, stormy weather and a very late freeze-up. Even at the northern hunting sites such as Point Hope and Wainwright, sea ice was not present until late December. These poor conditions adversely affected hunting success at most coastal settlements and resulted in a lower than average annual harvest.

The estimated seal harvest in 1971 was approximately 17,500 animals including ringed, bearded, spotted and ribbon seals. The 1972 harvest was estimated at 13,500 seals.

Although bounty records have not been useful in recent years for indicating total seal harvest during any given year, they do provide useful information concerning the relative success of those hunters that did submit seal scalps for bounty. Comparative hunting success at selected locations for 1971 and the first six months of 1972, as indicated by bounty records, is presented in Table 4.

Hunting success at Gambell, during the period October through December, 1971, was recorded by a resident anthropologist. His records indicate that during that three-month period of fall hunting, 512 seals were taken. Of these, 472 were identified as to species and included 258 spotted seals, 158 ringed seals, 52 bearded seals and 4 ribbon seals (Burgess, personal communication).

RECOMMENDATIONS

It is recommended that: 1) the State of Alaska, in view of the secure population status of ringed, spotted and bearded seals, petition the federal government for removal of the moratorium on these species; 2) support be given to a program which will provide accurate information about the characteristics and magnitude of the annual seal harvest; 3) participation of the State of Alaska, through its Department of Fish and Game, in an international exchange of data and research procedures concerning Bering Sea pinipeds be encouraged; 4) efforts to census seals be made; and 5) monies available through enactment of the "Marine Mammal Protection Act of 1972" be made available to the State of Alaska for continuation of marine mammal management and research programs.

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Table 4. Comparative success of seal hunters that submitted bounty claims in 1971 and the first six months of 1972.

Village	Number of Seals per hunter-1971	Number of Seals per hunter-first six months of 1972
Hooper Bay	19	10
Nome	17	11
Savoonga	23	12
Gambell	34	22
Wales	18	18
Diomede	21	18
Shishmaref	48	44
Point Hope	38	26

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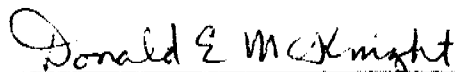
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