

ST. GEORGE ISLAND RESEARCH RESERVE

National Marine Fisheries Service
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Frontis. -- A northern fur seal harem on Kitovi Rookery, St. Paul Island.

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INTRODUCTION

Each spring the return of northern fur seals to the Pribilof Islands begins when "beach masters" averaging about 400 pounds emerge from the Bering Sea to await the females and guard their territories against encroachment from other male challengers. Next, pregnant females arrive to give birth and breed and are followed by younger males and females until in early autumn about 80 percent of the world population of northern fur seals is in the vicinity of the Pribilof Islands. These fur seals have been one of the great economic resources of the north since Gerasim Pribilof in 1786 traced their migration to the islands now bearing his name (fig. 1).

By 1911, the Pribilof Islands fur seals had been reduced to perhaps 10 percent of their original abundance. At that time management of all populations of northern fur seals came under international control and this example of cooperation among nations restored a great natural resource. During most of the period of international control, management has been simple and empirical.

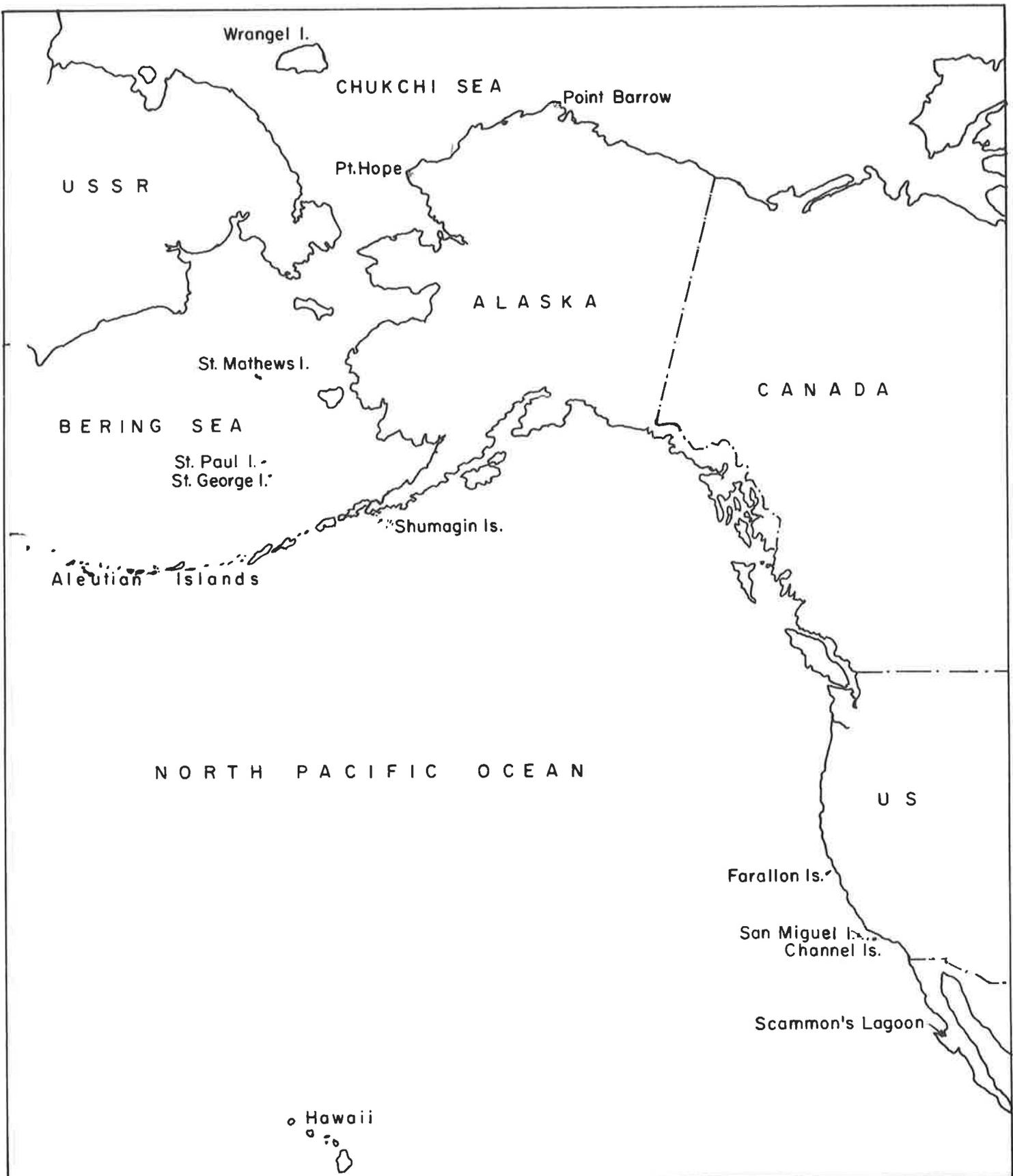


Figure 1

A limited number of males has been harvested each year, and as a result the population increased, though in later years at a decreasing rate, until it reached a maximum in the 1940's.

During the period of negotiation in the mid-1950's leading to signing of the current northern fur seal convention, scientists from the four nations noted the large increase in natural deaths of fur seal pups on the rookeries and decided that the Pribilof Islands fur seal population was too large to give maximum sustainable yield. As a result, the management objective starting in 1956 was to decrease the number of fur seals. At the same time, a research effort that had been started by the U.S. Fish and Wildlife Service in 1947 was intensified to gain knowledge of their life history, migrations, feeding habits, and population structure. These studies have made the northern fur seal by far the best known marine mammal. They do not, however, clarify the reasons for an apparent decrease in natural survival in recent years, rather than the increase expected with a reduced population. For an understanding of the factors which interact to regulate population size, the effects of management practices must be separated from other effects and the latter must be identified and evaluated. The relationship of fur seals to other marine resources must also be determined.

A proposal to attain these objectives by establishing St. George Island as a research area where harvesting of fur seals will not be permitted, in combination with a Bering Sea pelagic study, is proposed in Part I of this document. Part II describes the impact of a St. George Island fur seal harvest moratorium on the welfare of the Aleut resident federal employees and proposes solutions to problems anticipated should that action take place.

The establishment of St. George Island as a research reserve will also give opportunities for scientists in other disciplines to carry out projects on the islands. Of special interest are the rookeries for sea birds which are among the largest in the world. These birds must have considerable importance in the ecology of the area. The blue fox is a common terrestrial animal which preys on birds and is a scavenger of dead fur seal pups, yet it has been little studied. The plants and the insects need further investigation and the geology of the island is of great interest. Research opportunities will be made known to the scientific community, facilities will be made available to scientists, and they will be encouraged to hire residents of the islands to assist in their studies.

Part I. RESEARCH

Background of the Problem

Historical Information

Fur seals of the Pribilof Islands have been economically important for their yield of skins since discovery of their breeding grounds in the mid-18th century. These mammals have been harvested at various levels of utilization probably every year since discovery of the Pribilof Islands. The population has been decimated through excessive utilization at least twice, and recently was intentionally reduced with the ultimate goal of achieving maximum sustainable yield.

The fur seal population has been studied by U.S. scientists with varying degrees of effort since 1867 when the Pribilof Islands became a part of the United States. Since 1956, the population has been studied intensively in an effort to obtain the information needed to manage it for maximum sustainable yield with due regard to other valuable marine resources, the objective of the International Convention for the Conservation of North Pacific Fur Seals. Although much knowledge of the fur seal has accumulated, the factors which act to control population size are not fully understood and the relationship of fur seals to their environment and to other living resources has received little consideration.

Fur Seals and Commercial Fisheries

Fur seals play an important role within the ecosystem of the eastern Bering Sea. From June to November, their period of peak residency in the eastern Bering Sea, the estimated biomass of the Pribilof fur seal population is about 40,000 metric tons. The amount of food required to feed the population during this period is probably of the order of 500,000 metric tons. At the present time our knowledge of the relative importance of different species of fishes and invertebrates in the diet of the fur seals is imperfect and we have not attempted to relate the availability of the food resources to the productivity of the fur seal population. To further our understanding of ecosystem dynamics, we must better evaluate the relative importance of different organisms in the diet of fur seals and monitor changes in the availability of the more important food species.

Man's effect on the fur seal population is usually evaluated solely on the basis of the number of fur seals taken. However, the harvest of fishes and invertebrates which serve as food for these mammals may also affect population size. Within the past two decades, the harvest of certain fishes and invertebrates from the Bering Sea has increased greatly; some of these species are preferred items in the diet of fur seals.

This competition between man and the fur seal has serious implications for each. Through his fishing activities, man may reduce certain stocks of fish enough to lower the productivity of fur seals; conversely, predation by fur seals on these same stocks of fish may reduce the yield that can be taken by man. This problem is one of allocation of natural resources and must be considered under terms of the Convention which has as its objective maximum sustainable yield of fur seals "with due regard to their relation to the productivity of other living marine resources of the area." Since commercial fisheries in the Bering Sea are carried out largely by foreign countries, the interests of other nations as well as the United States are involved.

