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Keith H. Miller, Governor

DEPARTMENT OF FISH AND GAME
Wallace H. Noerenberg, Commissioner

DIVISION OF GAME
James A. Harper, Director

MARINE MAMMAL REPORT - *WARVUS*

by
John J. Burns

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: John J. Burns and Dr. David M. Hopkins, U. S. Geological Survey, Menlo Park, California

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Job Nos.: 1, 2 & 8.3R Job Title: Walrus Study

Job Nos.: 3 & 8.7R Job Title: Marine Environment Study

Period Covered: January 1, 1969 to December 31, 1969

SUMMARY

Collections of bottom dwelling invertebrates of Bering Sea were obtained from summer cruises of two research vessels: the R/V Thomas G. Thompson (U. of Washington), and the USCGS vessel Surveyor. In addition, collections made by Department personnel, in Norton Sound, were obtained. Two publications relative to biological aspects of the marine environment were prepared and accepted for publication, during this report period. Abstracts of these publications are included in this report.

The 1969 harvest of walrus in Alaska was 882 animals. Of these, 620 (70%) were bulls, 186 (21%) were cows and 76 (9%) were calves of either sex. Proportional harvests by season were three percent during late winter, 70 percent during spring, twelve percent during summer, and 15 percent during fall and early winter. A summary of retrieved harvest and total kill at each hunting site is included. Utilization of the 1969 harvest was relatively good, due primarily to a less than average hunting success. Greatest potential value of the 1969 walrus harvest was estimated at \$ 228,965. The actual realized value to hunters and other primary consumers of walrus or their by-products was estimated at \$ 122,400.

This progress report also includes remarks on the continuing use of recently re-established hauling grounds by walrus, and the impact of acculturation and/or assimilation of some Eskimo communities as these factors affect walrus hunting and utilization.

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BACKGROUND

The most appropriate place to begin a background sketch of present day Pacific walrus research and management is with the very beginnings of excessive hunting practices. The following quotations from Allen (1880) aptly describe conditions which prevailed 90 to 100 years ago.

"According to a quotation given by Captain Scammon from The Friend [a newspaper published in Honolulu] of March 1, 1872 the whalers first began to turn their attention to walrus-catching about the year 1868."

The walrus harvest from 1870 to 1880 was reported by Allen (loc. cit.) as follows:

"This amount [of oil and ivory] implies an annual destruction of at least ten to twelve thousand walruses. It thus appears that for the last ten years the number of walruses taken by the whalers alone cannot fall far short of one hundred and twenty thousand. It is hence little wonder that these animals are rapidly declining in number, and that the natives manifest alarm at the disappearance of their main reliance for support."

Concerning the impact of this hunting on the Eskimos, the following comments in Allen (loc. cit.) are disturbingly descriptive:

"A letter from E. F. Nye, barque [whaling ship] Mt. Wollaston, off Cape Lisburne, Arctic Ocean, written to the New Bedford Standard, and dated August 2 (1879), says: '....about half the fleet are in this vicinity, the other half are all over to Cape Seege and the

western walrusing, destroying them by the thousands; about 11,000 have been taken and 30,000 or 40,000 destroyed this year. Another year or perhaps two years will finish them,there will hardly be one left, and I advise all natural history societies and museums to get a specimen while they can. Fully one-third of the [human] population south of St. Lawrence bay (sic.) perished the past winter for want of food, and half the natives of St. Lawrence Island died; one village of 200 inhabitants all died excepting one man!"

The excessive hunting continued, on a reduced scale, until around 1923 when the last major kill by a single ship (1300 animals) was made. The vessel was a trading schooner out of Nome.

It was during the late 1920's and 30's that the walrus population probably reached its lowest level. However, there was little hunting effort except by local residents for the purposes of obtaining food.

World War II started a new wave of activity in western Alaska, and ushered in an era in which "outsiders" began arriving in ever increasing numbers. This trend is still continuing.

The newcomers again created a market for ivory and ivory carvings, which prompted the Eskimo to again begin hunting walruses in numbers beyond those actually required for food. However, at this time there was a concerned awareness of the situation.

Initial biological studies of Pacific walruses were undertaken by Brooks (1954) in order to investigate the life history and ecology of this species. Fay (1955) also studied the spatial ecology, life history and population status of walruses.

After statehood, the Alaska Department of Fish and Game assumed responsibility for both research and management of this species. Our involvement has been intensive and over a continuous period of time.

Objectives of our work have been, and will be, in the general sequence indicated below:

1. Evaluation of annual harvest.
2. Understanding of distribution and movements.
3. Determination of population status.
4. Estimation of gross annual productivity.
5. Estimation of age-specific productivity.
6. Population dynamics.
7. Life history and ecology.
8. Interspecific relationships with other Bering Sea pinnipeds.
9. The walrus in relation to the overall marine environment.

Results of this work have been made available through the Department's annual segment reports, comprehensive reports and several technical and popular articles.

We have always been cognizant of the socio-economic problems involved in walrus utilization and considerable effort has been devoted to this aspect of management.

OBJECTIVES

Job objectives during this report period included: 1) an investigation of the major biological aspects of the marine environment of Bering Sea in relation to walrus ecology; 2) continuing investigation of the interspecific relationships between walruses and other pagophilic pinnipeds of Bering Sea; and 3) continuing studies of walrus life history, especially social organization and food habits of animals on the periphery of their effective range. In addition, current harvest information necessary for effective regulation of this resource was obtained. Parameters of hunting success used as additional indicators of walrus abundance and availability included total harvest, hunting loss, total kill, hunting effort and success per unit of effort. Value of the harvest and actual extent of utilization were also determined as measures of the importance of walruses to the economy of western Alaska.

PROCEDURES

Investigation of the biological aspects of the marine environment in relation to walrus ecology was continued in two ways. Previous arrangements with Dr. David M. Hopkins and Dr. Hans Nelson (U. S. Geological Survey, Menlo Park, California) to obtain biological material and supporting data during research cruises in Bering Sea, were continued. A similar arrangement with University of Washington personnel was also maintained.

