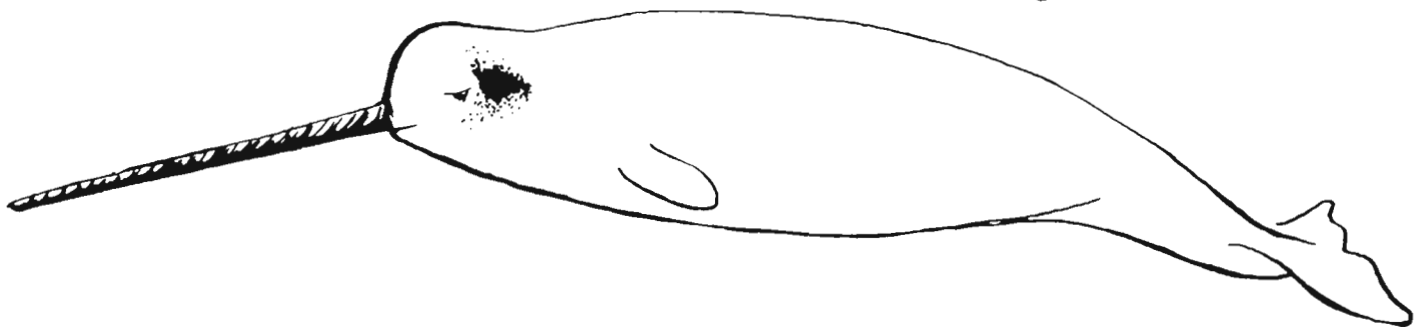
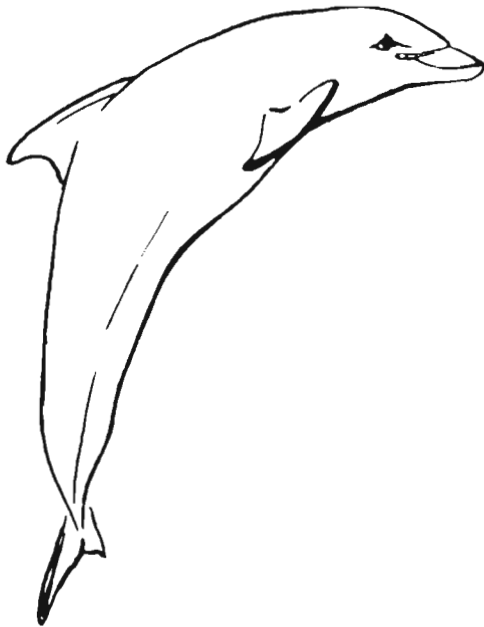




# Administration Of The Marine Mammal Protection Act Of 1972

April 1, 1976 through March 31, 1977

U.S. DEPARTMENT OF COMMERCE · National Oceanic and Atmospheric Administration · National Marine Fisheries Service



Prepared by

The National Marine Fisheries Service/National Oceanic and Atmospheric Administration  
Washington, D.C. 20235 June 1977

**REPRINTED FROM FEDERAL REGISTER, VOL. 42, NO. 147--MONDAY, AUGUST 1, 1977**

## DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric  
Administration

## STATUS OF MARINE MAMMALS

## Report of the Secretary of Commerce

Section 103(f) of the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361, 86 Stat. 1027 (1972)) states that "Within six months after the effective date of this Act (December 21, 1972) and every twelve months thereafter, the Secretary shall report to the public through publication in the FEDERAL REGISTER and to the Congress on the current status of all marine mammal species and population stocks subject to the provisions of this Act. His report shall describe those actions taken and those measures believed necessary, including where appropriate, the issuance of permits pursuant to this title to assure the well-being of such marine mammals."

Section 3(12)(A) of the Act limits the responsibility of the Department of Commerce to those mammals which are members of the Order Cetacea (whales and porpoises) and members, other than walruses, of the Order Pinnipedia (seals and sea lions). Accordingly, there is published herewith the report of the Secretary of Commerce for the period April 1, 1976, to March 31, 1977, on the administration of the Act with regard to those mammals.

Issued at Washington, D.C., and dated June 20, 1977.

Dated: June 20, 1977.

JUANITA M. KREPS,  
Secretary of Commerce.

ADMINISTRATION OF THE MARINE MAMMAL  
PROTECTION ACT OF 1972, APRIL 1, 1976,  
THROUGH MARCH 11, 1977.

REPORT OF THE SECRETARY OF COMMERCE  
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## PART I. INTRODUCTION

AUTHORITY FOR THE REPORT AND  
ADMINISTRATION OF THE ACT

This report to Congress is pursuant to requirements of Section 103(f) of the Marine Mammal Protection Act of 1972 (86 Stat. 1027, hereinafter called the "Act"). The Act, with certain exceptions, placed an immediate moratorium on the taking and importation of all marine mammals and marine mammal products. Under the Act, the responsibility of the Secretary of Commerce pertains to whales, porpoises, seals, and sea lions; the Secretary of the Interior is responsible for all other mammals, specifically sea otters, walruses, polar bears, dugongs, and manatees. On November 30, 1972, the Secretary of Commerce delegated authority for the functions prescribed by the Act to the Administrator of the National Oceanic and Atmospheric Administration (NOAA). On February 9, 1973, the Administrator delegated this authority to the Director of the National Marine Fisheries Service (NMFS). On October 13, 1976, the Administrator re-delegated this authority to the Director, NMFS, with clarification of the authority retained by the Administrator to provide policy guidance and to consult with the Director on the execution of the functions delegated.

## PROGRAM ACTIVITIES

The principal NMFS activities in administering the Act include: decisions and activities regarding waivers of the

moratorium; issuance of permits for scientific research and public display; enforcement of the provisions of the Act; promulgation of regulations to control the taking of marine mammals; research and surveys to determine the status of marine mammal population stocks; cooperation with the States; and international activities and agreements to conserve and manage marine mammals. A close working relationship has been fostered with the Marine Mammal Commission (established under Title II of the Act) and its authorized Committee of Scientific Advisors to facilitate interchange and consultation on substantive program matters.

In addition, meetings were held periodically with interested national conservation groups, fishing industry representatives, zoo and aquarium operators, and individual researchers, to discuss the problems as well as proposed solutions involved in the implementation of the Act.

Porpoise mortality incidental to the U.S. tuna purse-seine fishery remains one of the most significant problems NMFS continues to face in the administration of the Marine Mammal Protection Act of 1972. The Act and the legislative history, taken together, direct that the mortality and serious injury of marine mammals be reduced to insignificant levels approaching a zero mortality and serious injury rate, without closing down or seriously curtailing the fishing industry.

Enactment of the Fishery Conservation and Management Act of 1976 (FCMA) (Public Law 94-265) has expanded the responsibilities of NMFS under the Marine Mammal Protection Act (MMPA). Section 404 of the FCMA amended the MMPA to extend its territorial jurisdiction to the 200-mile Fishery Conservation Zone (FCZ). The moratorium on taking and importing marine mammals, therefore, now applies throughout the FCZ.

## SUMMARY OF MAJOR ACTIVITIES

## Optimum Sustainable Population

NMFS developed an operational definition of "optimum sustainable population" (OSP) that is broadly applicable to marine mammal population dynamics. OSP is defined as a range within which maximum net productivity of a population is expected to occur. Maximum net productivity is the gross addition to the population less natural mortality.

Incidental Taking of Marine Mammals  
in the Course of Commercial Fishing  
Operations

Regulations promulgated on December 5, 1975, to govern the incidental take of marine mammals in the yellowfin tuna purse-seine fishery were voided by Judge Charles Richey, U.S. District Court, on May 11, 1976; however, the effective date was stayed until December 31, 1976.

On October 14, 1976, proposed regulations were published to replace those reg-

ulations voided by the U.S. District Court on May 11, 1976. Those proposed regulations were the subject of a public hearing which was held in Washington, D.C., and San Diego, Calif., from November 15, 1976, through December 22, 1976. Based on the Administrative Law Judge's recommendations and the hearing record, the decision was published on March 1, 1977, and, among other things, limited the 1977 porpoise mortality level by U.S. vessels to 59,050, comprised of 12 different individual quotas.

The 1976 estimated mortality by U.S. fishermen was 103,600 through November 11, 1976, when it was prohibited to encircle any more porpoises in 1976. The mortality exceeded the 78,000 quota that had been imposed in 1976 subsequent to the decision by Judge Richey. It was estimated that the quota was reached on October 19; however, court actions delayed imposition of a prohibition until November 11, 1976.

A workshop to assess the stocks of porpoise involved in the eastern Pacific Yellowfin Tuna Fishery was completed. Its report, published in September 1976, established for the first time estimates of the populations of marine mammals involved and estimates of their optimum sustainable population levels.

#### Waiver of the Moratorium

On February 19, 1976, the moratorium was waived to allow the importation of Cape fur sealskins from South Africa under certain specific conditions. Because of foreign policy considerations, the Director denied importation of skins taken in Namibia (Southwest Africa). Following a review of the South African harvest, it was determined that the conditions that warranted granting the waiver continued to exist. Therefore, the waiver was continued for the 1976 harvest from which 12,471 skins were imported.

In January 1973, the State of Alaska applied to the Department of Commerce and the Department of the Interior asking that the moratorium be waived and regulations promulgated in order to return management of nine species of marine mammals to the State. Having reviewed the State's request over several years, the Directors of NMFS and the U.S. Fish and Wildlife Service (FWS) jointly proposed such a waiver and regulations governing return of management. Formal hearings on the matter were convened on June 29, 1976, in Anchorage, Alaska; July 6, in Nome; July 12, in Bethel; and July 14, in Anchorage. On October 20, 1976, the hearing was concluded in Washington, D.C. A decision will be rendered during 1977.

#### Public Display and Scientific Research Permits

At the beginning of this report period (April 1, 1976), 16 permit applications were pending action. During the period of this report, 60 permit applications were submitted. Of these 76 applications, 48 have been approved, 1 denied, 1 inactivated because of insufficiency, 2

withdrawn, 1 returned to the applicant, and 23 remain under consideration.

#### Other Actions in Regulating the Taking and Importing of Marine Mammals

The Hawaiian monk seal (*Monachus schauinslandi*) was designated as a depleted species throughout its range, on the basis that numbers of this species may have declined to a significant degree over recent years, and furthermore, may have declined historically to the point that, if such decline continued, this species would become subject to the provisions of the Endangered Species Act of 1973.

#### Law Enforcement

The first criminal prosecutions under the Act resulted in convictions of two conspirators involved in the illegal capture, possession, and sale of bottlenosed dolphins.

An investigation into an illegal importation operation was concluded with the seizure of 450 sea lion skins from South America.

Contracts were renegotiated with Alaska, Washington, Oregon, California, and Florida that provide Federal funds to these States for enforcement of the provisions of the Act.

The first administrative hearing for an alleged violation of the Act resulted in a ruling that the native exception of the Act applies only to natives under the jurisdiction of the United States, rather than to all Arctic Eskimos, as the defendant contended.

#### International Programs

An Ad Hoc Interagency Committee was formed to develop an International Marine Mammal Program. In addition to government representatives, members of the public participated in the Committee meetings.

At the International Whaling Commission meeting in June 1976, the United States continued efforts to have the Commission adopt conservation measures that conform with the Marine Mammal Protection Act. The U.S. efforts were successful in having the Commission adopt several conservation measures.

The Protocol Amending the Interim Convention on Conservation of North Pacific Fur Seals was ratified by the four parties to the Convention. The Protocol extends the Convention for an additional 4 years, and modifies a number of the Convention's fur seal conservation measures.

The United States ratified the Convention on the Conservation of Antarctic Seals.

Under the U.S.-U.S.S.R. Marine Mammal Project, Environmental Protection Agreement, three joint research projects were conducted, involving the cooperative exchange of United States and Soviet Marine mammal scientists.

#### Tuna/Porpoise Research and Development Program

Twenty U.S. vessels voluntarily used experimental gear in a program co-

operatively developed by the Porpoise Rescue Foundation and NMFS to facilitate porpoise release. Ten were equipped with Bold Contender Systems, and 10 had Modified Systems with 1/4-inch mesh in the safety panel. Each killed fewer porpoises than conventional gear; these tests led to changes in gear requirements. A chartered research cruise using different release methods demonstrated that porpoise kills may be reduced to very low levels. Further testing of the gear and procedures used on this cruise is planned for 1977.

Stock assessment research indicates that populations of spotted dolphins and whitebelly spinner dolphins are within the lower limits of OSP; the eastern spinner dolphin is depleted; and the northern, central and southern stocks of common dolphins and the northern and equatorial stocks of striped dolphins are at or above OSP levels.

Analysis of U.S. tuna fleet performances relative to porpoise kill indicates that, under standardized conditions of numbers of tuna and porpoise, and species of porpoise caught, the kill per porpoise set in 1978 declined 21 percent, compared with 1975.

#### PART II. NATIONAL MARINE FISHERIES SERVICE ACTIONS TAKEN PURSUANT TO THE PROVISIONS OF THE ACT

##### OPTIMUM SUSTAINABLE POPULATION

The Marine Mammal Protection Act states that "marine mammals have proven themselves to be resources of great international significance, esthetic and recreational as well as economic; and it is the sense of Congress that they should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem. Whenever consistent with this primary objective, it should be the goal to obtain an optimum sustainable population keeping in mind the optimum carrying capacity of the habitat."

The interrelated concepts of optimum sustainable population (OSP) and optimum carrying capacity (OCC), as used in the Act, are basic elements of a management program to carry out the Act's overall objective to protect and conserve marine mammals. The Act defines OCC as the "ability of a given habitat to support the optimum sustainable population of a species or population stock in a healthy state without diminishing the ability of the habitat to continue that function." OSP is defined to mean, "the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the optimum carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element."

The desired goal of marine mammal management in the Act is to maintain each species and population stock at an OSP level, and to restore to an OSP level any population that has declined below

that level. In this regard, a species may be brought within the additional protective measures conferred by designating that species to be depleted, if the number of animals is determined to be below the optimum carrying capacity for the species within its environment. In addition, the Act requires that the effect of any significant management action upon the OSP of the involved species be evaluated prior to implementing the action.