A brief review of the development of commercial fisheries in the Bering Sea will illustrate the potential impact of catches on the productivity of the fur seal population. Until the early 1950's the exploitation of fishes and shellfishes from the eastern Bering Sea by the United States was limited to sockeye salmon and small catches of cod and halibut, and by other nations to a comparatively small trawling effort for demersal fishes by Japan in the years 1933-37 and 1940-41. Except for the subsequent development of a modest fishery for king and Tanner crabs, exploitation by U. S. nationals is still largely confined to sockeye salmon in Bristol Bay and a small halibut fishery. In contrast to the very limited nature of U. S. fisheries, those of foreign nations, particularly Japan, have grown tremendously.

Because of this explosive development in foreign fisheries, the eastern Bering Sea is now one of the world's major fishing grounds. For example, recent catches of a single species (Alaska pollock) mostly from the Bering Sea have been exceeded on a world-wide basis only by the catches of anchovetta in Peru. The Alaska pollock and some of the other target species of the vastly increased foreign fisheries in the Bering Sea are important items in the diet of fur seals.

Foreign nations now harvesting fish in the Bering Sea are Japan, USSR, and South Korea. In 1954, Japan resumed fishing operations in the Bering Sea that had been interrupted by World War II. Her harvests (in metric tons) of demersal fishes and herring, primarily yellowfin sole, rapidly grew to over 600,000 in 1961, declined to around 300,000 in 1963, and thereafter increased to about 1,750,000 in 1971. Combined Japanese catches of demersal fishes, herring, shrimp, and Alaska pollock from 1964 to 1970 are shown in table 1. Over 80 percent of the total in recent years has been Alaska pollock. Japan's harvest of Alaska pollock alone from the Bering Sea in 1971, equalled about two-thirds of the total national harvest by the United States of all species of marine and freshwater fishes and shellfishes.

Table 1. -- Combined catches by Japan from the Bering Sea of demersal fishes, herring, and shrimp, and portion of total accounted for by Alaska pollock, 1964-70. Catches are by Japan's mothership, North Pacific trawl, and longline-gillnet fleets. ^{1/}

<u>Year</u>	<u>Catches in metric tons</u>	
	<u>Alaska pollock</u>	<u>All species</u>
1964	175,000	412,000
1965	231,000	385,000
1966	262,000	430,000
1967	551,000	748,000
1968	702,000	921,000
1969	841,000	1,078,000
1970	1,203,000	1,427,000

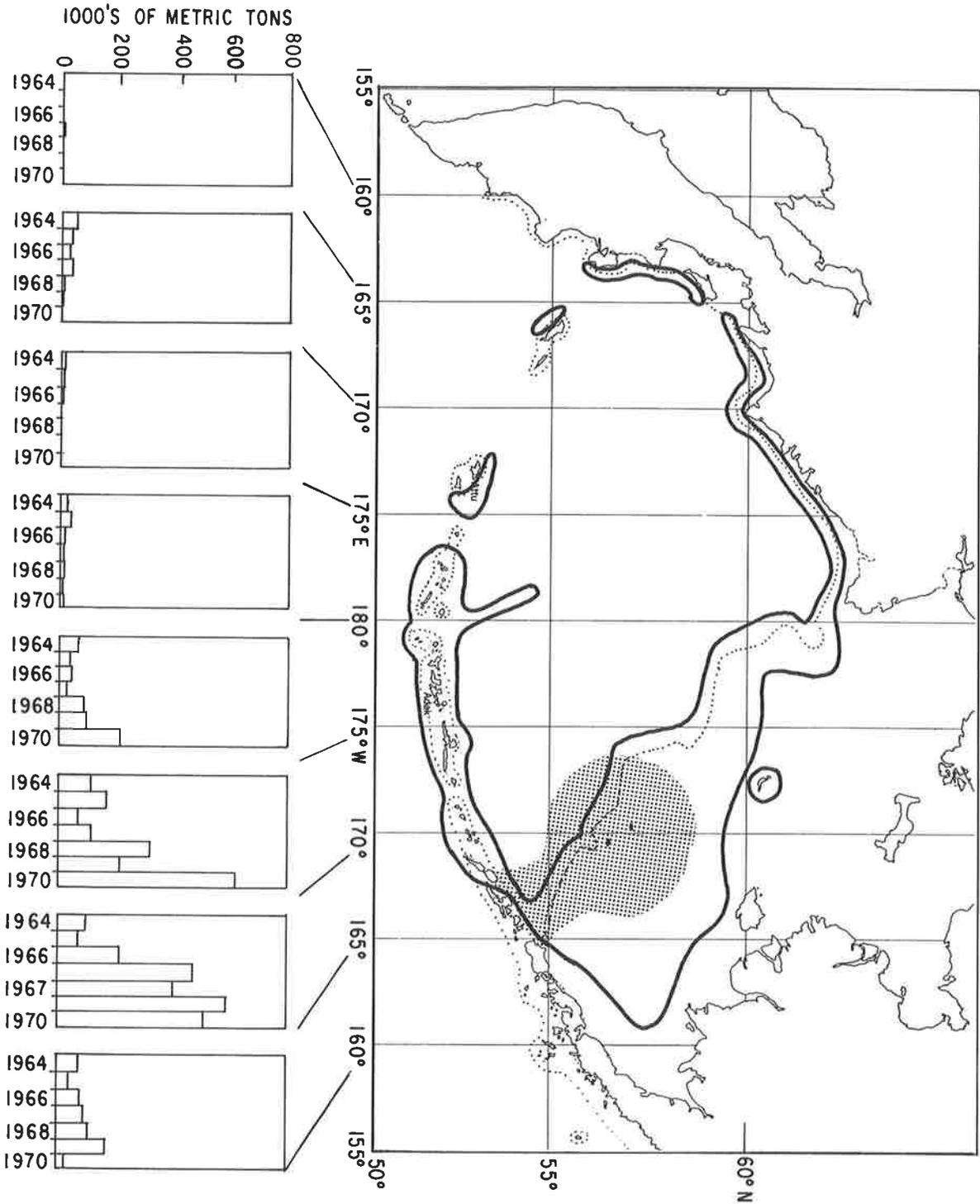
^{1/} Not included are catches by Japan's landbased dragnet fishery, which in 1970 amounted to approximately 55,000 metric tons from the Bering Sea.

Most of Japan's huge harvest comes from the eastern sector of the Bering Sea and much of it is taken within the food-foraging range of the Pribilof fur seal herd (fig. 2). A particularly important foraging area for the fur seal is along the outer continental shelf and upper continental slope between the Pribilofs and Unimak Island; this region is also one of the major fishing areas of the Japanese.

Since most of Japan's harvest in the Bering Sea is comprised of Alaska pollock, the distribution of catches of that species are compared in figure 3 with the foraging range of fur seals. As shown by comparing figures 2 and 3, the foraging range of fur seals is more closely related to areas from which Alaska pollock was harvested by Japan than to the harvest of all species combined. Similarly close relationships could probably be demonstrated for other species besides Alaska pollock, such as herring, Atka mackerel, and some flatfishes.