The U. S. Geological Survey and University of Washington provided samples of benthos from each oceanographic station during cruises of both the R/V Surveyor and the R/V Thomas G. Thompson. Our efforts consisted of examination and identification of food items actually eaten by walruses.

Understanding of the basic interspecific relationships among Bering Sea pinnipeds, and of the role of each species in the marine environment is a research objective that must be achieved before any sort of integrated management plan can be implemented. All of the various kinds of interactions among species are numerous enough that several investigators could profitably contribute to such a study.

Our efforts along these lines have been restricted to analyses of ecological adaptation (i.e. physiology, morphology and behavior), areal distribution and abundance of walrus in relation to physical environment (primarily ice) and recognition of the ecological niche of each pinniped.

species. The walrus has received greatest attention by virtue of its importance to Alaskan residents, and the fact that its monetary worth may pose management problems.

The walrus life history work was continued in a limited way though the selective sampling of individual animals for such things as seasonal body weights, food habits, determination of reproductive status, etc.

Information concerning walrus hunting, magnitude of the harvest and utilization by Alaskan residents was obtained primarily by Department employees working at the major walrus hunting sites during the main spring hunting season. Magnitude and composition of the walrus harvest at less productive hunting sites were determined through correspondence and interview with resident clergymen, teachers, and village leaders.

Persons assisting on this project either as employees stationed at a hunting site, or as helpful informants included: Messrs. Alexander Akeya, Vernon Slwooko, Sam Stoker, Robert Pegau, Edward Muktoyuk, Jack Lentfer, Rae Baxter and John High.

RESULTS

Two American research vessels operated in Bering Sea during the ice-free period of 1969; the R/V Surveyor of the U.S. Coast and Geodetic Survey, and the R/V Thomas G. Thompson belonging to the University of Washington. Both ships were engaged in studies of marine geology including ocean sediments and stratigraphy. These geological investigations involved bottom sampling in a systematic manner. Biological material taken during the cruises of these ships was turned over to me, along with all pertinent station and sampling data.

At the present time, benthos collections from the following cruises are available for analysis:

R/V Thomas G. Thompson, U. of Washington, 1967, 1968, 1969
R/V Surveyor, U.S.C.G.S., 1966, 1967, 1968, 1969
R/V Oceanographer, U.S.C.G.S., 1967
R/V Virginia City, U.S. Bureau of Mines, 1967
R/V Tomcod, U.S.C.G.S., 1968

In addition, bottom samples obtained by Messrs. Rae Baxter and Mike Geiger, Commercial Fisheries Division, Alaska Department of Fish and Game are available. This material is primarily from the Nome area.

During this report period, considerable time and effort were devoted to the cataloging and preservation of this material for future examination. In addition, the entire collection was packed for shipment to Fairbanks.

To date only two types of invertebrates in these collections have been identified. These are the shrimps and mollusks. Arrangements have been made to analyze and identify all of the material on hand. Identification will be accomplished as the result of a three way division

of labor involving an expert from the University of Alaska, a graduate student specifically working with invertebrates from Bering Sea, and myself.

Our approach to the problem will be to make overlays on a base map showing 1) the distribution of dominant invertebrates; and 2) the occurrence of invertebrates utilized as food by the various pinniped species according to the area in which the seal or walrus was killed. This approach will indicate what each pinniped species selects from the total spectrum of available epifauna.

It is anticipated that at least two more years will be required because of the necessity of developing expertise, and the extensive collections to be processed.

One sidelight of the marine environment studies was completion and publication of a paper entitled, "Birds observed during a cruise in the ice-covered Bering Sea in March 1968," Irving, McRoy and Burns (1970). This was a report of sightings made during the Alpha Helix cruise.

The questions of some interspecific relationships among pinnipeds, specific ecological adaptations, body structure and behavior, were also the subject of a paper prepared and accepted for publication during this report period. An abstract of this paper, entitled, "Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi Seas" (Burns, 1970), is included below:

Five species of pagophilic (ice-loving) pinnipeds live in Bering and Chukchi Seas: Odobenus rosmarus, Phoca (Pusa) hispida, Phoca (Histriophoca) fasciata, an ice breeding form of Phoca (Phoca) vitulina, and Erignathus barbatus. Breeding adults of these species are largely separated from each other during late winter and early spring, when, throughout the pupping and subsequent mating periods, P. vitulina and H. fasciata occupy the edge zone of the seasonal pack ice, E. barbatus and O. rosmarus are mainly farther north within the heavier pack ice, and P. hispida occupies areas of extensive land-fast ice. This paper discusses differences in body structure, ecological adaptation and behavior in relation to distribution of the five species.

During 1969, Albert Iyahuk, a walrus hunter from Little Diomed Island, again reported that walruses utilized the east side of Soviet Big Diomed Island as a hauling ground (Uglit). The re-establishment of regular hauling areas, after many years, is a very significant development. Many such areas were apparently abandoned during the last 90 years, due to harrassment of these animals by white and Eskimo hunters, and probably also because the total population of Pacific walruses was greatly reduced.

The Big Diomed hauling area has now been used each year since 1965. Residents of Little Diomed Island, living only 2.7 miles from the larger

island, reported that the animals are not molested by the Russians which man a military and weather station on Big Diomede. As long as this situation prevails, it can be expected that walruses will continue to frequent this hauling area.

During 1969, the retrieved harvest of walruses in Alaska was 882 animals. Total kill (retrieved harvest + estimated hunting loss including orphaned calves) was estimated at about 1,450 animals. Table 1 presents a summary of the 1969 retrieved harvest, including success at various villages, composition of the harvest, estimated hunting loss and total kill.

Three of the traditional walrus hunting villages in or near Bering Strait (Gambell, Savoonga and Little Diomede Island) harvested 73 percent of the total number taken.

At King Island, formally the single most successful hunting site, only one walrus was taken. It appears that this island village will possibly no longer be a traditionally important hunting site.