To fully implement these management concepts, NMFS assembled experts in population analysis to hold a workshop on porpoise stock assessment. The workshop was held July 27-31, 1976, at the Southwest Fisheries Center, National Marine Fisheries Service, La Jolla, Calif., with the task of producing estimates of existing population levels, OSP levels, and the impact of incidental taking on those levels for each and every species or population stock of small cetaceans involved in the U.S. yellowfin tuna purse-seine fishery. On the basis of the resulting "Report of the Workshop on Stock Assessment of Porpoises Involved in the Eastern Pacific Yellowfin Tuna Fishery" and the Marine Mammal Commission's paper entitled "The Concept of Optimum Sustainable Population," NMFS developed and adopted the following operational definition of optimum sustainable population:

Optimum sustainable population is a population size that falls within a range from the population level of a given species or stock that is the largest supportable within the ecosystem to the population level that results in maximum net productivity. Maximum net productivity is the greatest net annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality. (Appendix B-1. Regulations relating to the definition of optimum sustainable population.)

Public comments on the proposed definition from which the above definition was adopted clearly indicated the difficulties involved in defining optimum sustainable population as a single value to be used as a basis for all management decisions under the provision of the Act. The participants in the Workshop on Stock Assessment of Porpoises were unable to agree on a precise point value for the lower end of the range of OSP (some feel that 0.60 is a prudent estimate), but agreed that the value lies within the range of 0.50 to 0.70 of the initial size of the unexploited population. The definition of optimum sustainable population is expected to be modified as knowledge and understanding of the concept evolve.

#### DEPLETED SPECIES OF MARINE MAMMALS

The Marine Mammal Protection Act acknowledges that certain species and population stocks of marine mammals are, or may be, in danger of extinction or depletion as a result of man's activities. The Act states that "such species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and consistent with this major objective, they should

not be permitted to diminish below their optimum sustainable population. Further measures should be immediately taken to replenish any species or population stock that has already diminished below that population. In particular, efforts should be made to protect the rookeries, mating grounds, and areas of similar significance for each species of marine mammal from the adverse effect of man's actions."

One action provided by the Act to further this purpose is the designation of a species to be depleted. The Act defines a depleted species to be a species of marine mammal for which the Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals, determines that the number of individuals within the species:

- Has declined to a significant degree over a period of years;
- Has otherwise declined and that if such decline continues, or is likely to resume, such species would be subject to the provisions of the Endangered Species Act of 1973; or
- Is below the optimum carrying capacity for the species within its environment.

Designation of a species to be depleted places the species within the provisions of Section 101(a)(3)(B) of the Act, which states that "Except for scientific research purposes as provided for in paragraph (1) of this subsection, during the moratorium no permit may be issued for the taking of any marine mammal which is classified as an endangered species or threatened species pursuant to the Endangered Species Act of 1973, or has been designated by the Secretary as depleted, and no importation may be made of any such mammal." NMFS has determined that the Hawaiian monk seal (*Monachus schauinslandi*) and the eastern stock of spinner dolphin (*Stenella longirostris*) are depleted.

#### INCIDENTAL TAKING OF MARINE MAMMALS IN THE COURSE OF COMMERCIAL FISHING OPERATIONS

The Act provided, in Section 101(a)(2), that during the 24-month period initially following the date of enactment, the taking of marine mammals incidental to the course of commercial fishing operations was permitted. After October 20, 1974, no marine mammals may be taken in the course of commercial fishing operations unless the taking is done under a General Permit and Certificate of Inclusion as specified in regulations. Five categories of General Permit, designed to reduce marine mammal mortality and serious injury, were established by regulations promulgated on September 5, 1974. Five domestic General Permits were issued to allow marine mammals to be taken in the course of commercial fishing operations through December 31, 1976, and again through December 31, 1977: (1) towed or dragged gear; (2) encircling gear, yellowfin tuna purse seining; (3) encircling gear other than yellowfin tuna purse seining; (4) stationary gear; and (5) other gear.

In addition to the five domestic General Permits, six foreign associations,

representing fishermen from Japan, Korea, and the U.S.S.R., have submitted eight applications for general permits to take marine mammals during 1977 in the course of fishing operations within the Fishery Conservation Zone established by the Fishery Conservation and Management Act of 1976 (P.L. 94-265). These foreign applications were pending action on March 31, 1977.

Public concern over porpoise deaths occurring incidental to yellowfin tuna purse-seining operations grew significantly during 1976 and resulted in a flurry of activity in the courts, Congress, government, and industry. These actions were in response to 1976 regulations and proposed regulations for the 1977 season.

In announcing 1976 regulations, NMFS indicated that a quota on the incidental kill of porpoise during yellowfin tuna purse seining would be imposed if the U.S. 1976 kill for the January to April 14 period was not lowered to 70 percent of the 1975 kill for the same period. Although the U.S. kill actually dropped to 67 percent for the comparable 1975 period, a suit was filed in the U.S. District Court for the District of Columbia, on behalf of organizations of the environmental community. The resulting court order halted tuna purse seining for tuna associated with porpoise effective May 31, 1976. The basis for the ruling was that NMFS failed to meet certain legal requirements of the Marine Mammal Protection Act in issuing a General Permit to the tuna industry. In appealing the court decision, NMFS announced its intention to impose an incidental kill quota of 78,000 porpoises, to expand its observer program to more effectively monitor the quota, and to expedite efforts to determine the existing and optimum porpoise populations for each species involved in the tuna fishery. A subsequent ruling by the U.S. Circuit Court of Appeals upheld the lower court ban, but ruled that porpoise fishing could continue through 1976. The stay was granted to avoid a disastrous impact on the industry, to allow sufficient time for NMFS to comply with the Act's requirements, and to enable ongoing cooperative gear development studies to be completed throughout the entire fishing season.

Further court action was initiated when the NMFS announced that the 78,000-porpoise quota would be reached on October 19, 1976. Data provided by scientific observers placed aboard 54 U.S. tuna vessels were used to monitor the incidental kill rate and make projections on the closure date. Industry challenges on administrative procedures used to set the quota were overturned, and the prohibition on fishing of tuna associated with porpoise went into effect on November 11, 1976. The preliminary estimated incidental porpoise kill for 1976 was 103,600.

Proposed regulations for 1977 were published on October 14, 1976. The proposed regulations placed emphasis on deficiencies identified in the U.S. District Court ruling and included the establishment of a quota for each of 17 stocks of porpoises involved in the fishery, pro-

hibited encircling pure or mixed schools of certain species or stocks, and required the installation of a 1¼-inch mesh porpoise safety panel in the backdown area of the net (the Industry Fine Mesh System). In addition, the regulations proposed to deny entry into the United States all shipments of yellowfin tuna from nations whose vessels participate in the yellowfin tuna seine fishery in the eastern tropical Pacific Ocean unless the Director makes a finding that fishery operations are conducted in accordance with U.S. regulations and standards.

These proposed regulations were the subject of an extensive review process including public hearings in Washington, D.C., and San Diego, Calif., before an Administrative Law Judge (ALJ). These hearings were concluded on December 22, 1976, and the ALJ made his recommended decision to the Director on January 17, 1977.

Based upon the ALJ's recommended decision and the hearing record, the Director made his final decision which was published on March 1, 1977.

Based on a determination of optimum sustainable population, for all but 5 of 17 species and stocks, a total U.S. take limitation of 59,050 was established for species for which encircling by purse seine net could be permitted. The Eastern spinner dolphin stock was determined to be depleted. The status of the stocks of coastal spotted dolphin, Costa Rican spinner dolphin, and melon-headed and pygmy killer whales are unknown. Therefore, no take was allowed of these five stocks. This take would allow the species and stocks to increase or remain within their optimum sustainable range. NMFS will place an observer aboard each U.S. tuna vessel (400-ton carrying capacity or greater) fishing on porpoise for at least one trip during 1977, contingent upon the availability of manpower and funds. (Appendix B-2. Notice and regulations relating to the incidental taking of marine mammals in the course of commercial fishing operations).

#### WAIVER OF THE MORATORIUM

##### *South African Fur Seals*

The Fouke Company of Greenville, S.C., is the sole processor of fur sealskins in the United States and the largest fur sealskin processor in the world. The Company has processed fur sealskins almost continuously under contract with the U.S. Government for over a half century, and has imported raw sealskins from South Africa for 50 years. Its primary sources of raw product have been northern fur sealskins from the Pribilof Islands, Alaska, and Cape fur sealskins from South Africa.

On February 19, 1976, the NMFS Director published a decision in the FEDERAL REGISTER (41 FR 7537) to waive the moratorium imposed by the Marine Mammal Protection Act of 1972, to allow the importation of up to 19,180 skins of Cape fur seals harvested from each annual harvest commencing with the 1975 harvest within the Republic of South Africa, and promulgated regula-

tions to govern the waiver. (Appendix B-3. Notices and regulations relating to the South Africa fur seal waiver of the moratorium).

The waiver provides for an annual review of the South African management program and a number of activities conducted thereunder. The annual review permits the Director to review relevant information and to determine whether the conditions upon which the waiver was granted continue to exist, and would warrant a continuation of the waiver.

In connection with the annual review for 1976, the Director received information from the Government of the Republic of South Africa that the South African inspection program pertaining to the humaneness of harvests has been expanded to include all rookeries; additional tagging and aerial survey programs have been developed; and, in general, additional means to continue to implement a sound scientific management program consistent with the Act have been provided.

The 1975 South African harvest level of 74,945 Cape fur seals exceeded the level of 70,000 animals established by the waiver. However, the excess harvest (4,945 animals) was not considered significantly adverse from a scientific point of view to constitute evidence of inadequate management practices. There is no evidence that the seal populations will be adversely affected by this one incident of an excess harvest; nor can the excess harvest be viewed as evidence of a disregard for appropriate harvest levels, because the Director's decision on the harvest level was made after the harvest was completed.

The Director determined that conditions upon which the waiver was granted continue to exist; thus, amending or revoking the waiver was unnecessary.

On May 11, 1976, the Fouke Company petitioned to amend the Regulations to raise the maximum annual harvest limitation from 70,000 Cape fur seals to 76,965, thereby raising the maximum number of skins that could be imported from 19,180 to 21,088. The Fouke Company contended that increasing the maximum harvest level was warranted because the pup population had increased.

The petition was denied because the evidence submitted by Fouke was not considered sufficient to support a conclusion that the pup population of the Cape fur seal had increased.

In September 1976, the Director received a petition for Amendment of Rule from the Fouke Company to adjust the total harvest percentage that could be imported from 27.4 to 33.1 percent. Fouke alleged that NMFS failed to consider four islands as part of South Africa, and thereby understated that portion of the total yearly harvests in South Africa. After consulting with the Department of State, the Director decided that an amendment of the waiver was appropriate, and accordingly increased the maximum number of skins that may be imported to 23,170 annually, beginning with the 1976 harvest.

On April 2, 1976, NMFS gave notice (41 FR 14204) of receipt of an application from the Fouke Company for a permit to import 13,883 Cape fur sealskins from the 1975 South African harvest. However, the Company subsequently withdrew its application for a permit when it learned that it could not comply with the requirements of the Regulations for permit issuance.

Following a review of the 1976 South African management program, the Director received an application from the Fouke Company for a permit to import 13,000 Cape fur sealskins from the 1976 harvest and process the skins in accordance with the usual business practice. The application is pursuant to the waiver of the moratorium and the regulations. After reviewing the permit application, the supporting materials from the South African Government concerning the 1976 harvest, and the public comments, the Director granted the permit request on December 10, 1976.

##### *Alaska Marine Mammals*

The State of Alaska applied to the Secretary of Commerce in 1973, as stated in previous reports, to waive the moratorium on northern sea lions, harbor and spotted seals, ringed seals, and beluga whales, and return management of these species to the State. A simultaneous request was made to the Secretary of the Interior with respect to walrus, sea otters, and polar bears. NMFS and the U.S. Fish and Wildlife Service (FWS) are jointly considering the request. A draft environmental impact statement (DEIS) and proposed regulations were published in February 1976, as discussed in the June 1976 Report. A hearing on the State's regulation was convened on June 29, 1976, before Hon. Malcolm P. Littlefield, Administrative Law Judge, in Anchorage, Alaska. To obtain the broadest possible testimony of all parties concerned, the hearing was continued on July 6 in Nome, and July 12 in Bethel. On July 14, the hearing was reconvened in Anchorage. On October 19 and 20, the hearing was concluded in Washington, D.C. Based on the recommendation of the ALJ and the hearing record, the Directors of NMFS and FWS are expected to make a decision on the matter later in 1977. (Appendix B-4. Notices and regulations relating to State management of marine mammals.)

#### PUBLIC DISPLAY AND SCIENTIFIC RESEARCH PERMITS

Section 101(a) (1) of the Act and Section 216.31 of the Regulations Governing the Taking and Importing of Marine Mammals (50 CFR Part 216) authorize the NMFS Director (by delegation) to issue permits to take and import marine mammals and marine mammal products for the purposes of scientific research and public display.

Although the Act declares a moratorium on the taking or importing of marine mammals and marine mammal products, the Act included exceptions that allow continuing research on marine mammals and taking of marine mam-

mals for public display, providing that the health and well-being of the marine mammal species and populations involved, as well as the marine ecosystems, are not adversely affected. Permits may, however, be granted only after the Marine Mammal Commission and its Committee of Scientific Advisors on Marine Mammals have reviewed the application.

One of the major considerations in issuing permits, which involve captive marine mammals for either scientific research or public display, is the quality of care provided. Following enactment of the Act, NMFS developed requirements for marine mammal care and maintenance that have since been used as criteria for all permits involving captive marine mammals. These requirements appeared as Appendix C to the July 1973, Report of the Secretary of Commerce on Administration of the Marine Mammal Protection Act of 1972.