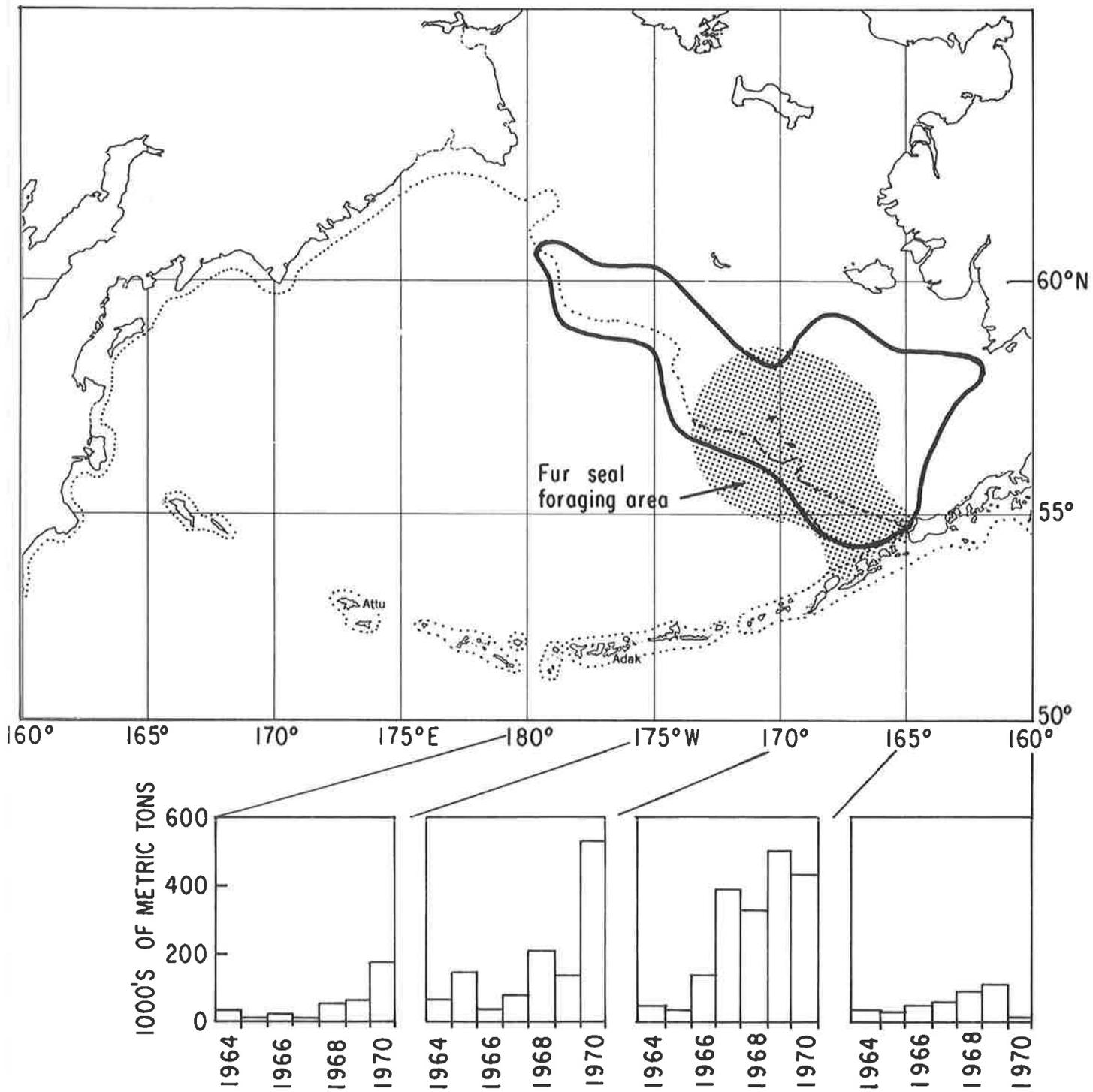
Management Scheme

Management of the fur seal population has been based on the conclusion that the herd in the mid-1950's exceeded the level that would provide maximum yield. Therefore, the population was reduced to increase survival and maximize the harvest. The expected average annual yield is 55,000 to 60,000 males and 10,000 to 30,000 females. The male harvest for the last 4 years has averaged



Combined catches from the Bering Sea by Japanese mothership, North Pacific trawl, and longline-gillnet fleets of demersal fishes, herring, and shrimp, 1964-1970. Not included are catches by Japan's landbased dragnet fishery ("Hokutensen") which in 1970 amounted to approximately 55,000 metric tons. (Shaded area indicates approximate foraging range of the Pribilof fur seals.)

Figure 2



Pollock catches by Japanese mothership, North Pacific trawl, and longline-gillnet fleets, 1964-1970 (excluding landbased dragnet fishery), and the approximate foraging range of the Pribilof fur seals.

Figure 3

37,500 and females have not been intentionally harvested since 1968. The actual harvest of males has been about 70 percent of the number expected. Until recent years approximately 80 percent of the total harvest came from St. Paul Island and 20 percent from St. George Island. However, in the last 5 years the percent contribution from St. George Island has been decreasing; 20, 16, 14, 14, and 11 percent each year from 1968 through 1972, respectively.

The reasons for the disparity between actual and expected harvest and the decline in the proportional take of seals on St. George Island are not known. The decline in the proportional take of seals on St. George Island may be caused by a change in the rate of intermingling between the two island populations. These fluctuations are to some degree random but also could be caused in part by oceanographic conditions. Several factors, however, may explain the disparity in actual and expected harvests. The discrepancy may not be real, but merely a result of errors in estimates and interpretation of historic data. If true, the problem will be solved by the present management policy of sparing females and the population as well as the harvest of males should increase. However, an actual change in recent years in the relationship between harvest and population abundance may be the cause of the discrepancy between actual and expected harvests.

This would indicate that the basic relationship between survival and abundance has changed from what it was from 1912 through the early 1950's.

Individually or combined, several factors could be causing an apparent decline in survival on both islands. The availability of food has already been discussed as one of the more obvious but not necessarily the most important factor. Increased human disturbance of fur seals on their rookeries may be another factor. Such disturbance may disrupt nursing cycles and lessen the intake of food by pups prior to weaning. Relatively long-term changes in the ocean environment, disease, and pollution are additional factors that may affect survival rates.

Although a decrease in the survival rate is believed to be the most likely factor preventing an increase in the fur seal population, a decrease in the rate at which pups are produced may also be a contributing factor. A reduction in the latter could result from a decrease in the age specific pregnancy rate; a change in the prenatal death rate of pups, or a change in the age at which females mature. Evidence exists that the last may be operating within the population of fur seals and that a slight decrease in the age specific pregnancy rates has also occurred, however, the data are insufficient for making confident conclusions about either of these indicated changes.

Management of the fur seal herd is limited in practice to changing the utilization rate of females and males and thus to regulating abundance and the adult sex ratio. Females have not been harvested since 1968 in an attempt to allow the population to increase. However, it appears that recruitment of females to the breeding population since that year has been barely sufficient to replace losses of breeding females from natural causes, leaving no excess for increasing the population.

In summary, the problem is twofold: (1) Why is the population not reacting in the expected way to management practices; and (2) what is the relationship between fur seals and other marine resources, especially in the Bering Sea. The solutions to these problems will contribute to future management of all Bering Sea resources, but especially the North Pacific fur seal population.

Planning Considerations

Fishery Studies

The Northwest Fisheries Center, NMFS, Seattle, is studying the fish and shellfish resources of the Bering Sea and Gulf of Alaska. This research is based on (1) an analysis of statistics on catches and fishing effort by U.S. and foreign nations, and (2) research cruises by NMFS and other vessels. Although these studies provide a historical base for examining the interactions of fur seals and other

marine mammals with the ecosystem, they need to be expanded to include a more detailed analysis of statistics on foreign fisheries, with specific emphasis on the relationship of harvests to productivity of marine mammals. More cruises are also needed by research vessels to monitor changes in individual stocks of fishes and invertebrates which serve as major food sources for marine mammals. This expanded research effort will be in concert with the sampling program described under pelagic research to better understand the food species taken by fur seals and the feeding behavior of these mammals.