Acculturation of the King Island people, and abandonment of the village is of great significance for several reasons: 1) it marks the end of a hunting society which, of all others in western or northern Alaska, was oriented in all respects toward wresting a livelihood from the moving pack ice of Bering Sea; 2) the great numbers of walruses formally killed by hunters from this village (as many as 800 to 900 animals retrieved per year, of which an average of 65 percent were adult females) are no longer being removed from the population; and 3) the King Island ivory carvers are now dependent upon walrus hunters from other villages for the necessary raw ivory to work with. This situation poses serious resource management and socio-economic problems which are proving difficult to cope with.

In the present discussion, reduction of total harvest resulting from the decline of King Island as a hunting site is the significant consideration.

Composition of the 1969 retrieved kill was 620 adult males (70%), 186 adult females (21%) and 76 calves of either sex (9%). Due to selectivity of the hunters, there are very few sub-adult walruses taken. Hunters from St. Lawrence Island prefer females accompanied by calves. At other localities the preference is either cows or bulls with well developed tusks. Sex composition of the 1969 harvest, excluding calves, was 88 percent males and 22 percent females.

The chronological aspect of annual harvests is important from the standpoints of storage, preservation and utilization of meat, availability of animals, and raw ivory supplies available to carvers.

Seasonal harvests and comments concerning conditions that prevailed at different locations during 1969 are summarized below:

Table 1. Retrieved and total kill of walrus in Alaska during 1969.

Location	Walrus Retrieved	Composition of Harvest*						Percent Hunting Loss	Total Kill
		Males		Females		Calves			
		No.	%	No.	%	No.	%		
Mekoryuk	7	7	(100)	0	(0)	0	(0)	40	12
Kuskokwim Area	61	39	(64)	20	(33)	2	(3)	20	76
Gambell	226	122	(55)	58	(25)	46	(20)	40	376
Savoonga	179	159	(89)	9	(5)	11	(6)	50	358
Northeast Cape	3	3	(100)	0	(0)	0	(0)	50	6
Norton Sound	13	110	(77)	3	(23)	0	(0)	20	16
King Island	1	1	(100)	0	(0)	0	(0)	0	1
Wales	6	1	(17)	3	(50)	2	(33)	50	12
Diomedede	229	182	(80)	40	(17)	7	(3)	40**	382
Shishmaref	16	10	(63)	6	(37)	0	(0)	40	27
Point Hope	5	5	(100)	0	(0)	0	(0)	20	6
Wainwright	92	40	(43)	44	(48)	8	(9)	20	115
Barrow	7	7	(100)	0	(0)	0	(0)	20	9
Other Areas	<u>37</u>	<u>34</u>	<u>(92)</u>	<u>3</u>	<u>(8)</u>	<u>0</u>	<u>(0)</u>	<u>20</u>	<u>46</u>
Totals	882	620	70%	186	21%	76	9%	39%	1,443

* The columns "Males" and "Females" include all age groups with the exception of calves of the year.

** The relatively low number of adult females taken at Diomedede during May-June 1969 accounted for the decreased hunting loss (compare previous years' data) as the number of orphaned calves was accordingly much reduced.

Winter Harvest - January through mid-April 1969

Walrus hunting during the mid and late winter period is usually poor. Unfavorable weather, short days, inaccessibility of walrus and heavy ice conditions severely limit the number of walrus taken at this time of the year. The few walrus that are killed are usually shot by seal hunters who happen to be in a favorable location when animals surface near the shore (land-fast) ice. Occasionally, at St. Lawrence Island, walrus haul out on ice where hunters can reach them on foot.

The total winter harvest (from January to mid-April) was 22 bulls. Most of these were taken by hunters from Gambell, Savoonga and Little Diomed. This limited harvest was about 3 percent of the number taken during 1969.

Spring Harvest - mid-April through June 1969

During the spring hunting period, a combination of factors including the northward retreat of the pack ice, extensive areas of open water, favorable weather and availability of walrus during the northward migration enable hunters to make their largest catches. At this season of the year, hunting effort is organized and concerted, with boat crews usually interested only in walrus. If none are available, they will then seek other game. For this reason, the spring harvest of various seal species may not be an accurate indication of either abundance or availability of the seals, but a reflection of these factors as they affect walrus.

Hunting conditions (ice, weather, etc.) were about average around St. Lawrence Island, and poor to average near Little Diomed Island. Hunting effort was drastically reduced at both Savoonga, on St. Lawrence Island, and at Little Diomed. The reasons can be summed up in part by the following comments from field notes of Mr. Sam Stoker.

"In general , the hunting at Diomed was quite poor this year, only 166 walrus being harvested as compared with 540 for 1968. Reasons for this diminished harvest are several, the major factors being unfavorable ice and weather conditions and employment by the Bureau of Indian Affairs of the majority of hunters. From my arrival on May 7 to June 14 about 13 adult hunters were employed six days per week...."

There is a maximum of about 23 hunters on Little Diomed. Construction of a new school building at Savoonga also caused a major reduction in hunting effort. However , the hunting success was still much higher than during 1968, when only 57 walrus were killed.

Changes occurring at King Island were previously mentioned. The King Island hunters, now residing at Nome, were unable to get to King Island until after most of the walrus had passed north. These hunters must travel from Nome to the island by skin boat. Unfavorable weather and

ice conditions frequently prevent a crossing in time to intercept the main migration of walrus. During 1969, two boats made the crossing. However, only one bull walrus was taken.

The total 1969 spring harvest is summarized below:

Spring Harvest 1969

Village or Area	Total Spring Harvest	Males	Females	Calves
Mekoryuk	7	7	0	0
Kuskokwim Area	61	39	20	2
Norton Sound	13	10	3	0
Gambell	176	82	49	45
Savoonga	168	148	9	11
Northeast Cape	3	3	0	0
King Island	1	1	0	0
Diomedes	166	131	29	6
Wales	6	1	3	2
Shishmaref	<u>16</u>	<u>10</u>	<u>6</u>	<u>0</u>
TOTALS	617	432	119	66

% Males = 70% Females = 19% Calves = 11%

This seasonal catch of 617 walruses represents 70 percent of the annual harvest. The 617 walruses taken included 432 males (70%), 119 females (19%) and 66 calves (11%). Hunting success was considerably below average and the 1969 season was, in general, considered poor. During 1968, the important spring harvest amounted to 1,133 walruses.