Since enactment of the Act, NMFS has worked closely with the Marine Mammal Commission, the Fish and Wildlife Service (FWS) of the Department of Interior, and the Animal and Plant Health Inspection Service (APHIS) of the Department of Agriculture, as well as representatives of the marine mammal display industry and concerned public groups, to develop more comprehensive standards for the care and maintenance of captive marine mammals. In October 1975, these efforts resulted in a set of standards and guidelines prepared by the Marine Mammal Commission, NMFS, FWS, and APHIS, under the authority of the Animal Welfare Act of 1970, have been developing the means by which these standards and guidelines will be implemented by the involved Federal agencies.

The criteria used by the Director to determine issuance of a scientific research permit include such considerations as whether the proposed taking or importing is consistent with the policies and purposes of the Act, and whether granting the permit is required to further bona fide, necessary, and/or desirable scientific purpose. Further considerations are the benefits anticipated to be derived from the scientific research contemplated and the effects of the proposed taking or importing on the population stocks and the marine ecosystem.

In determining whether to issue a public display permit, the Director considers, among other criteria, whether the proposed taking or importing will be consistent with the Act's policies and purposes; and whether (1) a substantial public benefit will be gained from the display contemplated, considering the manner of the display and the anticipated audience on the one hand, and the effect of the proposed taking or importing on the population stocks of the marine mammals in question and the marine ecosystem on the other; and (2) the applicant's qualifications for the proper care and maintenance of the marine mammal, and the adequacy of the holding facilities.

Appendix A provides an overview of the scientific research and public display permit program, both for the period

of this report and for the cumulative period since enactment of the Act. Table 1 of appendix A provides a listing of the common and scientific names of the marine mammal species that may be involved in permit applications. Table 2 provides a summary of the applications received, the number of marine mammals requested, the various actions taken on applications, and the number of marine mammals authorized to be taken and/or imported. Tables 3 and 4 provide analysis of the number of each species of marine mammals requested in permit applications. Tables 5 and 6 provide a similar analysis of the marine mammals authorized to be taken and/or imported under scientific research and public display permits.

Scientific research permit applications have involved the following:

1. Activities requiring the removal of living marine mammals from the ecosystem:
  - a. Killing wild animals for the collection of biological materials and measurement data; and
  - b. Holding animals in captivity for laboratory-oriented research.
2. Activities requiring the removal of dead marine mammals from the ecosystem:
  - a. Collecting biological materials and measurement data from dead marine mammals, not killed by permit holders (i.e., materials obtained from animals killed incidental to commercial fisheries, taken in native harvests, found beached, or floating at sea); and
  - b. Importing biological materials taken from previously killed animals.
3. Activities not requiring the removal of marine mammals from the ecosystem, nor involving any significant probability of accidental injury or death:
  - a. Capturing, tagging, and/or marking, followed by release of the animals;
  - b. Marking and/or tagging by means of a remote technique, not involving capture and release;
  - c. Taking skin samples from cetaceans to determine sex;
  - d. Collecting measurement data and limited biological material from living, restrained animals (i.e., blood samples, toenails, teeth), followed by release of the animals; and
  - e. Taking by actions technically considered as harassment, such as may occur in the course of aerial surveys, population counts, filming and sound recording activities, not involving direct contact with any marine mammals.

The research activities of greatest scope, in terms of the number of animals affected, involved animals that were not removed from the ecosystem.

During the period from April 1, 1976, through March 31, 1977, 60 permit applications have been received, in addition to 178 permit applications previously received (table 2). Of these 238 permit applications, 155 had been forwarded to the Marine Mammal Commission as of March 31, 1976, and 54 were forwarded to the Commission during the period of this report. As of March 31, 1977, the Commission had reviewed and submitted recommendations on 203 of the 209 applications referred to the Commission.

As of March 31, 1976, 162 permit applications had been resolved by means of permit issuance or denial, withdrawal of application, referral of applicants to the

appropriate States involved in beached and stranded marine mammals, and through interagency agreements. During the period of this report, an additional 53 applications have been resolved in the following manner: 2 applications have been withdrawn; 1 application has been returned to the applicant because of inappropriate submittal; 1 application has been inactivated because of insufficient response from the applicant to requests for additional information necessary to certify an application complete; 1 application has been denied; and 48 applications have been approved. The 23 remaining applications of the 238 received to date are pending.

The Regulations provide that a permit may be modified, with sufficient prior notification to the permit holder, followed by publication of notice of the modification in the FEDERAL REGISTER. During the period of this report, 22 permit modifications have been proposed and 20 made effective by publication in the FEDERAL REGISTER, in addition to 39 modifications previously proposed and made effective.

All permit holders are required, under permit-conditions, to provide a number of reports, which may be any of the following:

1. Reports on the taking of marine mammals;
2. Reports on the importing of marine mammals;
3. Reports on specific aspects of the husbandry of captive marine mammals, such as water quality;
4. Reports on marine mammal mortalities;
5. Monthly, quarterly, semiannual and/or annual reports on the health and condition of marine mammals held in captivity;
6. Reports on activities conducted under scientific research permits;
7. Preliminary reports on the progress of scientific research projects; and
8. Final reports concerning the results of scientific research projects.

During the period of this report, 280 reports were submitted; 25 on the taking of marine mammals; 212 on the health and condition of marine mammals held in captivity; 11 on mortality; 30 on research activities; and 2 on final research. Additionally, 72 permit holders have submitted special reports synthesizing their activities.

The Act and the Regulations provide for charging a reasonable fee to cover the administrative costs of issuing a permit. Public display permit holders fee is \$200; scientific research permit holders fee is \$25. Such fees are waived for Federal and State agencies. During the period of the report, a total of \$4,725 has been collected from permit holders and deposited in miscellaneous receipts of the U.S. Treasury.

REQUESTS FOR CERTIFICATE OF REGISTRATION AS TANNERY OR AS AGENT WITH RESPECT TO MARINE MAMMALS TAKEN BY ALASKAN NATIVES

Section 216.23 of the Regulations provides that marine mammals taken by an Indian, Aleut, or Eskimo resident of the coast of the North Pacific or Arctic Ocean, for the purpose of creating and

selling authentic native articles of hand-craft and clothing may be transferred to a registered tannery, either directly by the Indian, Aleu, or Eskimo or through a registered agent. Similarly, marine mammals taken by Alaskan Natives for subsistence may be sent to a registered tannery for processing and subsequent return to an Alaskan Native.

Any tannery or person who wishes to act as an agent within the jurisdiction of the United States may apply for registration as a tannery or an agent, and thus, be allowed to possess and process marine mammal products for Indians, Aleuts, or Eskimos. Prior to April 1, 1976, seven tanneries and nine agents had been granted Certificates of Registration as tannery or agent in accordance with Section 216.23 of the Regulations. Two of those registered tanneries have surrendered their certificates. During the period of this report, three additional certificates have been granted to tanneries, and seven to agents.

#### OTHER ACTIONS IN REGULATING THE TAKING AND IMPORTING OF MARINE MAMMALS

##### *Killer Whales*

In the early 1960's, oceanarium operators began to buy live killer whales from the waters of Washington and British Columbia. The killer whale population in the Puget Sound region has provided the people of that area with a unique, esthetic, and recreational pastime, and public sentiment has strongly opposed the capture of killer whales.

Prior to 1971, no State or Federal regulations concerned the capture of killer whales. In 1971, the Washington State Legislature passed a marine mammal protection act with responsibility for management vested in the State Game Department. Under provisions of the Marine Mammal Protection Act of 1972, management responsibility was transferred from the State to the Federal Government and delegated to NMFS. Under authority of the Act, NMFS can grant permits for scientific research and public display. Since the Act became effective, one economic hardship exemption and three permits have been issued, allowing the taking of killer whales in Washington/British Columbia waters and off eastern Vancouver Island.

Public protests over the much-publicized March 7, 1976, capture of six killer whales in Puget Sound by Sea World Inc., operating under a public display permit issued in 1974 by NMFS, prompted the introduction of a bill in the Senate, S. 3130, that would amend the Act to prohibit the issuance of permits to take killer whales, except for certain scientific research purposes. The bill passed the Senate on March 29, 1976.

An identical bill was introduced in the House of Representatives. Hearings on this bill, H.R. 12460, were held before the House Subcommittee on Fisheries and Wildlife Conservation on May 4, 1976.

The Department of Commerce opposed both S. 3130 and H.R. 12460 because available scientific data do not indicate that additional protection is warranted,

and sufficient statutory authority now exists to provide whatever degree of protection is, or may become, necessary.

In response to a nomination that Puget Sound be designated a marine sanctuary for killer whales, pursuant to Title III of the Marine Protection, Research and Sanctuaries Act of 1972, NOAA's Office of Coastal Zone Management, in consultation with NMFS, has prepared a discussion paper that assesses the potential environmental impacts of the proposed action. The sanctuary nomination is being considered under five possible single or multiple use classifications, i.e., habitat area, species area, research area, recreational and esthetic area, and unique area.

##### *Hawaiian Monk Seals*

An NMFS review of the status of the Hawaiian monk seal (*Monachus schauinslandi*) indicated that numbers of this species may have declined significantly over recent years, and may have, furthermore, declined historically to the point that, if such decline continues, this species would become subject to the provisions of the Endangered Species Act of 1973. After consultation with the Committee of Scientific Advisors on Marine Mammals, the Marine Mammal Commission concurred with this assessment, by letter dated December 24, 1975, and recommended that the Hawaiian monk seal be designated as a depleted species.

On June 16, 1976, proposed regulations were published in the FEDERAL REGISTER (41 FR 24393), setting forth the proposed designation of the Hawaiian monk seal as a depleted species throughout its range. The designation was finalized on July 27, 1976 (41 FR 30120) and became effective on September 1, 1976. (Appendix B-5. Regulations relating to the depleted status of Hawaiian monk seals).

#### PUBLIC HEARINGS

The Act and NMFS Regulations provide for public hearings for several types of actions including: scientific research and public display permit applications, permit modification, regulations, and waiver applications. In addition, meetings are held periodically with interested national conservation groups, fishing industry representatives, public display facility operators, State and Federal agencies, and individuals to discuss the problems as well as proposed solutions involved in the implementation of the Act.

In determining whether to hold a public hearing on an application for public display or scientific research, it is the policy of the Director to consider the following: (1) whether any interested person has requested a public hearing on such application during the time period set for public comment on the application; (2) the views of the Marine Mammal Commission on the desirability of holding a public hearing; (3) the nature of the application and the number of animals and species involved; (4) the extent to which a public hearing would facilitate the processing of the application; and (5) whether the application has aspects that require a major policy

decision prior to making a determination on the permit application.

Two public hearings were held during the reporting period. Both hearings were formal hearings on the record, presided over by an Administrative Law Judge. One hearing dealt with the request of the State of Alaska for a waiver of the moratorium and return of management of nine species of marine mammals to the State. The other hearing dealt with proposed regulations governing the issuance of permits for the incidental take of marine mammals in the course of commercial fishing operations.

#### LAW ENFORCEMENT

The five NMFS regional law enforcement offices reported 20,591 man-hours expended in responding to requirements of the Marine Mammal Protection Act during the reporting period. Although the man-hour figure and the number of investigations are nearly the same as reported for the previous 12-month period, the number of violations detected has increased from 52 percent to 89 percent of the total investigations conducted. This increase indicated an improved efficiency in carrying out enforcement activities under the Act.

Tuna-porpoise responsibilities still form the bulk of the enforcement workload in the Southwest Region. Illegal taking of marine mammals and the illegal importation and sale of marine mammal products remain the focus of attention in the Northeast, Northwest, Southeast, and Alaska Regions.

During the reporting period, NMFS special agents initiated 260 investigations into alleged violations of the Act. From these investigations, 232 actual violations were documented. Seventy-two cases were closed through the assessment of civil penalties and/or the forfeiture of seized contraband. One case was closed through successful criminal prosecution. Twelve cases involving insufficient documentation accompanying the items at the time of importation were resolved through substantiation of their pre-Act status or subsequent compliance with necessary certification requirements. About 164 cases are pending. In 198 of the 232 documented violations, seizures involving 793 illegal items were made. The remaining 34 violations involved illegal takings, such as harassment, which generally do not concern a tangible, seizable object. NMFS special agents also monitored the capture of seven marine mammals carried out under permits issued by NMFS and made 167 inspections of marine mammal holding facilities.

Two U.S. citizens were the first persons to be convicted of criminal violations of the Act in the U.S. District Court in Miami, Fla. One was found guilty on June 17, 1976, of 24 counts of illegal capture, possession, and sale of 21 bottlenosed dolphins during the spring and summer of 1974 and of conspiracy to violate the Act. This individual was sentenced to 90 days' imprisonment and placed on 1-year probation. The violations for which these individuals were

prosecuted and convicted involved the capture of dolphins within the territorial waters of another nation, and the subsequent sale of dolphins in international trade.

The successful prosecution of these individuals reinforces NMFS's interpretation of the Act, to the effect that U.S. citizens are subject to the provisions of the Act, regardless of the geographic location of their marine mammal activities, and regardless of the legality of such activities under a foreign state's law.

In December 1976, NMFS special agents seized 420 South American sea lion hides that were illegally imported into the United States by a furrier. The furrier was assessed a civil penalty and forfeited the hides, valued at over \$11,000, to the Government.

NMFS special agents seized 17 hair seal garments illegally imported into this country during August 1976. The garments were forfeited, and the importer paid a civil penalty in settlement of this case.

Contracts, which provide funds for enforcement of the Act, were renegotiated with the States of Alaska, Washington, Oregon, California, and Florida at a cost of about \$443,000. NMFS has worked closely with the law enforcement agencies of these States toward the goal of achieving nationwide compliance with the Act. State agencies initiated 69 investigations into possible violations of the Act; 7 cases were referred to NMFS for further action, and 43 cases were closed. State officials also monitored 21 marine mammal capture operations performed under permits issued by NMFS and made 34 inspections of marine mammal holding facilities.