Control Area

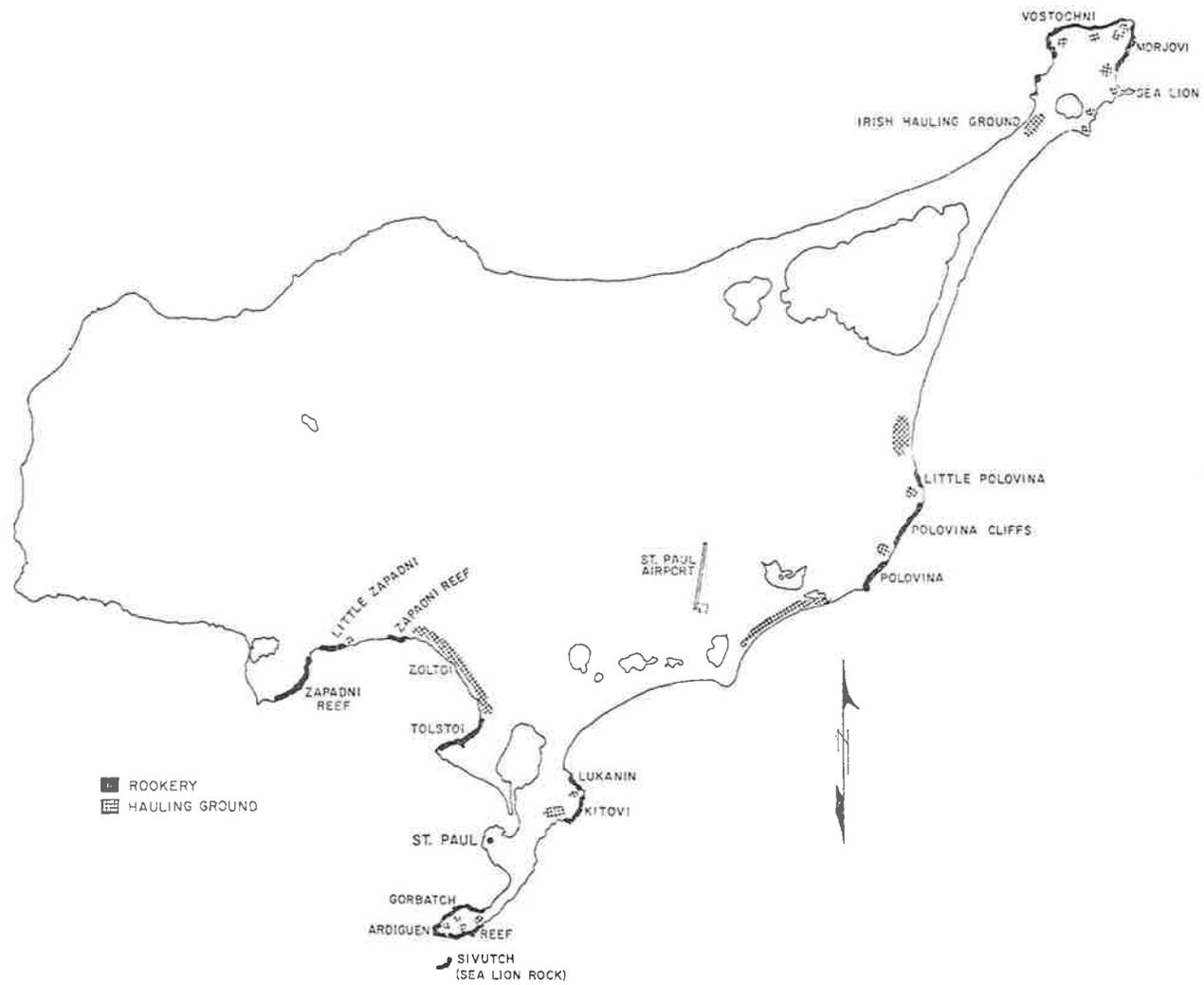
Research on wild animal populations is complicated by uncontrollable factors that affect the results. This situation has existed with respect to studies of the fur seal and has been a serious obstacle to evaluating the effects of recent management practices on the population. The establishment of a "control" area (one on which the animals are not harvested) will partially solve the problem. A comparison of the results of studies on unharvested and harvested populations will provide an opportunity to gain considerable knowledge about the effects of management practices as well as a vast amount of information on a "natural" population not now available.

Some of the more important criteria (excluding economics) that must be considered in selecting research control areas are:

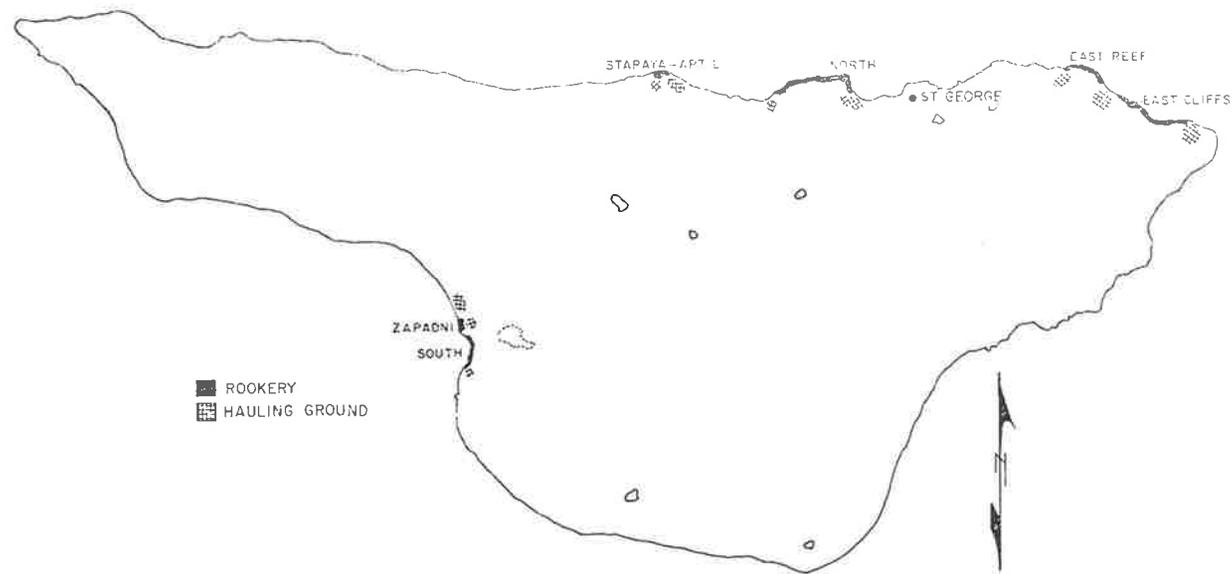
1. Are they suitable for data collection? Access, size, and topography are important factors.
2. How much can the utilization rate be expected to change?
3. What pretreatment data are available?
4. Are there uncontrollable factors that will negate results?

The Pribilof Islands have 21 named fur seal rookeries: 14 on St. Paul Island (fig. 4), 6 on St. George Island (fig. 5), and 1 on Sea Lion Rock. Some rookeries are isolated, whereas others are in more or less adjacent groups, though forming a convenient subpopulation (fig. 6). Five of these subpopulation units are on St. Paul Island and four are on St. George Island. Associated with each subpopulation are one or more rookeries and hauling grounds. Male seals are harvested annually from the hauling grounds.

The "homing" instinct is pronounced in fur seals in general and increases with age. By age 5 years, less than 30 percent of the animals hauled out on land are found outside the subpopulation area where they were born. Because of this fidelity to the area of birth among maturing animals, some of the rookery-hauling ground areas form relatively discrete subpopulation units, however, some straying occurs, even among older animals.

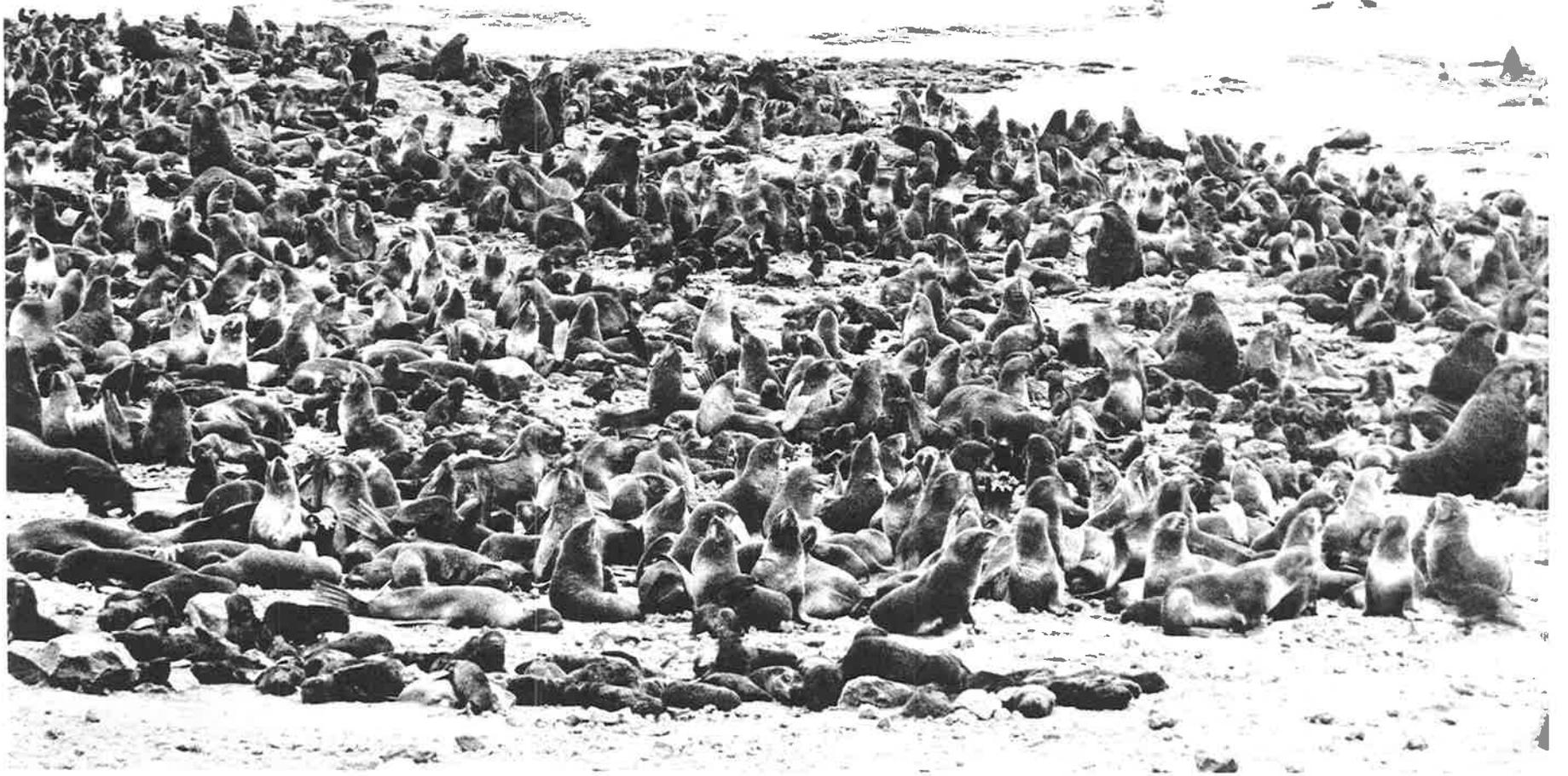


Location of rookeries and hauling grounds, St. Paul Island.
Figure 4



Location of rookeries and hauling grounds, St. George Island.