Hunting Effort During the Spring Season

Various measures of hunting effort and success have been used as general indicators of long term trends in abundance and availability of walruses, changes in hunting effort, and dependence of the people themselves on this marine mammal resource.

Hunting effort has previously remained consistently high at the major hunting sites of Gambell, Savoonga and Little Diomedes Island. King Island is only of sporadic importance. During 1969, hunting effort was greatly reduced due to employment opportunities. It can be expected that any employment opportunity available to men from these villages will result in reduced hunting effort.

Dependence of coastal village residents upon marine mammals as a vital source of food, has been decreasing for several years. The main reason has been a steady increase in purchasing power of village residents, resulting from greater employment opportunities and increased assistance through various welfare programs. Those persons choosing to do so can purchase a significant portion of their food.

A government program (Food Stamps) specifically designed to increase food purchasing ability was instituted in 1967. Full effectiveness or impact was not attained until 1969, at least in the coastal Eskimo villages. This program has greatly reduced the importance of marine mammals to the coastal residents, with some unfavorable side results.

In villages such as those on St. Lawrence Island, a family of six people can purchase stamps which are redeemable for \$170 worth of food, for a price of \$4.50. This same \$4.50 entitles a family of eight to purchase \$210 worth of food stamps. There are several stipulations which supposedly restrict this program to "needy" persons. In practice, however, most village residents that wish to do so can purchase food stamps.

The most unfavorable side result of this and other assistance programs is that the walrus is no longer important to the basic welfare of the people as a source of food and raw material. These animals, however, are abundant and available to the hunters; they have a definite and significant cash value (ivory only); and the hunter in a village has little else to do but hunt. In addition, the productive hunting season coincides with the favorable weather of spring when most men wish to be out.

The net result of these factors is that total utilization of the harvest (with the exception of ivory) is greatly reduced. Walrus are now primarily a source of cash. As a commercial resource the old traditions and basic attitude of respect toward the resource no longer exist; success is no longer measured in terms of full larders, but in maximum dollar return (= largest harvests that can be made). With the presently prevailing conditions, the stage has been set for some major and undesirable kills of Pacific walrus.

From the perhaps unrealistic standpoint of a marine mammal biologist the major shortcoming with regard to most assistance programs (including the above) is that the recipients are mentally, physically or materially obligated to do almost nothing in return. Money obtained from trapping or hunting walrus is not considered income (only wages paid in the form of check, for regular scheduled work). There are no significant conditions attached to assistance benefits at present.

At any rate, hunting effort and success may remain stable or increase for reasons which are inappropriate, particularly if alternate regular employment is not available.

Sixteen different boats participated in the spring walrus hunt at Savoonga, with a maximum of eleven boats out on any given day.

At Gambell, 22 boats hunted at one time or another during the spring season. The maximum number of boats out on any one day was 14.

As mentioned previously, hunting effort at Diomedes was greatly reduced due to employment. There was a total of five skin boats (two little ones and three big ones) available for walrus hunting. However, no more than four boats were used on any single day, and this occurred only once. Most commonly, only one or two boats were out. All variables considered, it is still apparent that the number of boat hours expended per walrus retrieved remains a very reliable indicator of availability which is, in turn, an indication of abundance. Table 2 presents a summary of hunting effort and success at sites in the northern Bering Sea area.

Summer Harvest - July through September 1969

The last successful walrus hunting day at the Bering Strait village of Little Diomedes was on June 10. By June 25, the last remnants of seasonal pack ice had passed north through the Strait. With the exception of a few stray walruses which hauled out on the beaches (some taken by hunters from the eastern part of Norton Sound) and the walruses which occur in Bristol Bay (protected by regulation) the walrus herds were no longer available to Bering Sea hunters.

A few animals were taken by hunters from Kivalina and Point Hope during early July. The most successful summer walrus hunting occurred at Wainwright, where 92 walruses were harvested during late July and early August. Men from Barrow did very little walrus hunting due to alternate employment in the village. At that site, only seven animals were taken.

The walrus harvest during the summer of 1969 is summarized below:

Summer Harvest 1969

Village or Area	Total Summer Harvest	Males	Females	Calves
Kivalina	3	3	0	0
Point Hope	5	5	0	0
Wainwright	92	40	44	8
Barrow	<u>7</u>	<u>7</u>	<u>0</u>	<u>0</u>
TOTALS	107	55	44	8
% Males = 51%		Females = 41%		Calves = 8%

This seasonal harvest was composed of 51 percent males, 41 percent females and 8 percent calves of either sex.

Table 2. Comparative hunting effort and success during the spring walrus hunting seasons in Alaska from 1961-1969.¹

Measure of Effort	Year	Gambell	Savoonga	King Island	Diomedede Island
Number of Hunting Days	1961	13 of 35	-	-	18 of 26
	1962	19 of 33	11 of 28	-	8 of 16
	1963	14 of 20	-	-	11 of 37
	1964	27 of 48	-	13 of 48	21 of 51
	1965	25 of 42	-	6 of 18	16 of 28
	1966	19 of 39	31 of 61	-	24 of 43
	1967	30 of 50	29 of 59	5 of 12	33 of 59
	1968	32 of 56	19 of 48	2 of 8	26 of 50
	1969	28 of 55	23 of 49	-	10 of 44
Boat Hours	1961	910	-	-	399
	1962	947	537	-	140
	1963	810	-	-	320
	1964	1,714	-	199	502
	1965	2,157	-	93	408
	1966	-	2,397	-	538
	1967	-	1,894	65	795
	1968	-	-	32	730
	1969	-	-	-	139
Boat Hours per Walrus Retrieved	1961	5.10	-	-	.75
	1962	4.62	1.80	-	.58
	1963	4.74	-	-	1.20
	1964	29.55	-	1.14	17.31
	1965	5.74	-	.46	2.33
	1966	-	5.30	.40 to .80 ²	1.13
	1967	-	10.41	.50	1.39
	1968	-	-	.80	1.35
	1969	-	-	-	.84

¹ Data include only those hours expended and walrus taken while an observer was at the respective villages.