The first administrative hearing for an alleged violation of the Marine Mammal Protection Act was heard on May 5, 1976, before an Administrative Hearing Officer, in Terminal Island, Calif. This hearing was requested by a person who had imported a fur seal coat at the Los Angeles, Calif., customs facility. Respondent's principal defense was that the native exception applies to all Arctic Eskimo people, not to Alaskan Eskimos exclusively. On November 22, 1976, the Hearing Officer ruled that the intention of the Act is clear; the native exception applies only to Alaskan Natives. He recommended a civil penalty of \$500 for the illegal importation and forfeiture of the sealskin coat. Before the action was removed to the U.S. District Court for forfeiture, the case was settled when the respondent voluntarily forfeited the illegally imported sealskin coat.

#### LEGAL ACTIONS BROUGHT AGAINST THE DEPARTMENT OF COMMERCE

*Committee for Humane Legislation, et al., v. Richardson et al.* 414 F. Supp. 297 (D.D.C., May 1976); aff'd 540 F. 2d 1141 (D.C.C.'s August, 1976)—Civil Action Numbers 74-0227.

Plaintiffs brought action for declaratory judgment and injunctive relief concerning certain regulations adopted pursuant to the Marine Mammal Protec-

tion Act of 1972 and the general permit issued under those regulations to the American Tunaboat Association. The Court found that: (1) the regulations were not promulgated under the legal requirements of the Act and thus should be voided; and (2) the permit application failed to demonstrate that the taking under the permit would be consistent with the purpose of the Act. The permit was found to be in contravention of the Act, because it failed to specify the number and kind of marine mammals authorized to be taken. Therefore, the permit for 1976 was voided. The Court of Appeals affirmed the order, but stayed its effect until January 1, 1977. That Court also remanded to the District Court the question of whether an aggregate quota satisfied the requirement of specification of "number and kind." On December 21 and 28, 1976, in the District of Columbia District Court, NMFS requested an extension of the stay of the District Court order, with the intention of imposing an interim regime, until new regulations and a new permit could be issued. The District Court denied these motions and found that the issue remanded to it was moot. On December 30, 1976, the District of Columbia Court of Appeals denied NMFS's motions to grant emergency relief and/or to summarily reverse the District Court.

On January 28, 1977, in response to Judge William B. Enright's Order of January 21, 1977, in the Theresa Ann case, a Motion for a Preliminary Prohibitory Injunction to restrain the taking of porpoise incidental to yellowfin tuna purse seining was filed before the District of Columbia Circuit Court of Appeals. In response, the Court issued Orders on January 28 and February 3 which essentially required the tuna purse-seine fleet to stop fishing on porpoise. The February 3 Order also required the Secretary of Commerce to submit to the Court within 10 days a plan to enforce the Marine Mammal Protection Act. The plan that was submitted consisted, in part, of aerial surveillance and restrictions on the use of operational speedboats in connection with tuna purse seiners.

Soon after this plan was instituted, Attorney General Griffin Bell submitted a Motion for Emergency Relief and/or Immediate Hearing and Ruling on the Appeal before the D.C. Circuit Court of Appeals. On March 8, 1977, the D.C. Court of Appeals issued an Order Staying the Judgment of the District Court invalidating the regulations and general permit as of January 1, 1977, to allow the taking of porpoise incidental to yellowfin tuna purse seining from the date of the Order to April 30, 1977, or until a new permit is issued, whichever comes first. The takings are to be governed by regulations published on March 1, 1977, except as to the term of the permit and the porpoise quotas, both of which are governed by the 1976 amended permit.

On March 30, 1977, the Committee for Humane Legislation filed a Complaint and Motion for a Preliminary Injunction in the District of Columbia District Court seeking to prevent implementation of the

regulations published on March 1, 1977, alleging that the regulations do not fully comply with the requirements of the Act.

*The Motor Vessels Theresa Ann, et al., v. Richardson et al.*, Civil Action Number 78-963-E (USDC SD Cal and 9th Cir).

In October 1976, the plaintiffs filed a complaint seeking damages and alleging that the Marine Mammal Protection Act was unconstitutional because it resulted in the taking of property without due process of law. The plaintiff also sought injunctive relief to prevent NMFS from enforcing the ban on setting on porpoise, imposed after the quota for 1976 had been reached. After some temporary relief, the Courts finally denied plaintiffs' requests for injunctive relief on November 10, 1976. On December 31, 1976, the courts also denied a later motion by the plaintiff for a temporary restraining order to prevent NMFS from enforcing the ban on setting on porpoise.

On January 21, 1977, a motion for a preliminary injunction requesting that NMFS be enjoined from enforcing the Act was heard. Plaintiffs argued that their inability to set on porpoise for several critical months of the tuna fishing season until valid 1977 permits could be issued constituted a denial of due process and an inequity demanding redress.

The Court granted the requested preliminary injunction subject to several conditions:

1. The injunction shall remain in effect only until an aggregate take of 10,000 porpoises has been reached, or until the 1977 permits are either granted or denied;
2. The observer program as implemented in 1976 shall be reinstated immediately, and 25 percent of the boats shall be required to carry observers; and
3. Marine mammal logs must be maintained.

On February 24, 1977, the Ninth Circuit Court of Appeals granted the Government's Motion to Stay Judge Enright's Order pending appeal of the case.

*Animal Welfare Institute v. Elliot Richardson, Robert W. Schoning*—Civil Action No. 76-0483 (D.C. D.C. 1976); and *Committee for Humane Legislation Inc., et al., v. Elliot L. Richardson*—Civil Action No. 76-0484 (D.C. D.C. 1976).

These actions sought: (1) a declaratory judgment that the decision of the NMFS Director to waive the moratorium to allow the importation of Cape fur seals from the Republic of South Africa contravenes the Marine Mammal Protection Act and is invalid, void, and of no effect; and (2) an injunction restraining defendants from taking any steps that give effect to the aforementioned decision.

In December 1976, both the requests for declaratory judgment and the request for an injunction were denied in the District Court by Judge Robinson.

Plaintiffs appealed to the U.S. Court of Appeals for the District of Columbia (Civil Action No. 76-0484). Although plaintiff's motion for an injunction pending appeal was denied, the appeal on the merits of the validity of the waiver and on appellant's standing is still pending and has been expedited.



## INTERNATIONAL PROGRAMS

In carrying out the International Marine Mammal Program, NMFS is continuing to pursue the objectives of the Act through international cooperation. The following details the principal thrusts of the international program.

*Ad Hoc Interagency Committee on an International Marine Mammal Program*

Beginning in April 1976, NMFS and the Fish and Wildlife Service (FWS) convened a public meeting to solicit ideas to be included in an international marine mammal program. An NMFS/FWS task force met for a week to (1) analyze the international problems associated with all species of marine mammals; (2) evaluate ongoing activities as to compliance with the Act; and (3) evaluate all options to fully implement Section 108(a) of the Act. The recommendations of the task force were made available to the public for comment in July. A meeting of the Ad Hoc Interagency Committee on an International Marine Mammal Program was convened in December to make final conclusions on a government-wide program. Present were representatives from NMFS, FWS, the Department of State, the Marine Mammal Commission, the Council on Environmental Quality, the House of Representatives Merchant Marine and Fisheries Committee, and observers from the environmental community and the fishing industry. The report of the Ad Hoc Interagency Committee, with some modifications, was formally adopted by all concerned government agencies in late January 1977.

*International Whaling Commission (IWC)*

The U.S. Delegation to the 28th Session of the International Whaling Commission contributed to discussions on several conservation measures. The IWC agreed to convene a conference of Plenipotentiaries to renegotiate the International Whaling Convention. It was also agreed to circulate the revised text among a large number of nonmember countries, after IWC Contracting Governments have reviewed it. Revisions to the Convention will be discussed at the 29th Annual meeting.

At the 28th Session, resolutions were adopted that:

a. recommended that all member governments prohibit the sale or transfer of vessels, equipment or supplies likely to be used for whaling operations by nations not members of IWC;

b. encouraged whaling nations not members of IWC to abide by IWC quotas and to become members of the Commission;

c. recommended that the United States as early as possible take all feasible steps to limit the expansion of the effort to take bowhead whales and to reduce the loss rate of struck whales; and

d. recommended that contracting governments (U.S. and Mexico) establish regulations to reduce harassment of gray whales in breeding areas as soon as possible.

Following the recommendations of its Scientific Committee in accordance with

the New Management Procedure the IWC established:

1. A complete moratorium on the catching of: fin whales in the North Pacific (at the 27th Session); fin whales in the Southern Hemisphere; and sei whales in the North Pacific (at the 27th Session).

2. Selective moratoria through the establishment of closed areas and closed seasons on the catching of: sei whales in the Southern Hemisphere; sperm whales in the Southern Hemisphere; fin whales in the North Atlantic; and Bryde's whales in the Southern Hemisphere.

The complete protection from commercial fishing is continued for the blue, humpback, gray, right and bowhead whales.

Additionally, quotas were approved by the IWC for those whale stocks that were found to be sufficiently abundant to permit their harvest under the New Management Procedure. While the 1976 quota for minke whales was increased to 8900 from the 1975 quota of 6810, most other quotas were reduced, resulting in a substantial decline in the allotted catch for 1976 when compared to 1975. Three stocks of whales, previously fished without regulatory restrictions were placed under quotas, thus bringing all commercially harvested whales, except one stock, under IWC management for the first time since the creation of the Commission. Considering these new additions to the quota scheme, the actual net reduction in the permitted harvest of whales between 1975 and 1976 is about 6000 animals, comprised mostly of the large whales such as fin, sei, and sperm whales.

*North Pacific Fur Seal Convention (NP-FSC)*

In accordance with the terms of the Interim Convention on Conservation of North Pacific Fur Seals, the United States shared the harvest of the fur sealskins from the Pribilof Islands with Canada and Japan. Also, the United States continued land research and the analysis of pelagic research data collected in previous years. The moratorium on commercial harvest of fur seals on St. George Island, for the purpose of facilitating intensive study of the factors that govern the survival of fur seals, remained in effect.

The 1976 Protocol Amending the Interim Convention on Conservation of North Pacific Fur Seals was ratified by the four parties to the Convention, (Canada, Japan, the Union of Soviet Socialist Republics, and the United States) on October 12, 1976. The Protocol extends the 1957 Convention as amended for an additional 4 years, and the Convention will now continue in force for 22 years (until 1979), and thereafter, until the entry into force of a new or revised fur seal convention between the parties, or until the expiration of 1 year after such period of 22 years (1980), whichever may occur earlier.

The Protocol modified the Convention as follows:

1. Revised the definitions of pelagic research responsibilities of the Parties and provisions for research on (a) the relationship

among fur seals, other living resources, and commercial fishing, and (b) the effects of environmental changes on fur seals caused by man;

2. Removed the U.S.S.R.'s obligation to suspend sealing in the Commander Islands, if the number of seals falls below 50,000;

3. Provided for the Commission to recommend the suspension or reduction of the fur seal harvest when the population falls below levels of maximum sustainable productivity;

4. Provided for applying subsistence needs for native populations living on rookery islands; and

5. Included a pledge by all parties to seek to ensure humane methods of capturing, killing, or marking seals.

The United States was unable to obtain unanimous agreement on the inclusion of an optimum sustainable population management concept in a revised Convention. Because of the lack of agreement on this issue, the United States supported an extension of the agreement for only 4 years.

In consideration of the need for flexibility in view of possible changes in fisheries jurisdiction in the future, the United States supported the inclusion of language allowing a party to call for a meeting of representatives of the parties within 90 days of such request to consider modifications of the Convention. Following a meeting of the standing scientific committee on March 14-18, 1977, at which research plans and commercial harvest forecasts for 1977 were discussed, the Twentieth Annual meeting of NPFSC was held in Tokyo, Japan, March 22-25, 1977.

*Inter-American Tropical Tuna Commission (IATTC)*

At the 1976 Annual Meeting of IATTC, the United States continued its efforts to achieve international action to reduce the incidental take of marine mammals. The United States reviewed the general direction of its national policy on the tuna/porpoise problem noting the probability that, beginning in 1977, the American tuna fleet would be subject to quotas on the various porpoise stocks. In addition, the United States noted that standards similar to those applied to U.S. tuna fishermen would be applied to foreign fleet operations involved in the purse-seine tuna fishery. In this respect, the United States indicated that countries desiring to continue importing tuna products into the United States would be required to provide certain information regarding their efforts to reduce the incidental take of porpoise. Copies of the proposed U.S. regulations were distributed, and governments were invited to participate in the hearing on the proposals scheduled for November 15, 1976. Copies of two detailed reports titled "Progress of Research on Porpoise Mortality Incidental to Tuna Purse Seine Fishing for Fiscal Year 1976" and "Report of the Workshop on Stock Assessment of Porpoises Involved in the Eastern Pacific Yellowfin Tuna Fishery" were also distributed.

As instructed by the Commission at its December 1975 meeting, the Director of Investigations presented a paper on the tuna/porpoise problem and the options regarding Commission involvement.

From among the three discussed alternative objectives concerning the problem of porpoise mortality, the Commission agreed on a policy to maintain tuna production at near current levels, and, at the same time, maintain stocks of porpoise at or above levels that would ensure their survival in perpetuity. Such a course would require, at a minimum (a) an estimation of the size of each porpoise stock in the eastern Pacific as well as the level of kill; (b) assessment of the impact of the kill on each stock; and (c) gear research.

The Commission directed that a comprehensive technical review be undertaken of all existing information pertaining to the tuna/porpoise problem (known as Phase I) and that a detailed proposal for Commission porpoise research be prepared.

In connection with the tuna/porpoise program supported by the Commission, the United States offered the following proposals:

1. That the governments agree on a target date to reconvene to consider the proposal prepared by the Director of Investigations;
2. That consideration be given to preparing a resolution concerning the need to begin gathering information immediately on porpoise mortality; and
3. That an international guest scientist program for the purpose of collecting porpoise mortality data be considered for which the United States would contribute \$88,000.