Figure 5



Polovina Rookery, St. Paul Island.
Figure 6

Analysis of tag recovery data obtained from harvested males shows that the degree of homing to the island of birth is considerably higher than that to the rookery of birth. For example, the degree of homing among age 2 males varies from 25 to about 40 percent to the subpopulation areas of St. George Island but is about 60 percent to the island. The latter figure increases to 85 percent by age 5 years. The homing tendency of females is considerably greater than that of males. Thus, the most informative experiment and one minimally contaminated by uncontrollable factors will result from designating an entire island (St. George) rather than parts of two (St. Paul and St. George) as a research reserve. St. George is also desirable as a research reserve because it contains four relatively small subpopulation units useful for replicating studies. Fur seals using St. George Island make up about 20 percent of the total Pribilof population. The expected reduction in the total harvest is between 10 and 20 percent.

Some straying occurs, particularly at ages 2 and 3, thus, the ideal situation of no utilization is not possible, though utilization can be substantially reduced. For example, the average utilization rate of males under present management is near 70 percent through age 5.

Few males older than 5 are harvested. A moratorium on the harvest of fur seals on St. George Island will reduce the utilization of males born there to an estimated rate of less than 30 percent through age 5, assuming that their homing tendency does not change. Because of progressive increases in homing tendency at ages 3, 4, and 5, little effect on the utilization rate of males born on St. Paul Island is expected. Thus, the adult sex ratio would change considerably over a period of years on the research control area. The number of females should also increase until the population reaches its maximum level.

Research Plan

The Goal

The ultimate goal of fur seal research is to understand the ecological relationship of fur seals to the other major elements of the ecosystem, particularly to fishery resources because of the obvious implications of these relationships to management. Additionally, we need a more thorough understanding of the population dynamics, especially density-dependent factors which control population increase. These goals are complex, and their full attainment will take a good many years. The objectives of this research proposal represent critical elements in a thorough understanding of the ecology and population dynamics of the fur seal.

Objectives

The basis of the research plan will be a halt in the harvest of fur seals on St. George Island for a sufficiently long period to achieve the research objectives. This appears to be about 15 years, but it would be unwise to establish a fixed period at this time. During this period, intensive comparative studies will be made on St. George and St. Paul Islands, and the pelagic life of fur seals in the Bering Sea will be investigated. The fish and invertebrate resources of the Bering Sea will also be studied in relation to their importance as food for fur seals.

The objectives of this research will be to:

1. Determine the maximum level of an unharvested population.
2. Describe the composition of the resource by major identifiable segments at a maximum population level; for example, the sex ratio of adults, number of pups, and the ratio of territorial to nonterritorial males.
3. Describe changes in rookery area and density as changes in population abundance and composition occur.
4. Make observations of behavioral changes or changes in activity, especially of adult males and females related to changes in density and the sex ratio.

5. Determine changes in reproductive and survival rates and causes of mortality with changes in population abundance and composition.
6. Obtain information on the distribution of fur seals in the Bering Sea and on their food and feeding behavior, with emphasis on adult lactating females.
7. Monitor abundance and distribution of Bering Sea stocks of fishes and invertebrates utilized by fur seals and other marine mammals.

Information that will be collected on the research control areas on St. George Island and on St. Paul Island will include:

1. Estimates of the number of pups born.
2. Counts of adult males, territorial and nonterritorial.
3. Number, age, sex, and where possible, causes of death among animals on land.
4. Behavior of adult males and females, pups on rookeries, and young males and females on hauling grounds.
5. Weight and other body measurements of young males in the harvest (St. Paul Island only) and of pups in autumn.
6. Area occupied by fur seals on land.
7. Marking and recapture.

8. Interaction between fur seals and northern sea lions on fur seal rookery areas.

9. Age composition of the harvest (St. Paul Island only).

Methods will be developed to minimize the disturbance of the animals while obtaining the needed data. Thus, improved tag procedures and more effective sampling procedures will be developed.

Additional data will be collected pelagically on:

1. Distribution of fur seals in the Bering Sea and northwestern Gulf of Alaska.
2. Age, sex, and body measurements of animals collected.
3. Location of major feeding areas.
4. Stomach contents.
5. Observations of feeding behavior.
6. Condition of genital tracts.
7. Presence or absence of fish concentrations in areas containing fur seals.
8. Environmental and oceanographic conditions in areas containing concentrations of fur seals.

Research Technique on Land

Intensive observations, counts, marking, telemetry, and necropsies will provide data on population abundance and growth, sex ratios, ratio of territorial and nonterritorial males, pups born, nursing cycles, number and age of animals dying on land, and causes and magnitude of mortality and behavior. Areas for intensive study will be selected on each of the islands to provide valid comparisons. Considerable background or pretreatment data are available for both islands. The resource will be studied intensively during the first 3 years to test methods and collect additional basic data prior to the changes in population abundance and composition. This period will be followed by one of 5 to 7 years of monitoring, which in turn will be followed by one of about 5 years of intensive study when the full effects of stopping the harvest on St. George Island are expected.

Research Technique at Sea

The pelagic life of fur seals will be studied intensively beginning with emphasis on summer distribution in the Bering Sea, amounts and kinds of prey species taken, and reproductive condition. The pelagic behavior of lactating females will then be studied using radio and sonic-tagged females. Observations of the same females will be made while these animals are on land. Hydroacoustic sampling and

oceanographic data collection will be carried out in areas of seal concentrations. Amounts and kinds of food taken will be compared with similar data collected in the early 1960's.

The monitoring of fish stocks will be carried out from chartered vessels. Sampling will be designed to complement information on fish stocks being obtained from ongoing NMFS programs. Sampling will differ from ongoing programs by focusing on fish stocks at times and places where fur seals actively feed. Information obtained from expanded studies on the feeding habits of fur seals will be utilized in designing an effective sampling strategy.

Descriptive oceanographic and other environmental data will be available from NMFS and other sources. Ecosystem-oriented studies funded by the Sea Grant Program and proposed under the IBP will also provide data useful for evaluating the relationship of fur seals to other resources.

Application of Results

An increase in our knowledge of fur seal biology, behavior, population dynamics, and ecology from this research approach will provide a better basis for management, and for interpreting the role of marine mammals in the ecosystem. For example, information on the optimum sex ratio among adults, factors that affect the hauling

out on land of young males, and the behavior of young males or females on hauling grounds will have a direct bearing on management practices.

Other Studies

The foregoing research proposal emphasizes field projects that by their nature must be carried out on the Pribilof Islands or in the adjacent Bering Sea. Other projects, primarily laboratory research, relate to the general objective of understanding mechanisms regulating fur seal abundance but are not an integral part of the field research proposed for the Pribilof Islands and vicinity. The following sections describe the most important of these projects and indicate why they are needed. Most of this research would be by contract. The budget for these projects is not included in budgets for the St. George Island-pelagic research proposal. This projects will, however, require additional funding.

Metabolism

A more complete picture can be obtained of the relationship of fur seals to other resources by including a study of the energy flow and needs of fur seals. That is, a study of consumption, assimilation, loss, excretion of energy, and changes in metabolism caused by changes in activity. When combined with observed changes in activity on the rookeries resulting from changes in population density and composition, the accuracy in interpreting these data will be improved. Knowledge of the energy requirements and growth of pups will provide a much better understanding of possible effects of interruption of nursing cycles by man or by other seals.

Microbiology

Although the number of animals dying on land can be counted and the causes of death for a major portion determined, additional information is necessary for assessing all causes of mortality among fur seals. A rather large proportion of mortality occurs at sea, and for about 10 percent of the animals dying on land, the causes of death cannot be determined. Additional microbiological studies will identify the causes of death in many of the latter group and should provide considerable insight into possible causes of death at sea. Specimen material can be collected from dead or sick animals on the islands and from seals taken pelagically.