² Determined by conversations with boat captains regarding success of daily hunts.

Fall Harvest - October through December 1969

After the August hunting season in northern Alaska, walrus are generally not available to Alaskan hunters. This situation prevails until October when the male walrus begin moving south through Bering Strait. It was during late October and early November of 1969 that a large number of bulls hauled out on the west side of Big Diomed Island, as previously mentioned.

Fall hunting was unusually good during 1969. During most years a combination of poor weather, young ice and unpredictable ocean currents, restrict access to walrus even when they are near hunting sites. From October to late December a total of 136 walrus, mostly males, was taken by hunters of the northern Bering Sea area. Most of these were taken during mid-December when they moved south on the heavier pack ice. The total fall and early winter harvest of walrus made by Alaskan hunters is summarized below:

Fall and Early Winter Harvest 1969

Village or Area	Total Fall and Winter Harvest	Males	Females	Calves
Diomed	63	51	11	1
Gambell	50	40	9	1
Savoonga	11	11	0	0
Other Areas	<u>12</u>	<u>9</u>	<u>3</u>	<u>0</u>
TOTALS	136	111	23	2
% Males = 82%		Females = 17%		Calves = 1%

The proportional harvest of walrus, by season, during 1969 was three percent during the January to mid-April period; 70 percent from mid-April through June; 12 percent from July through August; and 15 percent from October through December.

Utilization of the Harvest

Utilization of the important spring harvest of walrus was as follows: at Mekoryuk, the Kuskokwim area, Norton Sound, Wales and Shishmaref, 85 to 95 percent; Gambell, 75 to 80 percent; Savoonga, 60 percent; Little Diomed Island 20 percent. Higher overall utilization of the 1969 spring harvest was primarily due to the relatively poor success. As usual, when the success of individual boats increased, utilization of animals taken decreased.

At the other hunting sites, and during other seasons of the year when fewer walrus were taken, utilization was generally high, amounting to about 80 to 90 percent. Little Diomed Island was the exception. Utilization of the fall harvest at this island village was only about 45 percent.

Value of the 1969 Harvest

The potential value of the 1969 walrus harvest was calculated in the same manner as outlined in previous segment reports. It is based on the following values set forth by Fay (1958) and Harbo (1961):

- Tusks of adult females valued at \$10.00 per pair
- Tusks of adult males valued at \$24.00 per pair
- Tusks, carved, either sex, valued at \$125.00 per pair
- Bacula valued at \$7.00 each
- Walrus meat valued at 10 cents per pound
- Skins of females valued at \$20.00 each

Also included is the value of male skins which are presently sold for \$75.00 each.

The estimated values of the component parts of the 1969 harvest are presented in Table 3. Greatest potential value of the harvest was calculated to have been \$228,965.

Actual realized value to hunters and other walrus "consumers" is estimated at around \$122,400. This includes income derived from the initial sale of raw ivory, ivory carvings and bacula, home utilization of meat and use of some female skins. The actual income is far less than potential income due to poor utilization of meat and hides from males.

RECOMMENDATIONS

It is recommended that the present bag limit of five adult female walrus per hunter, per year, should remain in effect. Efforts should be continued to improve hunting techniques at all villages where walrus are taken. Involvement of the Alaska Federation of Natives in the overall walrus hunting situation, particularly the aspects of inefficient and wasteful hunting practices, should be encouraged. Involvement of the State of Alaska with the international ad. hoc. panel of scientists concerned with Bering Sea pinnipeds, scheduled to meet in conjunction with the International Fur Seal Commission, should be fostered and encouraged.

Table 3. Potential value of the 1969 walrus harvest in Alaska.

Location	Harvest			Value of Ivory		Bacula	Meat*	Value of Skins		Greatest Potential Value
	M	F	Calves	Raw	Carved			M	F	
Mekoryuk	7	0	0	\$ 168	\$ 875	\$ 49	\$ 700	\$ 525	\$ 0	\$ 2,149
Kuskokwim Area	39	20	2	1,136	7,375	273	5,113	2,925	400	16,086
Gambell	122	58	46	3,508	22,500	854	15,979	9,150	1,160	49,643
Savoonga	159	9	11	3,906	21,000	1,113	16,511	11,925	180	50,729
Northeast Cape	3	0	0	72	375	21	300	225	0	921
Norton Sound	10	3	0	270	1,625	70	1,180	750	60	3,685
King Island	1	0	0	24	125	7	100	75	0	307
Wales	1	3	2	54	500	7	293	75	60	935
Diomedes	182	40	7	4,768	27,750	1,274	20,645	13,650	800	64,119
Shishmaref	10	6	0	300	2,000	70	1,360	750	120	4,300
Point Hope	5	0	0	120	625	35	500	375	0	1,535
Wainwright	40	44	8	1,268	10,500	280	6,692	3,000	880	21,352
Barrow	7	0	0	168	875	49	700	525	0	2,149
Other Areas	34	3	0	846	4,625	238	3,580	2,550	60	11,053
Totals	620	186	76	\$16,608	\$100,750	\$4,340	\$73,653	\$46,500	\$3,720	\$228,963

* Utilizable weight is calculated on the basis of 1,000 lbs. for adult males, 600 lbs. for adult females and 65 lbs. for calves.