The member governments supported the first two proposals. Support, in principle, was voiced for the third proposal, although governments preferred to postpone action pending presentation of the Director of Investigation's report in order to determine how such a program might relate to future Commission efforts. Requesting only minor modifications, governments also supported a U.S. draft resolution incorporating the draft resolution incorporating the proposals.

The Commission agreed to reconvene no later than June 1977.

#### *Convention on the Conservation of Antarctic Seals*

The Senate ratified the Convention on September 15, 1976, and President Ford signed and declared it ratified on December 28, 1976. The other Antarctic Treaty parties were informed of this action by the Department of State. Those Antarctic Treaty parties who have not ratified the Convention were encouraged to do so. In ratifying the Convention, the United States again pointed out that an inspection or enforcement component is still required to make the Convention provisions effective.

#### *Food and Agriculture Organization (FAO) and the United Nations Environmental Program (UNEP)*

The task of the Advisory Committee on Marine Resources Research (ACMRR) Working Party on Marine Mammals, to examine the status of all marine mammals, was completed with the convening of the Scientific Consultation on Marine Mammals in Bergen, Norway, August to September 1976. The reports of the 23

working groups were made available at the conclusion of the Consultation, and a summary report is expected by April 1977. Major assistance was provided by the United Nations Environmental Program (UNEP).

#### *Endangered Species Convention*

As a signatory of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the United States proposed listing all stocks of fin and sei whales on either Appendix I or Appendix II of that Convention. The proposal was unanimously supported by all nations present at the First Conference of the Parties to the Convention, Berne, Switzerland, November 2-6, 1976. All stocks of fin and sei whales that receive total protection under conservation measures of International Whaling Commission (IWC) were listed on Appendix I. All other stocks of these species are now on Appendix II. This new action is an aid to the efforts of IWC to encourage nonmember whaling nations to join IWC. As a result, export and import of parts and products from these whales will require Convention permits.

#### *U.S.-U.S.S.R. Marine Mammal Project, Environmental Protection Agreement*

The objective of the U.S.-U.S.S.R. Marine Mammal Project is to develop collaborative research on the biology, ecology, and population dynamics of marine mammals of mutual interest to both nations that will contribute toward sound management and conservation of these animals.

In spring 1976, a cooperative ice seal-walrus expedition visited the Bering Sea, March 15 to May 4th. Three U.S. scientists participated in the cruise, which was primarily a U.S.S.R. commercial sealing expedition. The scientific party recorded biological data on age, sex, physical, and reproductive condition of 158 walruses and 84 ice seals (23 ribbon, 59 largha, and 2 bearded). One of the most significant findings during the cruise was the discovery of several hundred breeding walrus females in a more southerly area of the Bering Sea than was previously known. The discovery of this breeding assemblage between Bristol Bay and the Pribilof Islands indicates an isolated breeding unit separate from the main northcentral group (St. Lawrence-St. Matthew Islands area). The ice seal data will be used by scientists in assessing reproductive capacity and other aspects of the population dynamics of these species, information necessary to determine the status of these species under the Act.

During July and August 1976, two Soviet scientists spent 5 weeks working on ice seals in northern villages of Alaska. They sampled over 50 specimens of bearded and ringed seals in the field. The data collected in Alaska will lead to a better understanding of the biology and systematics of these species of seals. They examined about 300 skulls of ringed seals at the Puget Sound Museum of Natural History and the U.S. National Museum on their return trip. Upon examining osteological material from the

Canadian Arctic, they were able to draw definite conclusions about the taxonomy of ringed seals on a worldwide basis.

In September, a U.S. scientist visited museums and laboratories in Moscow and Leningrad to examine osteological specimens of dolphins. He was able to examine over 120 specimens of species involved in the worldwide taxonomic revision being done on the genus *Stenella*. This work contributed directly to a better understanding of the taxonomy of the *Stenella* species and their worldwide distribution. He was also able to discuss methods of aging dolphins through sectioning of teeth and received information that may enable development of a technique for marking specimens in the field to create known age marks on hard parts such as teeth.

In January 1977, the fourth meeting of the Marine Mammal Project was held in La Jolla, Calif. Among the meeting's highlights was the general agreement of the scientists on the need for a convention or agreement on the protection and management of marine mammal resources (principally walrus and ice seals) in the Chukchi and Bering Seas and adjacent regions of the North Pacific Ocean. The assembled scientists developed a set of principles that could form the basis of a bilateral agreement. These principles embodied the maintenance of optimum abundance of all species to ensure continuing existence of populations, determining acceptable limits of harvest for each population, developing necessary regulatory measures, establishing a system of marine sanctuaries, and providing a scientific basis for the protection and management of marine mammals through coordinated scientific research on populations, distributions, and the role of the species in the ecosystem.

Another highlight of the meeting was the agreement and preliminary plan for publication of a compendium of papers on the results of the cooperative research under the program since its inception. The first volume will cover pinnipeds and sea otters, and is targeted for draft form by the end of this year. The initial publication is to be printed in the United States, followed shortly by a Russian translation.

#### *TUNA-PORPOISE RESEARCH AND DEVELOPMENT PROGRAM*

The marine mammal program at the NMFS Southwest Fisheries Center (SWFC) is concerned with oceanic porpoise populations and their relation to the tuna fishery. The major objective of the program is to carry out NMFS responsibilities under the Marine Mammal Protection Act of 1972, especially in respect to Sections 101(a)(2), 103 (b) and (d), and 111.

The SWFC Porpoise/Tuna Interaction Program has three basic objectives:

1. Develop methods and technology to reduce porpoise mortality incidental to yellowfin tuna purse seine fishing;
2. Determine the status of the porpoise stocks; and
3. Monitor the incidental mortality by the U.S. fleet throughout the year.

Present program priorities were developed in consultation with the Marine Mammal Commission, the tuna industry-sponsored Porpoise Rescue Foundation, Naval Undersea Center, environmental groups, Council on Environmental Quality, and other interested parties in a series of meetings in late 1975 and early 1976.

#### Mortality Reduction Technology

At the start of the reporting period, a major experiment was initiated in cooperation with the Porpoise Rescue Foundation. Twenty vessels were outfitted with experimental gear, and despite interruptions of the study by court actions, sufficient data were acquired to indicate that further reductions in porpoise mortality are possible.

Each of 20 vessels carried a small rubber raft and face mask and snorkel to aid in porpoise hand-release and to signal the captain of the presence of tuna in the release area, a porpoise grabber to reach entangled porpoise, and a 180- by 12-fathom, 1¼ inch stretched mesh porpoise safety panel to prevent entanglement during release operations. In addition, 10 vessels placed a two-step trapezoidal-shaped apron and chute assembly atop the safety panel to reduce canopy formation and form a shallow area to facilitate porpoise release and reduce fish loss. As a direct result of the study, 1¼-inch mesh safety panels will be required on all purse seiners that fish for yellowfin tuna associated with porpoise. Problems in using the apron/chute system, despite its apparent increased capability for porpoise release, have made additional studies necessary.

During a fall 1976 charter, followup gear research has shown that it is technically possible to reduce the kill to very low levels—at least under the conditions found on the charter. During this charter, in 45 net sets on porpoise, over 900 tons of tuna were captured and only 16 porpoises were killed (most were killed accidentally during scientific research). Under average conditions found in the fleet and using conventional gear, about 800 porpoises would have been expected to be killed. During 1977 there will be further testing of this gear, which uses extensive areas of small-mesh webbing (to prevent entanglement) and a large single-step trapezoidal-shaped apron (to shoal up the release area and to reduce canopy formation) in the porpoise release area.

A new study was begun in 1976 to reduce or eliminate the incidence of "roll-ups" (the purse cable turns and winds up webbing). The study involves development of a purse-block suspension system capable of minimizing the induction of turns into the purse line caused by the weight of the block not allowing the cable to run in the center of the block's pulley. A field test of a prototype unit is planned for spring 1977.

Work on the large-volume net, designed to provide less crowding of the animals in the net, was suspended because major repairs were needed to make the net useable. Although the results to

date have been inconclusive, a vessel owner has agreed to make necessary repairs and modifications, and testing of the net will resume in 1977.

SWFC is involved in a large research project to document the behavior of porpoise and tuna before, during, and after the set is made. The study has involved photography from a helicopter, from underwater, and from the deck. The underwater acoustic environment was also recorded during the field portion of the study aboard a chartered seiner in the fall of 1976. Major sponsors of this study are the Marine Mammal Commission, National Science Foundation, Porpoise Rescue Foundation, and NMFS.

Additionally, SWFC has contracted a study at the University of Hawaii to determine the odor-detecting capabilities of yellowfin tuna and to develop artificial scents for use in breaking the porpoise/tuna bond and attracting the tuna.

During 1977, most of the gear research budget will be used to field SWFC gear technicians aboard seiners testing solutions to several identified problems.

Also, the use of rafts as porpoise-rescue platforms, conditions that lead to "disaster sets" (sets in which more than 50 porpoise are killed), the effectiveness of porpoise grabbers, and the role of malfunctions in causing porpoise mortality will be investigated more completely. Rollup-prevention research will also continue through evaluation of alternative purse-block designs and further analysis of antitorque purse-line cable.

#### Biological Stock Assessment Research

During the period, biological research concentrated on estimation of important life history parameters of the major porpoise species involved in the tuna fishery. Using specimens and data collected aboard commercial tuna seiners and standard techniques and analyses, the biological studies staff at SWFC completed estimates of growth and reproduction parameters of the eastern spinner dolphin, *Stenella longirostris* subsp., the second most important species in the tuna fishery, and produced a manuscript for publication. Also completed were preliminary analysis of growth and reproduction of the whitebelly spinner dolphin, *S. longirostris* subsp., an analysis of data for the offshore spotted dolphin, *S. attenuata graffmani*, for the period 1973-75; and a preliminary survey of data for the striped dolphin, *S. coeruleoalba*.

A contract was made to process and analyze the life history data and specimens of the common dolphin, *Delphinus delphis*, by scientists at the Naval Undersea Center, San Diego. Another contract was granted to a private firm for sectioning and reading of a backlog of some 8,000 teeth from spotted and spinner dolphins sampled during the period 1973-76.

A third contract was made with Scripps Institution of Oceanography to develop a technique for aging porpoise teeth that relies on chemical analysis rather than counting of growth rings. This is particularly important because

it is still not certain how many growth rings are formed each year.

In stock assessment, the limits of the ranges of the stocks of *Stenella* spp. in the eastern Pacific were investigated in January and February, 1976 using the two NOAA research vessels, R/V *Townsend Cromwell*, based in Hawaii, and R/V *David Starr Jordan*, based in San Diego. These vessels skirted and transected the known limits of the historical ranges of the species to collect data on (1) limits of occurrence, for use in new population estimates; and (2) physical oceanographic and faunistic correlations of the occurrence of dolphins and the simultaneous occurrence of tuna. Results from these cruises may extend the known range of *Stenella* and also indicate the existence of possible new stocks of spotted and spinner dolphins in the area from 0° to 10°S and west to South America.

The assessment of the impact of incidental mortality on the porpoise stocks was undertaken in July 1976, by a workshop composed of a panel of experts in the areas of population dynamics and the biology of marine mammals. In the report of the workshop (SWFC, 1976), the concept of optimum sustainable population (OSP) as it relates to the tuna-porpoise problem in the eastern tropical Pacific was defined. Combined information collected by (1) a 1974 aerial survey, (2) NMFS observers in 1971-76, and (3) analysis of historical records of the Inter-American Tropical Tuna Commission was used to estimate present stock sizes, incidental mortalities, and to project backward in time to predict the stock sizes at the commencement of exploitation. Results of this work indicated that the spotted and whitebelly spinner dolphins were within the lower limits of OSP whereas the eastern spinner dolphin was close to the lower limit of OSP. Additionally, the northern, central, and southern stocks of the striped dolphin (*Stenella coeruleoalba*) were felt to be at or above OSP.

To obtain more reliable and precise estimates of population sizes, a major aerial survey was initiated in January 1977. This survey will involve 300 hours of flying time, 30,000 track miles, and will encompass the eastern tropical Pacific. The aerial survey will be coordinated with ship surveys aboard the *Townsend Cromwell* and the *David Starr Jordan*. The ships will cover areas that cannot be reached by air. The results of this effort should provide a significant improvement in the reliability of the population estimates, and consequently, in the estimates of the impact of incidental mortality on the porpoise stocks.

#### Fleet Performance

With the institution of a quota on the number of porpoises that could be killed in 1976 during tuna purse-seining operations by the U.S. fleet, it has become very important to monitor the cumulative mortality during the year and to continue analysis of the kill rate performance of the U.S. fleet.

During 1976, a procedure was designed, published, and followed to monitor the

kill on a monthly basis and predict the date for reaching the 78,000 quota. As a result of the analyses through September 30, 1976, it was calculated that the quota would be reached on October 19, 1976. Subsequent court actions delayed the effective closure date until November 11, 1976.

During the first half of the year (the only part of the year for which a time series of data is available), the U.S. fleet continued to improve its performance in releasing porpoise alive. Under standardized conditions of numbers of tuna and porpoise and species of porpoise caught, the kill per porpoise set fell 21 percent in 1976 from 1975. The overall decline in kill per set from 1973 to 1976 is 55 percent under standardized conditions. A statistical analysis confirmed the need to use standardized conditions in comparing indices of performance from year to year.

#### RESEARCH ON NORTHERN FUR SEALS, PINNIPEDS, AND CETACEANS

The Marine Mammal Division of NMFS, Northwest and Alaska Fisheries Center, conducted three principal research programs. The northern fur seal program consists of monitoring studies on the status of the fur seal herds, basic population dynamics studies, as well as behavioral and ecological research in accordance with the provisions of the Interim Convention on Conservation of North Pacific Fur Seals. St. George Island has not been established for an indefinite period as a no-harvest research control area for comparative studies with the harvested fur seal population on St. Paul Island.