Reproductive Physiology

Precise estimates of age specific pregnancy and ovulation rates are important for managing the fur seal resource. The correct interpretation of what these estimates indicate is even more important. For example, the ovulation rate among females age 5 years is nearly twice the pregnancy rate and, therefore, about one-half of the 5-year-olds that appear mature by gross examination of the ovaries contain no evidence of a fetus. Was the ovulated egg fertilized? Did the embryo implant? If so, the embryo apparently died sufficiently early so that

no evidence of implantation remained. Delayed implantation for a 3- or 4-month period is common in some groups of animals but the causes are not known. The facts, if known, could contribute significantly to the problem of birth control in many other animals and possibly man. We must also understand how a change in the age at maturity (first ovulation) would occur with a change in population density. As mentioned previously, this situation may have occurred among fur seals and in populations of other pinnipeds.

Genetics

Males have been harvested under a relatively rigid time schedule and selective procedure at least since the early 1920's. Fur seal males and occasionally females have been harvested for about 200 years. The possible effects of these harvests on the population gene pool are not obvious.

Past harvesting techniques will be reviewed by a population geneticist to evaluate possible effects on the population and recommend additional action needed if any.

<u>Budget phase</u>	1974 <u>(in thousands)</u>	1975 <u>(in thousands)</u>	1976 <u>(in thousands)</u>	1977 <u>(in thousands)</u>	1978 <u>(in thousands)</u>
<u>Land Studies (expanded program addition to current program)</u>					
<u>Salaries</u>	88.0	91.0	86.0	81.0	81.0
GS-13 (19.0)					
GS-11 (14.0)	(70.0)	(71.0)	(71.0)	(73.0)	(73.0)
Tech. 9 (12.0)					
Tech. 5 (14.)					
Med. Tech. 9 (11.0)					
Temporary and laborers	(18.0)	(20.0)	(15.0)	(8.0)	(8.0)
<u>Travel</u>	10.0	10.0	8.0	8.0	8.0
<u>Supplies and Equipment</u>	20.0	10.0	5.0	5.0	3.0
<u>NOAA Support Costs</u>	<u>30.8</u>	<u>32.0</u>	<u>30.0</u>	<u>28.0</u>	<u>28.0</u>
Total	<u>148.8</u>	<u>143.0</u>	<u>129.0</u>	<u>122.0</u>	<u>120.0</u>

<u>Budget phase</u>	<u>1974</u> <u>(in thousands)</u>	<u>1975</u> <u>(in thousands)</u>	<u>1976</u> <u>(in thousands)</u>	<u>1977</u> <u>(in thousands)</u>	<u>1978</u> <u>(in thousands)</u>
<u>Pelagic Studies</u>					
<u>Fur Seals</u> (expanded program excludes present pelagic salary funding)					
<u>Salaries</u>					
GS-7 (9.0)	9.0	9.0	9.0	9.0	9.0
Temp. GS-5 (1-man year)	7.0	14.0	7.0	14.0	7.0
<u>Travel</u>	5.0	5.0	5.0	5.0	5.0
<u>Supplies and Equipment</u>	6.0	4.0	3.0	3.0	3.0
	(gear up radio and sonic tracking)				
<u>Vessel Charter at \$750/day</u>	67.5 (1 vessel)	135.0 (2 vessels)	67.5 (1 vessel)	135.0 (2 vessels)	67.5 (1 vessel)
<u>NOAA Support Costs</u>	<u>6.4</u>	<u>9.2</u>	<u>6.4</u>	<u>9.2</u>	<u>6.4</u>
Total	<u>100.9</u>	<u>176.2</u>	<u>97.9</u>	<u>175.2</u>	<u>97.9</u>

<u>Budget Phase</u>	<u>1974</u> <u>(in thousands)</u>	<u>1975</u> <u>(in thousands)</u>	<u>1976</u> <u>(in thousands)</u>	<u>1977</u> <u>(in thousands)</u>	<u>1978</u> <u>(in thousands)</u>
<u>Pelagic Studies (con.)</u>					
<u>Bering Sea Fishery Resource</u> (NWFC expansion of ongoing research)					
a. Statistical analysis of commercial fisheries					
<u>Salaries</u>					
GS-12 (17.5)	17.5	17.5	17.5	17.5	17.5
<u>Supplies and Equipment</u>					
ADP machine service	3.0	3.0	3.0	3.0	3.0
<u>NOAA Support Costs</u>					
Total	<u>27.5</u>	<u>27.5</u>	<u>27.5</u>	<u>27.5</u>	<u>27.5</u>
b. Monitor fish stocks					
<u>Salaries</u>					
GS-12 (17.2)	43.7	43.7	43.7	43.7	43.7
GS-11 (14.5)					
GS-9 (12.0)					
<u>Supplies and Equipment</u>					
	10.0	10.0	10.0	10.0	10.0
<u>Vessel Charter at \$750/day</u> (70 days)					
	52.5	52.5	52.5	52.5	52.5
<u>NOAA Support Costs</u>					
Total	<u>17.4</u> <u>123.6</u>	<u>17.4</u> <u>123.6</u>	<u>17.4</u> <u>123.6</u>	<u>17.4</u> <u>123.6</u>	<u>17.4</u> <u>123.6</u>
Grand total	<u>400.8</u>	<u>470.3</u>	<u>378.0</u>	<u>448.3</u>	<u>369.0</u>

<u>Budget phase</u>	<u>1974</u> <u>(in thousands)</u>	<u>1975</u> <u>(in thousands)</u>	<u>1976</u> <u>(in thousands)</u>	<u>1977</u> <u>(in thousands)</u>	<u>1978</u> <u>(in thousands)</u>
<u>Other Studies</u> (not included in grand total)					
Microbiological	100.0	100.0	100.0	100.0	100.0
Reproductive physiology	75.0	50.0	25.0	--	--
Metabolism (energy consumption, accumulation, and excretion)	50.0	50.0	50.0	--	--
Genetics	10.0	--	--	--	--

Part II. EMPLOYMENT AND LOGISTICS

Background Information

The Federal Government has the responsibility as required by the Fur Seal Act of 1966 (80 Stat. 1091) to provide for the employment and welfare of the approximately 600 native Aleut residents of the Pribilof Islands of St. Paul and St. George. This continuing responsibility is delegated to the Department of Commerce and must be met whether or not the harvesting of fur seals is terminated, modified, or interrupted in whole or in part. There are virtually no other means available for gainful employment, thus the Aleut residents are almost entirely dependent on the fur seal industry as a source of income.

With a moratorium on the fur seal harvest on St. George Island as proposed there will be created problems of employment and logistics beyond those now prevalent on both islands. Of the 650 native residents of the Pribilofs, 180 are located on St. George Island.

In order to cope with the problems that surely will develop, it must be assumed that all physical facilities on St. George Island will continue to be maintained in good repair; Company House (Government hotel and mess) will be operated on a seasonal basis; and all planned construction and renovation will continue as scheduled.

Employment

There are 15 permanent full-time employees on St. George Island engaged in routine maintenance, construction, storekeeping, and office work not directly involved in the physical labors of sealing. Four of these employees serve dual roles during the season. Unlike St. Paul where sealing is conducted 6 days per week, sealing on St. George is conducted 3 days each week--Mondays, Wednesdays, and Fridays--for about 5 weeks. On alternate days the sealing crew performs the blubbering and processing of skins or routine maintenance and construction duties.

The permanent work force is supplemented by temporary employees hired for periods ranging from 6 weeks to 6 months. Hiring practices follow an established pattern: In descending order of priority temporary hires are (1) Pribilof Aleut residents, (2) Pribilof Aleut nonresidents, (3) Alaskan natives, (4) Alaskan residents, and (5) non-Alaskans. During the 1972 season 49 temporary workers were employed at St. George Island. Of these, 11 are year-round residents who will be employed full-time for approximately 6 months and intermittently during the balance of the year for longshoring and emergency maintenance work. Seven of these individuals work in the harvest or in the processing plant, or both, during the sealing season.

Practice has been to employ a large number of returning students to assist in the processing plant, on the killing field, in the store, and at the transient housing and mess facility. Most of these students are from boarding schools in Anchorage, Mt. Edgecumbe, or Chemawa or are college students on summer vacation. Boys 18 years of age or older are hired as laborers on a full-time basis for about 6 weeks. Others are usually hired as summer aides at the minimum wage rate on a part-time or intermittent basis. In the past, many 16-year-old students were employed, but in 1972 no one under 17 was hired.

Generally 12 to 15 nonresident workers are imported to assist in village maintenance, principally carpentry work, and to work as blubberers in the processing plant. The blubberers are required since most of the Pribilovians do not have the stature for this arduous work, nor do they have the desire. In 1972, 13 nonresidents were employed. With no harvesting it will not be necessary to recruit off-islanders except a moderate number with specialized skills in carpentry, electrical, or sheetmetal work.

The attached table shows the total work force at St. George Island as of July 1972. Although it is not known how many of those now classified as "students" will eventually become "year-round residents," the available work force is not expected to change substantially in the future.