** Includes the sum of all estimated values with the exception of ivory in the raw (unworked) form.

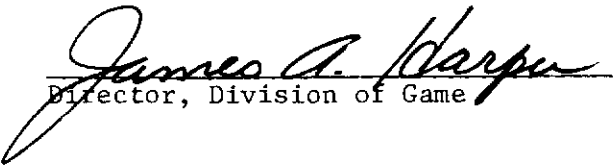
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PREPARED BY:

APPROVED BY:

John J. Burns
Marine Mammal Biologist


James A. Harbo
Director, Division of Game

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: John J. Burns and Dr. Francis H. Fay, Arctic Health
Research Center, Fairbanks; Messrs. Jack Lentfer, Robert
Pegau, Edward Muktoyuk and Sam Stoker, ADF&G; and Mr.
Thomas Menadelook of Teller, Alaska.

Project Nos.: W-17-1 and Project Title: Marine Mammal Investigations
W-17-2

Job Nos.: 3 & 8.4R Job Title: Ribbon Seal Life History

Job Nos.: 3 & 8.5R Job Title: Interspecific Relationship
Between Seals

Job Nos.: 3 & 8.6R Job Title: Spotted Seal Life History

Period Covered: January 1, 1969 to December 31, 1969

SUMMARY

Three publications pertinent to these investigations were published or accepted for publication during this report period. Abstracts are included in the results section. The major involvement with regard to ribbon seal investigations was preparation of a comprehensive report (as yet uncompleted). Specimens and data pertinent to the overall seal research program included material from 29 ringed seals, 74 spotted seals, 8 bearded seals and 5 ribbon seals. The value of seal bounty records for recent years has continued to decline, as far as providing reliable information for estimating total annual seal harvests. Analysis of all data from various sources indicates a total of 44 settlements from which men hunt seals (northwest coast only). These extend from Platinum to Kaktovik on Barter Island. Total population of these settlements during 1969 was 15,680 people; including about 1,560 seal hunters that harvest approximately 17,700 seals of various species.

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BACKGROUND

The various seal species present near the northwest coast of Alaska have traditionally been the economic mainstay of most coastal settlements by providing food, necessary by-products and, in recent years, a means of obtaining cash.

Starting in 1962, several developments prompted initiation of seal investigations on a species by species approach. These included 1) sudden rise in the value of seal pelts for the fur market; 2) initiation of pelagic commercial sealing in Bering Sea by the Soviet Union; 3) increase in the number of seals taken by Alaskan residents; and 4) the unknown status of some species, particularly bearded and ribbon seals.

The bearded seal was (and continues to be) the preferred species as far as hunters are concerned. This animal was the logical subject of initial investigations. However, material was obtained from all species, whenever possible. The general approach to the Arctic marine mammal program involves an understanding of: 1) the biology of each species; 2) relationships and comparisons among species; and 3) relationships of all species to the total marine environment of the seas they occupy.

To date, species accounts of the walrus and bearded seal have been completed; the ribbon seal study is nearing completion, and adequate material is available to begin analysis of spotted seal biology. The ringed seal will also eventually receive attention.

In addition to data presented in these segment reports, both comprehensive reports and publications have been prepared as data warrant.

In 1968, at the urging of concerned scientists and laymen, initial efforts were made to begin thinking of western Arctic seal management through the cooperative efforts of both the Soviet Union and the State of Alaska. This has placed us in the responsible position of providing, as far as possible, information relative to the marine mammal species involved. The on-going program of the Alaska Department of Fish and Game has incorporated this responsibility in overall program goals.

OBJECTIVES

Objectives of work conducted during this report period included:

- 1) completion of two papers suitable for publication concerning the nature and function of underwater sounds of bearded seals (Erignathus), and a major paper about the morphology of ribbon seals Phoca (Histriophoca) fasciata, in relation to systematics of the family Phocidae;
- 2) continuation of the life-history study of Histriophoca including data analysis and, as far as possible, preparation of a comprehensive report about the interspecific relationships among Bering Sea phocids and the marine environment in general; and 4) accumulation of sufficient data and specimen material from Phoca (Phoca) vitulina, the spotted seal, on which to base a comprehensive life-history study of this species. In addition, selected material from Phoca (Pusa) hispida, the ringed seal, was desired in order to investigate various aspects of its ecology in relation to the other species. For management purposes, we also wished to continue with the annual assessment of magnitude, geographical distribution and characteristics of the hair seal (all Bering Sea phocids) harvest in northwest Alaska.

PROCEDURES

The completion and submission of manuscripts suitable for publication involved the straightforward but time consuming tasks of data analysis, writing, preparation of illustrations, rechecking of all references, etc. As previously mentioned, four manuscripts were completed (two of which involved only the Phocidae, and will be discussed in this report). In my case, the most time consuming aspect of writing involves the editing and revision process. In addition to the preparation of manuscripts, I prepared a book review (The World of the Walrus, by Richard Perry) for the "Journal of Wildlife Management". This sort of involvement is documented here because of the significant amount of time involved.

A major amount of time was also devoted to preparation of a monograph synthesizing all of the material, data and pertinent literature available about the ribbon seal, Phoca (Histriophoca) fasciata. This undertaking remains to be completed during the coming year.

As far as possible, the investigation of comparative food habits of Bering Sea seals was continued. Procedures for this work involved determining volume of stomach contents, separation of various prey items, identification of as many food species as possible, and storage of those items to be identified at a later date. Considerable correspondence, and shipping of material has been required to obtain identifications of those items requiring services of an expert to make positive identifications. Polychaetes have proven one of the most difficult items to identify. At such time as our data permits, food habits of all pinnipeds will be compared with quantitative data about the distribution and abundance of invertebrates in the marine environment.

Field collection of data and specimens from seals taken by local hunters was continued, although at a reduced level due to emphasis on reporting. During 1969, the following animals were processed: 29 ringed seals; 74 spotted seals; 8 bearded seals and 5 ribbon seals. The most significant collection was a sample of 51 animals, mostly spotted seals, obtained at Gambell between 3 and 9 February. Normally, spotted seals are not available during the mid-winter period as their normal distribution at this time of year is around the latitude of St. Matthew Island.

Several persons assisted in the collection of specimens and data. These included Jack Lentfer at Barrow, Thomas Menadelook at Teller, Robert Pegau and Edward Muktoyuk at Nome and Sam Stoker at Little Diomed Island.