The pinniped and cetacean programs are aimed primarily at assessing the status of the stocks and obtaining life history information about such species as the bowhead, killer, gray, and humpback whales; commercially harvested species of large whales; and California sea lions. Although the primary geographic area of concern is the North Pacific Ocean including the Bering and Chukchi Seas and the Arctic Ocean, the Marine Mammal Division maintains an interest in marine mammal research throughout the world.

#### Northern Fur Seal Program

Long-term objectives of the northern fur seal program are to determine what measures may be necessary to make possible maximum sustainable productivity and to determine the relationship between fur seals and other living marine resources.

Population assessment studies being carried out are designed to build a data base on population structure essential to management of the resource. Included are counts of living adult males and of dead pups on land, determination of the number of pups born, and the age composition of harvested seals.

Behavioral research on St. George and St. Paul Islands involves the identification and quantification of behavioral components that may act to control population size. Studies include experiments

on the length and regularity of female feeding cycles and on the female estrus cycle. The program is also designed to reveal the optimum ratio of males to females. Radio telemetry is used to define the movement patterns of subadult males on hauling grounds, and the diving and feeding effort of female fur seals on normal feeding excursions is measured using depth-time recorders.

Population assessment and behavioral research are correlated to determine how survival relates to changes in abundance of the fur seal population in order to determine an optimum population level.

Pelagic data collected from 1958 through 1974 are being analyzed. Specific subjects include distribution and abundance, feeding habits, age, growth, intermixture of fur seals of different origins, and age-specific pregnancy rates. The results are essential for calculating the productivity of the fur seal resource and as input into an analysis of ecosystem dynamics.

A program of physiology and medicine involves a determination of causes of death among pups, development of new methods of marking fur seals, and research on the infectious diseases of fur seals.

#### Pinnipeds of the U.S. Pacific Coast

Biological and population studies are being carried out on the six species of pinnipeds that haul out on San Miguel Island, one of the Channel Islands off Southern California. Special attention is focused on determining the cause of premature births in California sea lions. The number of fur seal pups counted in Adams Cove, San Miguel Island, increased to 417, an increase of 88 over 1975. On Castle Rock, 521 pups were counted, an increase of 125 over the 1975 count.

A long-term study of the Hawaiian monk seal was begun in 1976. Included were studies of behavior and biology, and counts to determine population trends. Two surveys were carried out in 1976 during which 695 animals were counted. Populations at French Frigate Shoals, Laysan Island, and Lisianski Island appear stable; however, those at Pearl and Hermes Reef, Midway, and Kure have declined since the late 1950's.

#### Marine Mammals of the Arctic Ocean and Bering Sea

Arctic Ocean and Bering Sea studies emphasize assessment of the bowhead whale populations and the effect of the Eskimo harvest on the populations. Information on the distribution and abundance of marine mammals in the Gulf of Alaska, Bering Sea, Chukchi Sea, and Beaufort Sea is collected under the Outer Continental Shelf Environmental Assessment Program sponsored by the Bureau of Land Management.

#### Cetaceans

Population studies of protected and exploited whales such as sei, minke, and sperm whales, especially in the North Pacific Ocean, are made to develop the data base for management recommen-

dations to the International Whaling Commission. Estimates of stock sizes of large whale species are developed through censuses, whale observation and marking cruises, and analysis of catch and effort statistics. Under this program are the annual gray whale census off Pt. Loma, Calif., the cooperative killer whale survey in Puget Sound, Wash., and humpback whale surveys in southeastern Alaska and Hawaii.

#### FUNDING

The FY 1977 Marine Mammal Conservation total budget is 97 positions and \$5,934,000. The FY 1977 totals include: in MMPA appropriations, 77 positions and \$4,445,000 for research, administration, enforcement, and an expanded Tuna-Porpoise Observer Program, in accordance with the provisions of the Act and recent Court Orders; in Fur Seal Act appropriations, 14 positions and \$595,000 for research and management associated with the North Pacific Fur Seal herds; in Endangered Species Act appropriations, 6 positions and \$294,000 for research and enforcement associated with large whales protected under the Endangered Species Act; and Saltonstall-Kennedy funds in the amount of \$600,000 for tuna-porpoise surveillance. Because the MMPA appropriation exceeds the Authorization Limit as stipulated in the Act, NOAA is requesting relief legislation to increase the MMPA Authorization Limit.

The FY 1978 base funding for Marine Mammal Conservation as anticipated will be 97 positions and \$5,334,000. Additional positions and funding are being requested for FY 1978 to expand tuna-porpoise research, in the amount of 1 position and \$206,000. The anticipated FY 1978 total will include Marine Mammal Protection Act appropriations, 78 positions and \$4,651,000; Endangered Species Act appropriations of 6 positions and \$294,000; and Fur Seal Act appropriations of 14 positions and \$595,000. The FY 1978 total will be 98 positions and \$5,540,000 for Marine Mammal Conservation providing that the Increase Request receives favorable Congressional action (appendix C).

#### PART III. CURRENT STATUS OF STOCKS OF MARINE MAMMALS

##### INTRODUCTION

Of the approximately 108 species of pinnipeds and cetaceans throughout the world, status reports have been prepared for 69 species which are of primary concern to the United States and which are the responsibility of the Secretary of Commerce under the terms of the Marine Mammal Protection Act. The Act requires a report not only on the status of each marine mammal species, but also on the population stocks. The population stocks of only a few marine mammals have been delineated, and the effort needed to obtain information on most population stocks is beyond the scope of research being carried out at the present time.

Information about each species is summarized under six major headings.

They are distribution and migration, abundance and trends, general biology, ecological problems, allocation problems, and current research. Selected references are listed at the end of each species discussion. Summary information on existing protective regulations for marine mammals is also included.

References are not cited in the report except for the paragraph on abundance and trends. Because of the importance of data on abundance and trends, information in this section is cited and citations are given in the list of references. Data on the abundance of marine mammals are difficult and costly to obtain. Except for a few species which have been harvested commercially, such as large whales and fur seals in the North Pacific Ocean, abundance data are usually inadequate for management purposes.

A list of scientists who have assisted either by providing information or reviewing the status reports is included in this report.

#### SPECIES LIST

The following species list indicates the scientific and common names of the 69 species of marine mammals for which status reports have been prepared. The common names used by Rice and Schaffer (1968) for pinipeds, mysticete cetaceans and the sperm whale have been adopted for this list. Odontocete cetacean common names (other than the sperm whale) have been adopted from Mitchell (1975).

The scientific names of several species have been changed since publication of the 1976 edition of this report. Three species of seals, formerly placed in separate genera, have been merged with the genus *Phoca* (Burns and Fay, 1970). The spelling of the specific names of four species is corrected to conform with their original spelling, as required under the International Code of Zoological Nomenclature. Accordingly the following changes have been adopted in this report:

*Pusa hispida* becomes *Phoca hispida*  
*Histriophoca fasciata* becomes *Phoca fasciata*  
*Pagophilus groenlandicus* becomes *Phoca groenlandica*  
*Arctocephalus philippi* becomes *A. philippii*  
*Ommatophoca rossi* becomes *O. rossii*  
*Phocoenoides dalli* becomes *P. dallii*  
*Berardius bairdi* becomes *B. bairdi*

Two scientific names are currently used for the sperm whale (*Physeter catodon* and *P. macrocephalus*). While Husson and Holthuis (1974) indicate that *P. macrocephalus* is the valid name, considerable controversy remains. Therefore, for the purposes of this report, *P. catodon* will continue to be used.

#### ORDER CARNIVORA (INCL. "PINNIPEDIA")

##### FAMILY OTARIIDAE

*Zalophus californianus californianus* (California sea lion)  
*Eumetopias jubatus* (northern sea lion)  
*Callorhinus ursinus* (northern fur seal)  
*Arctocephalus pusillus pusillus* (South African Cape fur seal)  
*Arctocephalus australis* (South American fur seal)

*Arctocephalus philippii* (Juan Fernandez fur seal)  
*Arctocephalus townsendi* (Guadalupe fur seal)

##### FAMILY PHOCIDAE

*Phoca hispida* (ringed seal)  
*Phoca vitulina* (harbor seal)  
*Phoca groenlandica* (harp seal)  
*Phoca fasciata* (ribbon seal)  
*Halichoerus grypus* (gray seal)  
*Erignathus barbatus* (bearded seal)  
*Cystophora cristata* (hooded seal)  
*Monachus tropicalis* (Caribbean monk seal)  
*Monachus schauinslandi* (Hawaiian monk seal)  
*Lobodon carcinophagus* (crabeater seal)  
*Ommatophoca rossi* (Ross seal)  
*Hydurga leptonyx* (leopard seal)  
*Leptonychotes weddelli* (Weddell seal)  
*Mirovinga leonina* (southern elephant seal)  
*Mirovinga angustirostris* (northern elephant seal)

#### ORDER CETACEA, SUBORDER MYSTICETI

##### FAMILY ESCHRICHTIIDAE

*Eschrichtius robustus* (gray whale)

##### FAMILY BALAENOPTERIDAE

*Balaenoptera acutorostrata* (minke whale)  
*Balaenoptera edeni* (Bryde's whale)  
*Balaenoptera borealis* (sei whale)  
*Balaenoptera physalus* (fin whale)  
*Balaenoptera musculus* (blue whale)  
*Megaptera novaeangliae* (humpback whale)

##### FAMILY BALAENIDAE

*Balaena glacialis* (black right whale)  
*Balaena mysticetus* (bowhead whale)

#### ORDER CETACEA, SUBORDER ODONTOCETI

##### FAMILY PLATANISTIDAE

*Platanista gangetica* (Ganges susu, Ganges river dolphin)  
*Platanista minor* (Indus susu, Indus river dolphin)

##### FAMILY DELPHINIDAE

*Steno bredanensis* (rough-toothed dolphin)  
*Tursiops truncatus* (bottlenosed dolphin)  
*Stenella longirostris* (spinner dolphin)  
*Stenella attenuata* [*frontalis*, *graffmani*, and *dubia* (spotted dolphin)]  
*Stenella plagiodon* (Atlantic spotted dolphin)  
*Stenella coeruleoalba* (striped dolphin)  
*Delphinus delphis* (common dolphin)  
*Lagenodelphis hosei* (Fraser's (Sarawak) dolphin)  
*Lagenorhynchus albirostris* (white-beaked dolphin)  
*Lagenorhynchus acutus* (Atlantic white-sided dolphin)  
*Lagenorhynchus obliquidens* (Pacific white-sided dolphin)  
*Lissodelphis borealis* (northern right whale dolphin)  
*Grampus griseus* (Risso's dolphin)  
*Peponocephala electra* (melon-headed whale)  
*Feresa attenuata* (pygmy killer whale)  
*Pseudorca crassidens* (false killer whale)  
*Globicephala melaena* (long-finned pilot whale, pothead, blackfish)  
*Globicephala macrorhynchus* (short-finned pilot whale)  
*Orcinus orca* (killer whale)  
*Phocoena phocoena* (harbor porpoise)  
*Phocoenoides dallii* (Dall's porpoise)

##### FAMILY MONODONTIDAE

*Delphinapterus leucas* (white whale, beluga, belukha)  
*Monodon monoceros* (narwhal)

##### FAMILY PHYSETERIDAE

*Physeter catodon* (sperm whale)  
*Kogia breviceps* (pygmy sperm whale)  
*Kogia simus* (dwarf sperm whale)

#### FAMILY ZIPHIIDAE

*Berardius bairdii* (Baird's beaked whale)  
*Ziphius cavirostris* (Cuvier's beaked whale)  
*Hyperoodon ampullatus* (Northern bottle-nose whale)  
*Mesoplodon mirus* (True's beaked whale)  
*Mesoplodon europaeus* (Gervais' beaked whale)  
*Mesoplodon ginkgodens* (ginkgo-toothed whale)  
*Mesoplodon carlhubbsi* (Hubb's beaked whale)  
*Mesoplodon stejnegeri* (Stejneger's beaked whale)  
*Mesoplodon bidens* (Sowerby's beaked whale)  
*Mesoplodon densirostris* (Blainville's beaked whale)

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#### STATUS REPORTS

#### CALIFORNIA SEA LION

(*Zalophus californianus californianus*)

**Distribution and Migration:** This subspecies of the California sea lion ranges along the west coast of Mexico from about lat. 19° N. to southern British Columbia, Canada. The California sea lion breeds on some Gulf of California islands northward to San Miguel Island, California, in lat. 34° N. Many adult and subadult males move northward along the California, Oregon, Washington, and British Columbia coasts after the breeding season. Feral animals which have escaped from captivity are being reported in the southeastern U.S. (including the Gulf of Mexico) but there is yet no evidence for breeding (Caldwell, D. K., pers. comm., 1974).

Another subspecies occurs on the Galapagos Islands, and still another, formerly found in Japanese waters, from 34° to 37° N. is now extinct.

**Abundance and Trends:** The California Department of Fish and Game censuses indicate that the California sea lion population reached a low level in the early 1930's in California waters, then made a steady recovery and apparently leveled off about 1961 with little variation in the counts since then (Ripley, Cox, and Baxter, 1962; Carlisle and Apelin, 1971). Rice, Kenyon, and Lluch (1965) counted 16,150 California sea lions on Guadalupe, San Benito, and Cedros Islands, Mexico, in January and February 1965. Orr, Schoenwald, and Kenyon (1970) counted this species in the Gulf of California between 1960 and 1968, and made counts on six islands of about 5,400 animals in April 1966. Brownell, et al. (1974) state they made

counts in 1968 of 15,467 on four islands off Baja California. Odell (1971) obtained minimum counts of 34,382 California sea lions on all Channel Islands in June 1964. Peterson and LeBoeuf (1969) estimated that 40,000 animals were ashore on San Nicholas and San Miguel Islands during the 1967 and 1968 breeding seasons. Carlisle and Aplin (1966) obtained a total count in California of 22,000 animals in 1965, using aerial photography. The preceding figures indicate a total population of about 60,000 with near 20,000 animals in Mexico and 40,000 in the United States.