Work Force at St. George Island - 1972

<u>Name</u>	<u>Sex</u>	<u>Employment Status</u>	<u>Basic Classification</u>	<u>Sealing Season Classification</u>	<u>Remarks</u>
1. Chercasen, Emil	M	Permanent FT	Laborer	Sticker 3 days/wk	Resident year-round
2. Galanin, Ferman	M	"	Power Plant Operator	No change	"
3. Galanin, Lawrence	M	"	Janitor	No change	"
4. Kashevarof, Andronik	M	"	Maintenanceman	No change	"
5. Lekanof, Peter	M	"	Sales Store Worker	No change	"
6. Lestenkof, Alvin	M	"	Heavy Duty Mechanic (Machine shop Foreman)	No change	"
7. Lestenkof, Innokenty G.	M	"	Motor Vehicle Operator	Sealer Foreman 3 days/wk	"
8. Malavansky, Victor	M	"	Power Plant Operator	Clubber 3 days/wk	"
9. Merculief, Agafangel	M	"	Maintenanceman	No change	"
10. Merculief, Ben Jr.	M	"	Warehouseman	No change	"
11. Merculief, John Jr.	M	"	Motor Vehicle Operator	Clubber 3 days/wk	"
12. Merculief, Nicolai S.	M	"	Foreman, Mixed Gang	No change	"
13. Merculief, Peter	M	"	Electrical Worker	No change	"
14. Merculief, Stephanida	F	"	Clerk (Typing)	No change	"
15. Philemonof, Ilarion	M	"	Motor Vehicle Operator	No change	"
16. Galanin, Moses	M	Temporary FT	Laborer	No change	"
17. Kashevarof, Andronik	M	Temporary FT	Laborer	Wash house six days	Resident - student
18. Kashevarof, Gilbert	M	"	Laborer	No change	Resident - student
19. Lekanof, Anthony	M	"	Laborer	Blubberer 3 days/wk Sticker 3 days/wk	Resident-year-round
20. Lekanof, Peter R.	M	"	Laborer	No change	Resident - student
21. Kestenkof, Victor	M	"	Motor Vehicle Operator	Clubber 3 days/wk	Resident-year-round
22. Malavansky, Blake	M	"	Laborer	Podcutter 3 days/wk	Resident - student
23. Malavansky, Jacob F.	M	"	Laborer	Leadman, processing Plt.	Resident-year-round
24. Malavansky, Victor T.	M	"	Laborer	Blubberer 3 days/wk Barman 3 days/wk	Resident - student
25. McGlashen, Gregory P.	M	"	Laborer	Skins 3 days/wk	Resident - student
26. Merculief, Andrine	M	"	Laborer	No change	Resident-year-round
27. Merculief, Antony P.	M	"	Laborer	Ripper 3 days/wk Blubber 3 days/wk	Resident - student
28. Merculief, Boris R.	M	"	Laborer	Ripper 3 days/wk Blubber 3 days/wk	Resident - student
29. Merculief, Burt G.	M	"	Laborer	Ripper 3 days/wk Wash house 3 days	Resident - student
30. Merculief, Carl W.	M	"	Laborer	Stripper 3 days/wk Blubber 3 days/wk	Resident-returned vet
31. Merculief, Cyril C.	M	"	Motor Vehicle Operator	No change	Resident year-round
32. Merculief, John R.	M	"	Laborer	Blubberer 3 days/wk	Resident returned vet

33. Merculief, Mark	M	Temporary FT	Laborer	Ripper 3 days/wk	Resident year-round
34. Merculief, Terenty	M	"	Motor Vehicle Operator	Clubber 3 days/wk	"
35. Merculief, William	M	"	Laborer	No change	"
36. Prokopiou, Alexis H.	M	"	Carpenter Helper	No change	"
37. Shabolin, Isiah	M	"	Laborer	Stripper 3 days/wk	"
38. Zacharof, George	M	"	Laborer	Skins 3 days/wk	"
39. McGlashen, Vassa	F	Temp.-Intm't	Laundry Machine Opr.	No change	"
40. Merculief, Feona	F	"	Laborer	No change	"
41. Merculief, Susie A.	F	"	Housekeeper	No change	Resident - student
42. Prokopiou, Margaret	F	"	Laborer	No change	"
43. Lestenkof, Sharon	F	Temporary FT	Clerk (typing)	No change	"
44. Lekanof, Julia P.	F	Temp.-Intm't	Summer Aid	No change	"
45. Merculief, Elizabeth	F	"	"	"	"
46. Merculief, Ruby V.	F	"	"	"	"
47. Merculief, Theresa	F	"	"	"	"
48. Philemonof, Sarah	F	"	"	"	"
49. Merculief, Afanasia	M	"	"	"	"
50. Merculief, Theodosy	M	"	"	"	"
51. Merculief, Georgy	M	"	"	"	"
52. Alexander, Walter	M	Temporary FT	Blubberer 3 days/wk	Stripper 3 days/wk	Non-resident (Alaskan)
53. Ashenfelder, Gerald	M	"	"	Stripper 3 days/wk	Non-resident (Alaskan)
54. Brown, Albert	M	"	"	Wash house 3 days/wk	Non-resident (Alaskan)
55. Bull, John	M	"	"	Stripper	Non-resident (Alaskan)
56. Hensley, Richard	M	"	"	Barman 3 days/wk	Non-resident (Alaskan)
57. Ermeloff, Leonty	M	"	Carpenter Helper	No change	Non-resident (Alaskan)
58. Krukoff, Daniel J.	M	"	"	"	Non-resident (Alaskan)
59. Krukoff, Freddie	M	"	"	Foreman, Processing Plt.	Non-resident (Alaskan)
60. Lee, Jon	M	"	Blubberer 3 days/wk	Stripper 3 days/wk	Non-resident (Alaskan)
61. Merculief, Angelina	F	"	Cook	No change	Former resident -
62. Pletnikoff, Ronald	M	"	Data Collector	No change	Former resident
63. Swetsoff, Paul Jr.	M	"	Carpenter Helper	Ripper 3 days/wk	Former resident
64. Tuzeyluk, Emanuel	M	"	Blubber 3 days/wk	Stripper 3 days/wk	Non-resident (Alaskan)

Conclusions and Recommendations (Employment)

The above table reflects the present employment picture on St. George Island. St. George resident work force availability can be expected to prevail in the future. With a cessation of harvesting on St. George it will be necessary to make adjustments in the work force in order to afford employment at least equal to that presently available. This could be accomplished by restructuring the total work program to (1) provide seasonal employment (management) opportunities on St. Paul Island, (2) provide seasonal employment in the research sector on St. George, and (3) develop an expanded work program on St. George as a substitute or replacement for customary seasonal harvesting and skin processing operations. Basic to this approach will be (1) the continued maintenance of all physical facilities on St. George, (2) the operation of Company House (Government Hotel and mess) on an extended seasonal basis, and (3) a continuous construction and renovation program designed to upgrade existing support facilities.

Permanent Employees

Of the 15 permanent NMFS employees on St. George Island only 4 are assigned seasonally to sealing operations. These assignments generally are for 3 days per week extending over a 5- or 6-week period. There should be no problem in retaining these employees in their basic work classification throughout the year exclusive of sealing.

Temporary Employees (resident)

St. George resident temporaries who have been employed in sealing operations for about 6 weeks during the summer months could be employed for the same period in the St. Paul processing plant, thus eliminating the need to import plant workmen. Nonresident labor requirements on St. Paul have been reduced by conversion to machine blubbering but finish blubbering still requires importation of workers who could be replaced by St. George residents. If St. George residents are willing to accept employment on St. Paul, at least 13 positions would be available during the sealing season. During the off-season, temporary employment for routine maintenance work and longshoring would continue to be available at St. George.

Housing on St. Paul would present a special problem. Only a limited number of bachelor-type quarters would be available in the dormitory on St. Paul and Pribilovians are reluctant to leave their families for even short periods of time. To make temporary employment on St. Paul attractive to St. Georgians, the availability of family-type housing would be a requirement. Housing possibilities will be discussed in greater detail under the heading of logistics.

With the continued operation of Company House on St. George Island for use by research and management transient staff, temporary (seasonal) employment could be offered to the same number of women usually employed.

Employment for the 18 to 25 students who return to St. George each summer presents a special problem. Those not needed at St. George could not be used effectively at St. Paul where there is a similar problem in providing employment for returning students. NMFS has attempted to employ all returning students and should this practice be discontinued even greater social problems will arise. St. George offers limited recreational outlets for young people, and summer employment is essential to occupy their time as well as to train them for future careers.

Some relief will be offered through research needs. Several St. George temporary employees and undoubtedly many of the students will have qualifications acceptable for routine biological field work. An accurate assessment of these needs is not available but a reasonable requirement might be 4 or 5 positions.