Almost one month was devoted to cataloging and preparing material for shipment to Fairbanks. In September, my duty station was changed from Nome to Fairbanks, resulting in the anticipated program delay associated with such a change. Edward Muktoyuk and Robert Pegau provided invaluable assistance during the course of this moving process.

As in past years, assessment of magnitude of the annual seal harvest was determined by a combination of procedures including analysis of bounty records, reports from hunters, and observations recorded by Department biologists at various villages, and during different periods of the year.

RESULTS

For the sake of brevity, results included in manuscripts accepted for publication will not be discussed in detail. However, pertinent abstracts are included below.

Burns and Fay (1970):

Study of skulls from 145 ribbon seals, mainly from the Bering Sea, disclosed much greater variation in form than was indicated by earlier descriptions. The characters of greatest diagnostic value in the ribbon seal are the short rostrum, broad cranium with reduced temporal fossae, short, wide palate with small, widely spaced teeth, and the elongate, thick-walled bullae with massive, widely exposed petrosals. Comparison of these skulls with examples from each of the other recognized genera of Phocidae revealed several deficiencies in the referred cranial characteristics of taxa at all ranks below the family. Provisional support for J. E. King's recently proposed division of the Phocidae into two subfamilies, Phocinae and Monachinae, is reported; the distinctions formerly employed for diagnosis of a third subfamily, Cystophorinae, can be ascribed to convergent evolution.

Craniologically, the subfamily Phocinae is divisible into three tribes: Erignathini, Cystophorini, and Phocini. The first two are monotypic; the third is polytypic. The subtribes Phocina and Histriophocina are untenable; while Histriophoca's nearest structural relative is Pagophilus, the latter shows equal or closer relationship with Phoca. Within the tribe Phocini, only the grey seal, Halichoerus grypus, shows sufficient cranial differentiation for recognition as a monotypic genus. The other four major taxa within that tribe show a complex system of intergrading characters that disallows generic recognition, other than as a polytypic group. Therefore, the ribbon, harp, harbor and ringed seals are re-assigned to subgeneric rank, under the inclusive genus Phoca (sensu lato).

Ray, Watkins and Burns (1969), The underwater song of Erignathus (Bearded Seal):

Vocalization by mature males during breeding season. The call consists of a long oscillating frequency-modulated warble that may be more than a minute in duration, followed by a short unmodulated low-frequency moan. It typically starts at about 2,000 cps with many frequency variations and ends as low as 200 cps. This call has been identified with the species by our own observations and those of others. Examination of seals heard calling and which were killed revealed them to be males in breeding condition. Thus this "song" is apparently used solely by mature males in spring courtship season. It is suggested that its purpose is a proclamation of territory or of breeding condition or both.

As previously mentioned, the comprehensive report on ribbon seals also received intermittent attention whenever opportunities arose to work on this manuscript.

Investigations of seal food habits and the biology of Bering Sea spotted seals have not progressed to the point where the data can be synthesized and presented at the present time.

1969 Seal Harvest in Northwest Alaska

As indicated in the procedures, several approaches have been used to assess magnitude of the annual seal harvest. In past years, analysis of bounty records has provided the basis for estimating this annual harvest. In addition to the harvest as indicated by these records, 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 in northwest Alaska.

Since about 1966, bounty records have proven unreliable as far as providing any real indication of the annual seal harvest. This stems basically from the fact that many seal hunters do not consider the \$3.00 bounty to be sufficient incentive for them to go to the trouble of saving, preparing and submitting scalps for bounty. The seal bounty has remained in effect primarily as a means of subsidizing Eskimo seal hunters in northwest Alaska, who, as a group, have been considered by many to be "economically deprived." Employment opportunities and various assistance programs (see walrus segment report) have apparently reduced the importance of seal bounties for additional cash income.

Table 1 indicates the trend as far as reduction in the number of hunters submitting seal scalps for bounty, and the reduced number of seal scalps submitted.

Table 2 is a partial estimate of the actual number of seal hunters in all northwest coastal villages (based on census records) and the estimated 1969 seal harvest. Table 2 is of especial significance as far as pointing out the actual number of people (total population) living in towns and villages along the northwest coast. With the exceptions of Nome, Kotzebue and Barrow, a great majority of these people are dependent to some degree on marine mammal resources. The estimated total harvest of seals is based on 1) general abundance and availability of seals near the various settlements; 2) dependence of residents on subsistence hunting; 3) the estimated number of seal hunters in each village; 4) known seasonal harvests as determined by actual observation and 5) reports from local residents.

The actual census figures are reasonably accurate and indicate a total of 44 settlements from which hunters take seals along the coast from the village of Platinum to Kaktovik on Barter Island. Total population of these settlements is 15,680. It is estimated that there are about 1,560 men that hunt seals at one time or another during the year. A significant number of men hunt during the spring months when game is readily available and boats can be employed. The estimated annual seal harvest is about 17,700 animals.

Considering all factors involved in estimating the total number of men that hunt seals and the estimated annual harvest, I presently consider the figures set forth in Table 2 as slightly conservative. It is requested that area biologists and other department personnel operating in the appropriate areas amend these estimates based on reliable information available to them.

Accurate seal harvest information is necessary in order that the Alaska Department of Fish and Game remain in a position to meet a commitment to the Bering Seal panel of the International Fur Seal Commission. At a February 1970 meeting of this Commission it was agreed that both the Soviet Union and the State of Alaska would provide harvest statistics as an initial step in determining resource utilization, and eventually, formulating a management plan.

Table 1. Changes in numbers of hunters and seal scalps submitted for bounty, as indicated by bounty records for the years 1962, 1965, 1966 and 1969.