During the nonbreeding season, 2,500 *Z. californianus* may be found in Oregon, 500 in Washington, and 1,000 in British Columbia (Mate, 1975).

On 25 February 1972, 430 California sea lions were counted in Barkley Sound off Vancouver Island, 35 on Race Rocks off Victoria, B.C., and 10 in Dodds Narrows (lat. 49°07' N.) near Nanaimo, B.C. (Bigg, 1973).

Before passage of the Marine Mammal Protection Act by the U.S. Congress, California sea lions were taken by State permit each year for sale to zoos, oceanaria, and circuses. Daugherty (1972) states that 400 of these animals were taken in 1969 and 580 in 1970.

**General Biology: Species Statistics.**—The adult male grows to 2.1 m and 273 kg; the adult female to 1.8 m and 91 kg. Newborn pups are about 0.8 m long and weigh 5.4 to 6.4 kg.

**Reproductive Data.**—On San Nicolas Islands, the pupping season begins about 15 May and lasts about 5 weeks, with the peak during the first week in June. The females usually breed 15 to 30 days after parturition, and the mother and pup may remain together the first year. The males establish and defend breeding territories on land; the females move about freely.

**Age-Growth Data.**—California sea lions have lived 18 to 20 years in captivity.

**Feeding Habits.**—The California sea lion's food is squid, octopus, and a variety of fish such as herring, sardines, rockfish, hake, and ratfish.

**Parasites and Diseases.**—During the past 2 or 3 years an apparent increase in premature births and in the mortality rate of subadults and young adults has occurred. Three potential causes have been isolated: (1) chemical residues (polychlorinated biphenyls, DDT, and metabolites); (2) a bacterium (*Leptospira*); and (3) a virus. The greatest single cause of death in wild and captive animals is lungworm. Animals in captivity have also died from pleuropneumonia, pneumonia, and enteric infections, diseases which may also occur in wild populations.

**Ecological Problems:** Killer whales and large sharks are known to prey upon sea lions. Possibly there is some competition with other otariids for food and hauling grounds. California sea lions associated with certain hauling grounds and rookeries have practically abandoned these areas because of harassment by man. Although most major populations of sea

lions are now on sites not easily reached by the public, a few areas, such as the Monterey Bay breakwater in Monterey, California, are used extensively as hauling grounds by California sea lions and are visited frequently by tour boats. The latter sometimes pass within 10 m of the hauling grounds.

**Allocation Problems:** A history of conflict exists between people for and against complete protection of this species. Some conservation groups would like complete protection for the California sea lion while some fishermen want the number of California sea lions to be controlled. California sea lions are probably the most widely sought-after species of eared seals in the world for public display.

**Current Research:** The National Marine Fisheries Service conducts research on this species on San Miguel Island off California. The following organizations are conducting research on the California sea lion: University of California, Santa Cruz, California; University of California, Berkeley, California; California Academy of Science, San Francisco, California; Humboldt State College, Arcata, California; and Fisheries Research Board of Canada, Nanaimo, B.C.; Naval Undersea Center, San Diego, California; Navy Biomedical Research Laboratory, Oakland, California.

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#### NORTHERN (STELLER) SEA LION

(*Eumetopias jubatus*)

**Distribution and Migration:** The northern sea lion is found in continental shelf water from the Sea of Japan and northern Honshu, Japan, northward around the North Pacific Ocean rim to the Okhotsk and Bering Seas and southward to the California Channel Islands. Some seasonal movements occur in parts of its range. Examples of such movements are differences in the winter and summer distribution of these animals in the Bering Sea, and the postbreeding movements in central California.

**Abundance and Trends:** Mate (1976) estimated a world population of 250,000 to 325,000. Alaska has 202 known rookeries and hauling grounds. The Alaska population has increased considerably since the early 1900's and now exceeds 200,000 and may be near maximum levels in many areas (Alaska Department of Fish and Game, 1973). Since 1964, several thousand pups have been harvested annually in Alaska until 1973 when the Marine Mammal Protection Act became effective; 6,546 were taken in 1972.

The population of sea lions in British Columbia waters was estimated at 11,000 to 12,000 from an aerial census in 1956-57. The authorities undertook a heavy reduction program in 1959 and 1960, and the population was reduced to about 4,000 animals in 1969 (Banfield, 1974). The breeding population is estimated to be 5,000 by Fisher and Brenton (cited in Mate, 1976).

Kenyon and Scheffer (1962) made six aerial and one surface survey along the Washington coast between 1949 and 1959 and stated that the population did not exceed 500. Mate (1975) revised this estimate to be 600. Pearson and Verts (1970) estimated the Oregon population at 1,078. Mate (pers. comm., 1975) estimated the Oregon breeding population at about 2,000 animals. The California Department of Fish and Game makes periodic aerial censuses of sea lions in

California. Carlisle and Aplin (1971) have given the following figures for sea lions in California north of Pt. Conception: (1958) 7,053; (1961) 6,675; (1965) 4,998; (1969) 7,156, and (1970) 5,189. They consider these to be northern sea lions, although small numbers of California sea lions were known to occur north of Pt. Conception at the time the census was made.

The northern sea lion ranges to the Channel Islands group south of Pt. Conception. In the Channel Islands, the population peaked at about 2,000 in the late 1930's and has declined since (Bartholomew, 1967). In 1975, the San Miguel Island population was estimated by DeLong (pers. comm.) at 30 to 35 plus a few pups.

**General Biology: Species Statistics.**—The adult males grow to 3.0 m in length and over 900 kg in weight. The adult females reach 2.0 m and almost 300 kg. Newborn pups weigh 16 to 23 kg, are 89 to 102 cm long, and have a dark chocolate-colored pelage.

**Reproductive Data.**—Northern sea lions favor isolated locations with some shelter, free access to the sea, and freedom from human harassment. Colonies may become established on rock outcrops and boulder, cobblestone, and coarse sand beaches.

Males may mature sexually by age 5 years, but hold breeding territories first at age 7 or 8. Females can first produce young at age 5 or 6, and breed 10 to 14 days after parturition. The adult male maintains a territory 40 to 60 days and fasts throughout the period. The harems consist of 10 to 30 cows. The female is aggressive toward other females for several days after her pup is born.

**Age-Growth Data.**—The pup sheds its dark chocolate birthcoat for the tan pelage in the autumn of birth. Some pups remain with their mothers the first year. They have been known to live 17 years in the wild.

The northern sea lion has only a few predators besides man—the killer whale and one or two species of large sharks.

**Feeding Habits.**—The northern sea lion eats a variety of fish and cephalopods. A study of 382 stomachs indicated the following diet: squid, octopus, sand lance, rockfish, clams, crabs, flounder, halibut, greenling, and lumpfish.

**Ecological Problems:** Northern sea lions in some areas may compete with other pinnipeds for spaces on rookeries and hauling grounds. Some animals have abandoned their rookeries and hauling grounds because of excessive disturbance by humans.

**Allocation Problems:** Northern sea lions have damaged gear and destroyed fish in the halibut longline, salmon purse-seine, gillnet, and troll fisheries. In recent months, the Alaska Department of Fish and Game has received increasing numbers of gear damage complaints from fishermen with respect to the northern sea lion (J. Vania, pers. comm., 1974). The species has also destroyed herring in herring traps and has been accused of biting and sinking in-

flated plastic buoys used to mark crab pots. This species has considerable esthetic and recreational value.

**Current Research:** This species has its center of abundance in Alaska where the Alaska Department of Fish and Game's management and research investigations have been directed primarily at determining abundance and distribution, and the effects of harvesting operations on rookery populations. A marking program began in 1975, and an aerial survey program in 1976. The University of California, Santa Cruz, is also conducting research on the species off California.

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#### NORTHERN FUR SEAL

(*Callorhinus ursinus*)

**Distribution and Migration:** Most of the animals are on their breeding grounds from May through November to bear young and to breed. They otherwise are found at sea along the continental shelf from the Bering Sea south along both sides of the North Pacific Ocean to lat. 32° N. Some intermingling of eastern and western Pacific populations occurs at sea and on land, primarily among males younger than age 6 years.

**Abundance and Trends:** A program of reducing the population of Pribilof Islands fur seals was begun in 1956 with the expectation that the rate of survival would improve (Roppel, et al., 1963) and result in an increased yield of pelts. By 1968, it had become evident that the herd had been reduced to a level somewhat below that of maximum sustainable yield, and that an increase in the number of pups born was desirable. Thus, female fur seals have not been harvested commercially on the Pribilof Islands since 1968 with the expectation that the population would increase. However, less than average survival of several year classes, the cause of which is not understood, has prevented the expected increase.<sup>1</sup> In 1975 the number of pups born was estimated to be 361,000, and in the past the maximum yield of furs was produced when about 400,000 pups were born.

Apparently the Commander Islands fur seals have not become reestablished on a considerable portion of their original rookery area. Consequently, this population should increase to a higher level. It is likely that the Robben Island population is near the maximum. Johnson (1972) estimated the abundance of northern fur seals by breeding islands, as follows:

Location of fur seal rookeries:

	In thousands
Pribilof Islands.....	1,300
San Miguel Islands.....	2
Commander Islands.....	265
Robben Island.....	165
Kuril Islands.....	33
Total .....	1,765

**General Biology: Species Statistics.**—The adult male weighs 227 to 318 kg, and the female 36 to 59 kg. Newborn pups average 4.5 (female) and 5.4 kg (male). The male is polygynous and establishes his territory in late May and early June.

**Age-Growth Data:** Pups shed their birthcoat in late summer for the adult pelage. The females reach 23 kg. in weight by age 4 years, or 46 percent of their average adult size of 50 kg. They become sexually mature by age 3-5 years.

<sup>1</sup> An average of 48,000 males were harvested annually in 1956-72, while the average was 65,000 annually from 1939 to 1955.

The males weigh 25–35 kg. by age 4 years, then experience major growth adding approximately 200 kg. of weight by age 10. Males are sexually mature as young as age 4–5 years but do not become members of the organized breeding structure until age 10. Females have been observed to reach 22 years, whereas few males live longer than 15 years.

**Reproductive Data.**—Most of the pregnant females arrive on the rookeries in late June and early July, when they form harems of 1 to 100 females to 1 adult male. Within 3 days of her arrival, the female bears a single pup (twins are rare), breeds 2 to 5 days later, then begins nursing-feeding cycles of 2 days on land and about 8 days at sea within a 200-mile radius. Implantation of the blastocyst is delayed until November. Most of the males first breed a age 10, and few live longer than 15 years.

**General Behavior.**—Immature fur seals arrive on the breeding grounds in descending order of age, the males beginning in mid-June and the females in late July. Some 1-year-olds haul out in September and October, but most fur seals return first at age 2. Most of the animals have left the rookeries by December. The adult males winter in northern waters, pregnant females usually migrate as far south as southern California, and young animals of both sexes are found throughout that range.

**Diseases and Parasites.**—The main causes of death among pups on the rookeries are, in order of importance: emaciation-malnutrition syndrome, hookworm disease, bacterial infections, leptospirosis (perinatal hemorrhagic syndrome), and injuries. Pathogenic bacteria thus far isolated include: *Clostridium perfringens*, *Proteus mirabilis*, *Salmonella enteritidis*, and *Leptospira* sp. A psittacosis group chlamydia has been reported, but the clinical syndrome caused by the agent has not been described. A calcivirus, indistinguishable from vesicular exanthema of swine virus, has been found associated with vesicles on the flippers and may be related to emaciation syndrome.

The fur seal has filariid worms, stomach ascarids, intestinal flukes, cestodes, hookworms, and acanthocephalans, and nasal mites, but no heart or lungworms. Hookworms and sucking lice parasitize the newborn.

**Feeding Habits:** The fur seal is an opportunistic feeder taking squid and a variety of fishes including herring, anchovy, salmon, capelin, saury, walleye pollock, and mackerel.

**Ecological Problems:** Northern fur seals concentrate within their body tissues contaminants such as pesticides and heavy metals. For example, mercury compounds have been found in fur seal liver. The effect of contaminants on the health of fur seals is unknown. Predators include sea lions, sharks, and killer whales. Some competition may exist between fur seals, other pinnipeds and sea birds (Lander and Kajimura, 1976).

**Allocation Problems:** In the North Pacific Ocean and Bering Sea, fur seals

and commercial fisheries may compete for the same species of fish. Harvesting of fur seals on the Pribilof Islands has been criticized in recent years by animal protection organizations that would prefer esthetic and educational rather than economic use of the resource.

**Current Research:** Long-term research is financed and carried out by the Governments of Japan, Canada, the U.S.S.R., and the United States. Short-term projects are frequently carried out on the Pribilof Islands by university professors or graduate students.

In 1973 St. George Island was designated by the North Pacific Fur Seal Commission as an area of intensive research where no commercial harvest would take place for some years. An expanded research program on St. George Island began in 1973.

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#### SOUTH AFRICAN (CAPE) FUR SEAL

(*Arctocephalus pusillus pusillus*)

**Distribution and Migration:** The South African fur seal breeds on the mainland and coastal islands of southern Africa from Cape Cross (South West Africa) to Algoa Bay (South Africa). This species shows no definite seasonal migration, but disperses widely while feeding. A marked adult was seen in deep-sea trawling grounds 450 miles from its birthplace. Young seals in their first year (November to October) frequent protected bays and areas near their places of birth. (Another race, *A. pusillus doriferus*, occurs in southeastern Australia and Tasmania.)

**Abundance and Trends:** Rand (1972b) estimates about 19,500 mature territorial males and about 273,000 mature females on mainland and island rookeries of the

Republic of South Africa. Best (1973) estimates that from 250,000 to 300,000 South African fur seal pups are born each year in the Republic of South Africa and South West Africa. Shaughnessy (1975) has reviewed the estimates of Best (1973) and revised them downward to between 211,000 and 213,000 pups. Assuming the number of pups to be 1/4 the population, Shaughnessy estimates the total population to be 850,000 animals. First-year pups (about 9 months) and a small (unknown) number of second-year animals of either sex are harvested in the winter (June–September), although all cow seals are protected (Rand, 1972b). In 1950 the winter harvest totaled 27,289 pups and has increased to 76,694 in 1971 (Laws, 1973). The summer kill of surplus adult males (October–December) has declined from 3,000 in the early 1950's to 812 in 1969 (Rand, 1972b).