Temporary Employees (nonresident)

Except for special trade skills, nonresident requirements would be negligible for both St. Paul and St. George. Off-islanders with specialized skills would continue to be required in moderate numbers, depending on the extent of construction and maintenance programs. There should be no special obligation by NMFS to employ Pribilovians not now in permanent residency on the islands.

Logistics

Transportation

To facilitate research and provide interisland transportation on a stand-by basis it will be necessary to consider alternatives to the normal services provided by the supply vessel M/V Pribilof. To meet supply requirements the vessel makes four trips each year to the islands. The schedule for 1972 which approximates those in former years is as follows:

<u>Voyage number</u>	<u>Depart Seattle</u>	<u>Approximate duration at Pribilofs</u>	<u>Arrive Seattle</u>
33	March 4	March 14-April 4	April 14
34	May 23	June 2-June 23	July 3
35	July 24	August 2-September 5	September 15
36	Oct. 28	November 7-December 5	December 15

The isolation of St. George has been a long-standing problem. More frequent mail service as well as interisland transportation for other agencies (HEW and Alaska Department of Education) and NMFS cannot be provided by the M/V Pribilof. Even with adjustments in sailing schedules, which are not practical, the basic problem will remain for lengthy periods interspersed throughout the year.

Suggestions have been made for use of a small (60'-70') charter vessel. This approach is impractical because no harbor facilities are available at either island, and there are no safe anchorages. Charter costs would amount to at least \$500 per day or not less than \$15,000 per month.

St. George Island has a serviceable airstrip for emergency purposes suitable for use by high performance aircraft. In constructing the strip it has not been the intent of NMFS to provide a facility for commercial use. To accomplish this would require relocation at prohibitive cost. The existing strip can be further improved to adequately accommodate small twin engine aircraft.

Conclusions and Recommendations (Transportation)

It is essential that regularly scheduled trips by the NOAA supply vessel M/V Pribilof be maintained. The present scheduling of four trips each year will enable NMFS to provide the continued services of supply to the Aleut Communities of St. George and St. Paul as well as to the Federal installations on the islands. Rescheduling would serve no useful purpose in alleviating the necessity for more frequent interisland transportation to serve the needs of research and management. Even at best, interisland transportation by vessel is uncertain due to the vagaries of weather and the lack of harbors or protected anchorages.

The use of an aircraft to provide interisland transportation is practical. Estimated minimum costs are as follows:

1. Purchase and operation

Cessna Skymaster (example) push-pull twin	\$ 70,000.00
(hourly operating cost \$ 10 fuel, \$ 12 maint. and overhaul = \$ 22)	
Pilot /A&E GS- 13 + 25% differential	23,500.00
Per diem	5,500.00
Operation round-trip between islands about \$ 22 for 26 weeks at 4 trips/week	2,300.00
Minimum annual cost exclusive of purchase	<u>\$ 31,300.00</u>

2. Charter

Cessna Skymaster (Seattle rate) per hour	65.00
R/T Anchorage/St. Paul-8 hours	
Four shuttles/trip-4 hours	
Add 30% for Alaska costs each round trip (12 hours) (\$ 65) (1.3)	1,000.00
26 weeks/year	<u>\$ 26,000.00</u>

3. Lease--costs would be prohibitive because operators are not interested in tying up their capital without quickly amortizing aircraft costs.

4. Other aircraft--Possibilities for helicopter charter have been explored. The costs for a 6-place unit are totally prohibitive.

5. Supporting facilities

(a) Airstrip improvement--St. George	\$ 60,000.00
(b) Air beacon--St. George	3,000.00
(c) Hangar--St. Paul	10,000.00
	<u>\$ 73,000.00</u>

The charter of aircraft offers the most practical and reasonable solution to provide interisland transportation to meet the needs of research and management. Not to be ignored would be the possibility providing more frequent mail service and medical attention. There is a very real possibility that a cost-sharing arrangement could be developed among NOAA, HEW, and DPO. Such an arrangement could substantially reduce projected annual aircraft charter costs.

Airstrip supporting facilities, although desirable, are not immediately necessary. Airstrip improvements to include improvement of grade and widening can be a regularly scheduled improvement and maintenance function extending over more than one fiscal year. An air beacon will be required. A hangar at St. Paul becomes a necessity for transient (charter) aircraft during winter months. The initial capital outlay for FY 1973 would be minimal. (See Budget Estimate recapitulation.)

Conclusions and Recommendations (Housing)

Adequate housing, both family-type and bachelor quarters, must be available for those St. George residents who might agree to temporary or permanent transfer to St. Paul. Adequate housing does not now exist.

On St. Paul there is the Alaska Dormitory used to house transient workers during the summer months. It has bunk space suitable for bachelor use only with accommodations for a maximum of 53 men.

Staff quarters are as follows:

Q-105 2 bdrm, 2 story, 5 rms, 1322 sq. ft. w/basement. Presently occupied by NMFS staff.

Q-106/107 Duplex. 2 bdrm apts. 1928 sq. ft. w/full basement. Presently occupied by transient research staff.

Q-108/109 Duplex. 2 bdrm apts. 1928 sq. ft. w/full basement each. Occupied by transient management and school teachers in winter months.

Q-111 1 bdrm apt. 4 rms. 784 sq. ft. plus 4 additional bedrooms (Government House). Occupied by management staff and transient official visitors.

Q-112 3 bdrm, 2 story, 6 rms, 1756 sq. ft. Occupied by transient visitors.

Q-113 Same as above. Occupied by by-products contractor during June, July, and August under terms of contract.

Q-115 2 bdrm, 1 story, 5 rms, 1644 sq. ft. w/basement and garage. Occupied by Alaska Department of Education during school year.

Plans have been developed to construct staff quarters to collocate NMFS functions on St. Paul Island. Originally these plans were made in anticipation of the construction of a new processing plant complex apart from St. Paul Village. Although entered in the preliminary budget process, funds have not been appropriated for

construction. If funding could be made available for consolidated NMFS staff needs (research and management), two purposes would be served: (1) release of family-type housing for temporary use by St. George employees, and (2) relief in the existing housing shortage for St. Paul residents or the Department of Education. An additional benefit would be to clarify use of existing facilities (e.g. biological laboratory) that will be transferred to the Community of St. Paul through provisions of the Alaska Native Claims Settlement Act and the Fur Seal Act of 1966.

Estimated costs for providing quarters for research and management use including laboratory facilities are as follows:

1. Quarters	
10 single occupancy rooms (300 sq. ft.)	\$ 75,000.00
Supporting rooms (furnace, library, et.)	20,000.00
6 sleeping rooms double occupancy	<u>13,500.00</u>
Total	\$ 108,500.00
15% contingency	<u>16,350.00</u>
	\$ 125,000.00
2. Laboratory	
2,000 sq. ft. at \$40/sq. ft.	\$ 80,000.00
3. Office	
1,200 sq. ft. at \$20/sq. ft.	24,000.00
4. Garage--8 stalls	10,000.00
Total (force account)	\$ 239,000.00
Total (contract-plus 50%)	\$ 358,000.00

For immediate consideration to be given to the construction of facilities it will be necessary to utilize the contract approach. All island personnel skilled in construction are presently employed in the force account construction of a new school scheduled for completion September 1973.

In summary, one of the most important conditions necessary for acceptance of the research proposal by the Aleuts is resolution of the social problems to be created. The development and availability of adequate housing facilities is absolutely essential.

A practical solution is the construction of bachelor-type quarters for use by research and management transient staff. This would release not less than six existing family-type units, e. g. Quarters 105, 106, 107, 108, 109, and 112. In addition, Quarters 111, 113, and 115 could then be made available to the Alaska Department of Education for full-time use by their teaching staffs. With the abandonment of full-time residency by NMFS research or management staffs, family-type housing requirements are minimal.

Of the total facility requirements outlined for research and management, the most immediate need is for substitute housing. The remaining facilities (laboratory, office, and garage) can be relegated to a subsequent fiscal year.

A summary of budgetary requirements by fiscal year follows:

	<u>FY '73</u>	<u>FY '74</u>	<u>FY '75</u>
Personal services ^{1/}	--	--	--
<u>Transportation</u>			
Air charter	\$ 5.0	26.0	26.0
Strip improvement	5.0	30.0	25.0
Beacon	3.0	--	--
Hangar	--	10.0	--
<u>Housing and Support Facilities</u>			
Quarters	187.0 ^{2/}	--	--
Laboratory	--	80.0 ^{3/}	--
Office	--	20.0 ^{3/}	--
Garage	--	10.0 ^{3/}	--
Total	\$ 200.0	\$ 176.0	\$ 51.0

1/ No additional required.

2/ Contract construction \$ 125.0 plus 50 pct.

3/ Force account construction.