Village	1962		1965		1966		1969	
	Hunters	Seals	Hunters	Seals	Hunters	Seals	Hunters	Seals
Platinum	-	43	-	Total for	0	0	-	0
Goodnews Bay	-	213	-	Lower	0	0	-	0
Quinhagak	-	0	-	Kuskokwim	10	157	5	88
Eek	-	104	-	Villages	3	60	-	0
Tuntaluliag	-	0	-	= 826	0	0	1	9
Kwigillingok	-	0	-	"	0	0	-	0
Kipnuk	-	0	-	"	0	0	-	0
Chefornak	-	0	-	"	0	0	-	0
Nightmute	-	0	-	"	0	0	-	0
Mekoryuk	-	0	-	1,332	32	1,087	28	474
Tununak	-	0	-	0	0	0	-	0
Hooper Bay	-	1,114	-	1,332	33	686	18	313
Chevak	-	465	-	629	20	332	5	87
Scammon Bay	-	40	-	319	5	140	3	68
Alakanuk	-	0	-	0	0	0	-	0
Kwiguk	-	0	-	0	0	0	-	0

Table 1. (Continued) Changes in numbers of hunters and seal scalps submitted for bounty, as indicated by bounty records for the years 1962, 1965, 1966 and 1969.

Village	1962		1965		1966		1969	
	Hunters	Seals	Hunters	Seals	Hunters	Seals	Hunters	Seals
Stebbins	-	331	-	401	7	79	3	31
St. Michael	-	57	-	0	1	6	-	0
Unalakleet	-	0	-	173	1	11	1	22
Shaktolik	-	132	-	321	7	128	4	73
Koyuk	-	165	-	172	1	10	3	33
Elim	-	136	-	0	6	133	3	76
Golovin	-	100	-	230	1	19	-	0
White Mtn.	-	6	-	0	-	0	-	0
Solomen	-	0	-	0	-	0	1	30
Nome	-	386	-	815	19	300	4	55
Gambell	-	115	-	893	35	820	21	335
Savoonga	-	52	-	621	33	736	11	297
Northeast Cape	-	0	-	0	-	0	1	14
King Island	-	0	-	0	-	0	-	0
Teller	-	449	-	320	8	172	3	79
Brevig Mission	-	0	-	729	5	183	5	142

Table 1. (Continued) Changes in numbers of hunters and seal scalps submitted for bounty, as indicated by bounty records for the years 1962, 1965, 1966 and 1969.

Village	1962		1965		1966		1969	
	Hunters	Seals	Hunters	Seals	Hunters	Seals	Hunters	Seals
Wales	-	632	-	761	9	234	9	312
Little Diomedé	-	0	-	210	11	161	8	107
Shishmaref	-	3,956	-	6,604	33	3,291	23	1,095
Deering	-	154	-	180	5	120	-	0
Buckland	-	61	-	0	-	0	-	0
Kotzebue	-	1,085	-	1,131	5	255	1	27
Noatak	-	56	-	0	2	150	-	0
Point Hope	-	124	-	2,016	42	2,571	20	793
Kivalina	-	275	-	827	12	445	8	282
Point Lay	-	67	-	0	-	0	-	0
Wainwright	-	328	-	345	3	69	5	68
Barrow	-	80	-	114	3	63	2	22
Kaktovik	-	0	-	0	-	0	2	47
Totals	-	10,920	-	21,015	352	12,418	191	4,615

Table 2. 1969 village census,* estimated number of seal hunters, and estimated seal harvest.

Village	Total Population	Number of Seal Hunters	Seal Harvest	Village	Total Population	Number of Seal Hunters	Seal Harvest
Platinum	80	4	22	Golovin	88	4	15
Goodnews Bay	220	21	180	White Mtn.	113	1	7
Quinhagak	320	35	185	Solomen	7	2	35
Ek	197	31	250	Nome	2,350	27	120
Tuntatuliag	190	15	90	Gambell	415	56	450
Kwigillingok	185	30	200	Savoonga	343	49	410
Kipnuk	310	35	185	Northeast Cape	9	2	11
Chefornak	155	24	125	King Island	0	0	0
Nightmute	120	18	54	Teller	249	11	110
Mekoryuk	310	44	1,100	Brevig Mission	120	9	170
Tununak	260	37	450	Wales	126	9	370
Hooper Bay	575	73	1,200	Little Diomed	70	13	120
Chevak	420	60	550	Shishmaref	240	40	3,850
Scammon Bay	185	25	300	Deering	93	13	45
Alakanuk	447	25	90	Buckland	98	11	35
Kwiguk (Emonak)	440	2	15	Kotzebue	1,855	27	140

Table 2. (Continued) 1969 village census,* estimated number of seal hunters, and estimated seal harvest.

Village	Total Population	Number of Seal Hunters	Seal Harvest	Village	Total Population	Number of Seal Hunters	Seal Harvest
Stebbins	215	28	390	Noatak	275	12	120
St. Michael	212	11	66	Kivalina	173	26	650
Unalakleet	811	21	220	Point Hope	337	51	2,300
Shaktolik	151	25	285	Wainwright	290	49	450
Koyuk	160	17	75	Barrow	2,150	520	2,100
Elim	156	18	90	Kaktovik	160	25	90
Totals	44 = villages	15,680 = population			1,556 = hunters		17,720 = seals

* Village census data from Bureau of Indian Affairs, Directories of Village Councils, Nome, Fairbanks and Bethel areas, 1969.

RECOMMENDATIONS

It is recommended that: 1) the necessary time be made available to complete the life-history investigations of ribbon seals and spotted seals; 2) whenever possible, accurate information concerning seal hunting effort and success be obtained by area personnel in a position to do so; 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 Seal pinnipeds be encouraged; and 4) the seal bounty (primarily a means of subsidizing seal hunters in northwest Alaska) be critically re-evaluated with appropriate committees of the state legislature. If the intended purpose of the bounty is not being realized due to lack of interest, the bounty should be discontinued.

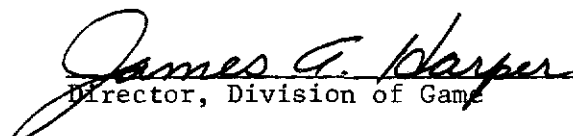
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PREPARED BY:

APPROVED BY:

John J. Burns
Marine Mammal Biologist


Director, Division of Game