**General Biology: Species Statistics.**—The adult males weigh 204.2 to 363 kg and grow to 2.3 m long; females weigh 90.7 to 122.0 kg and are 1.5 to 1.8 m long. At birth the pup is about 0.76 m long and averages 6.4 kg.

**Reproductive Data.**—In late October, when most of the older pups are weaned, the first adult males come ashore to establish territories and harems; pregnant females arrive about a week later. In November and early December, the female bears a single pup (twins are rare), mates 5 to 6 days later, then leaves its pup for the first time and feeds for 1 to 2 days at sea. Subsequent nursing-feeding cycles extend to 4 to 5 days on land and 7 to 10 days at sea. Implantation of the blastocyst in the uterus is delayed until April or May. Thus, gestation is 7 to 8 months, but may be longer for some females that mate for the first time in their second year.

**Age-Growth Data.**—Adults of both sexes molt on land (14 days duration) a few weeks after the breeding season, usually during March. The pups also shed their natal hair and milk teeth at this time and acquire the olive-gray coat of the yearling. The copper-colored underfur also becomes obvious.

Weaning is well advanced by September and October, although undisturbed mother-pup relationships may prolong weaning.

**Feeding Habits.**—Food consists of fish, cephalopods, and various small crustaceans.

**Ecological Problems:** Sharks and killer whales are natural predators. On the desert coast, the black-backed jackal is a predator on pups.

**Allocation Problems:** Local fishermen engage in scattered and illegal killing of seals, contending that the animals interfere with their expanding purse-seine fishery. Seals occasionally feed on fish protruding through the meshes of otter trawl nets or taken by line fisheries.

**Current Research:** A recently expanded research program is carried out by the South African government to measure herd size, production, annual recruitment, natural and harvest mortality, and movements.



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## SOUTH AMERICAN FUR SEAL

*(Arctocephalus australis)*

**Distribution and Migration:** Two major populations of the South American fur seal, identifiable only by size, are found, one on the Falkland Islands (Islas Malvinas) and the other on coastal Uruguayan Islands. Minor populations of this species occur in Argentina, Chile, and Peru. The adults are on the Uruguayan breeding grounds in November and December, and offshore up to 200 miles east on the edge of the continental platform during the austral winter. An extreme northern record for the South American fur seal was of one identified at Rio de Janeiro, Brazil.

**Abundance and Trends:** In 1972, the Uruguayan population was estimated at 252,000. This population grew from an estimated 129,000 in 1960 to an estimated 174,000 in 1965. According to Strange (1973) the 1965-66 population on the Falkland Islands was 15-216,000. From a census taken in 1976, Chile reports a population of 40,000. The data on the Argentine population were collected in 1954 and are given as 2,700. (Advisory Committee on Marine Resource Research, 1976)

**General Biology: Species Statistics.**—Adult males on the Falkland Islands grow to 159 kg, whereas those in Uruguay reach only 136 kg; the females weigh 33 to 48 kg. The males are blackish-gray; the females and immature animals vary but usually have a silvery-gray neck and back and a yellow tint to the belly.

**Reproduction Data.**—Males are polygynous and establish territories in early November. Most of the pregnant females arrive on the rookeries in mid-November, and form small harems of about six animals. Within 6 to 7 days, each female bears a single pup and breeds 2 to 3 days later. Most males breed at age 7 years and the females at age 3 years. Uterine implantation of the blastocyst probably occurs in March. Gestation, including the period of delayed implantation, lasts nearly 1 year.

**Age-Growth Data.**—Most of the animals leave the rookeries during the austral winter. On the rookeries, the fur seals are in close contact with South American sea lions, *Otaria flavescens*. Main causes of death in order of importance are from sporadic storms, which wash large numbers of pups out to sea; the seven-gilled shark; and probably the killer whale, which is common around the larger rookeries.

**Feeding Habits.**—Brownell cited in Vas-Ferreira (1976) examined 13 stomachs and found remains of anchovies, mackerel, and sea bass.

**Parasites and Diseases.**—The South American fur seal has nasal mites and 10 species of endoparasites, but no heart or lung worms.

**Ecological Problems:** Offshore oil wells are planned in the near future and may result in an ecological hazard.

**Allocation Problems:** The species has esthetic, educational, and economic values. The Government of Uruguay annually harvests about 12,000 male fur seals on the islands.

**Current Research:** Long-term research on this species is carried out by the Governments of Uruguay and Argentina. In addition, short-term projects are carried out by the Natural History Museum of Montevideo and the Smithsonian Institution.

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## JUAN FERNANDEZ FUR SEAL

*(Arctocephalus philippii)*

**Distribution and Migration:** This seal is known to occur only on the Islas Juan Fernandez (360 and 440 miles west of Valparaiso, Chile) and Islas San Felix (500 miles west of Caldera, Chile). The two groups are 500 miles apart. It is not known elsewhere, and migratory movements are unknown.

**Abundance and Trends:** In the late 18th and early 19th centuries the population on the Islas Juan Fernandez may have numbered 3 to 3½ million, but was reduced to the point of commercial extinction. Although there were occasional reports of its existence, the species had been regarded as probably extinct since the early 20th century. In 1965 its survival was confirmed (Aguayo, 1971). Aguayo (1973) estimates 700 to 800 seals now occur in the Islas Juan Fernandez. The trend in numbers is increasing. Seals were formerly common on the Islas San Felix; despite several searches, only two seals have been seen there in recent years (Hubbs and Norris, 1971).

**General Biology:** The biology of this species is little known. Few specimens have been taken, and no studies made. It is now known to breed only on the Islas Juan Fernandez. Pupping occurs in December. The habitat of the Juan Fernandez seal is similar to that utilized by the Guadalupe seal.

**Species Statistics:** In the genus *Arctocephalus*, this species is second in size to *A. pusillus*. One male taken in November 1968 was 201 cm long and weighed an estimated 159 kg.

**Reproductive Data:** No study has been made.

**Age-Growth Data:** No study has been made.

**Ecological Problems:** None known.

**Allocation Problems:** Although the species has been given complete protection by Chilean law since 1965, local fish-

ermen may still kill some seals for lobster bait.

*Current Research:* None known.

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### GUADALUPE FUR SEAL

(*Arctocephalus townsendi*)

*Distribution and Migration:* The distribution of *A. townsendi* in the 18th and 19th centuries is unknown. The Guadalupe fur seal was believed extinct during two periods (1895-1926; 1928-49). One adult male was observed on San Nicolas Island in 1949, and breeding animals were rediscovered at Guadalupe Island in 1954. Subsequently, individual animals have been reported at Cedros Island, Baja California, and adult and immature males have been sighted on San Miguel Island each year since 1968.

*Abundance and Trends:* The last Guadalupe fur seal was commercially harvested from the islands of southern California and Baja California in 1894. The populations of Guadalupe fur seals on the Guadalupe and San Benito Islands apparently once numbered in the thousands. Rice, et al. (1965) counted 285 of these mammals on Guadalupe Island and suggested that the population was growing rapidly and may contain as many as 600 animals, including those in the water. Peterson, et al. (1968) counted 372 animals in April 1966. In June 1968, 314 individuals including pups were observed on Isla de Guadalupe (Brownell, et al., 1974). 355 individuals were counted in June and July 1976 by Fleischer (pers. comm.).

*General Biology:* Biological information on this species is scarce. Specimens have not been collected since their recent rediscovery.

*Species Statistics:*—The males are almost 1.8 m long and weigh about 136 kg. Males appear somewhat smaller and females considerably larger than *Callorhinus ursinus*. *A. townsendi* can be separated from *C. ursinus* by its narrow, pointed muzzle and the extension of pelage beyond the wrist onto the dorsum of the foreflipper. It is separated from *Zalophus californianus* by its distinctive underfur.

*Reproductive Data:*—The pups are born in June and July. Although breeding has not been observed, a postpartum estrus probably occurs, which would extend the breeding period into August. The adult males establish territories in

isolated caves or recesses that have access to the sea or among large boulders close to the splash zone. Single or small groups of breeding territories are distributed along 20 km of the eastern shoreline of Guadalupe Island. The harems contain 1 to 10 females.

*Age-Growth Data:*—The adult males apparently spend considerable time at sea; most sightings of males on other islands have occurred during the non-breeding season, but since 1973 males have been observed at San Miguel Island during the breeding season. The females may not migrate long distances from Guadalupe Island.

*Ecological Problems:* Increasing numbers of human visitors to Guadalupe Island are subjecting the animals to more disturbance. Because they breed only on Guadalupe Island, the seals need complete protection from undue disturbance and habitat modification.

*Allocation Problems:* None known.

*Current Research:* The University of California makes periodic censuses of this species. In 1976, the University of Washington and NMFS, Marine Mammal Division, will begin a study of the species.

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### HARBOR SEAL

(*Phoca vitulina*)

*Distribution and Migration:* The harbor seal is found in the North Atlantic Ocean from the ice pack south to France and Georgia and in North Pacific Ocean waters from the Arctic Ocean south to Baja California and southern Japan and Korea. Populations that breed on the ice in the Bering and Okhotsk seas are distinct from those that breed on land. *Phoca vitulina largha*, the ice inhabiting form, lives in the seasonal pack ice in winter and spring, bearing and nurturing its pup there, and moves toward the coasts when the ice retreats. *P. v. largha* is often regarded as an independent spe-

cies. The coastal forms (*P. v. richardii* and *P. v. kurilensis* in the North Pacific; *P. v. vitulina* and *P. v. concolor* in the North Atlantic) are more sedentary. The harbor seal is the predominant near-shore seal in ice-free waters north of lat. 35°N.

*Abundance and Trends:* Overall, the world population of harbor seals appears to be high and stable. About 750,000 are present in the North Pacific area (Alaska Department of Fish and Game, 1973; Bigg, 1969; Chapksii, 1966) and about 150,000 in the European North Atlantic region (Chapksii, 1966). Popov (1976) estimates the Bering Sea supports 135,000 large seals.

*General Biology: Species Statistics:*—Harbor seals of all subspecies are of medium size; large adults of both sexes are from 160 to 180 cm long and weigh about 130 to 150 kg. Pups weigh from 9 to 12 kg, and are about 80 to 90 cm long at birth. Pups of ice-inhabiting harbor seals are born with white coats, whereas those of the coastal form possess dark coats. Coloration in the adults varies considerably; the background varies from creamy white to dark brown with irregular dark brown blotches.

*Reproductive Data:*—Adults of the ice-inhabiting form pair in March for the duration of the breeding season, and a single pup is born to each pair on the ice, usually in March or April. Adults of the coastal form congregate on islets and also bear a single pup, usually in April to July. The pups of each form nurse 4 to 6 weeks, in which time the weight is more than doubled. Males of both forms become sexually mature at 4 to 5 years of age; females at 3 or 4 years. Breeding is annual, and the period of pregnancy (including delayed implantation) is about 10.5 months.

*Age-Growth Data:*—Adults of both forms are gregarious outside the breeding season. The annual molt occurs between August and early November; it proceeds from the posterior to the anterior parts. Predators include the polar bears, walrus, killer whale, and sharks. Golden eagles have been known to prey upon newborn pups resting on sandbars.

*Feeding Habits:*—The diet of the harbor seal, which varies according to season and location of specific populations, includes primarily pelagic, demersal, and anadromous fishes, cephalopods, and crustaceans. In captivity a single animal eats about 4 kg of fish per day.

This species has been known to dive as deep as 91.5 m for short periods and can remain under water for as long as 23 minutes.

*Parasites and Diseases:*—Almost all adult seals have anisakid roundworms and corynosomid acanthocephalans, and occasionally, high infestations of anopluran lice. The latter seem associated with filarial heart worms and may be vectors. *Toxoplasma* has been reported in captive animals, but its presence in wild seals is not verified.

*Ecological Problems:* In some parts of its range, the harbor seal contributes to high worm infections in fish, notably codfish. This animal is extremely sensi-

tive to disturbance, and may leave an area temporarily or even permanently after continual harassment by people, equipment, or aircraft. Contamination of the environment with pesticides, heavy metals, and other contaminants may be a problem for the land-breeding harbor seal, because it frequently inhabits the relatively closed waters of bays and estuaries where these contaminants are likely to concentrate.

**Allocation Problems:** These seals damage commercial fishing gear and compete with man for such fish as herring, smelt, whitefish, and salmon.

According to the Alaska Department of Fish and Game, hunting and the harvest of the harbor seal have declined markedly during the past year because of a reduced market for salable products from these species, mainly skins. In southeastern Alaska, the decreased harvest has resulted in additional conflicts between the harbor seal and the fishermen.

**Current Research:** Ongoing research in California, Washington, British Columbia, Alaska, the U.S.S.R., and Japan is aimed toward the identification of North Pacific populations and describing their distribution and movements, reproductive biology, feeding habits, growth, physiology, and ecology.

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#### RINGED SEAL

(*Phoca hispida*)

**Distribution and Migration:** The ringed seal is circumpolar in distribution in the ice pack. In the North Pacific Ocean it is found in the Bering, Chukchi, and Okhotsk Seas and in the permanent ice pack of the Polar Basin. In winter, most ringed seals occupy areas of land-fast ice, but nonbreeding adults and juveniles may be found wherever ice occurs. Apparently, animals wintering in the Bering and Chukchi Seas move northward in spring as the ice recedes and southward in autumn as it advances again, whereas those in the Canadian Arctic may reside year-round in the same locality. In western Alaska, the ringed seal is the dominant near-shore seal during months when sea ice is present and is replaced by the harbor seal during ice-free months. A small proportion of the population, mainly juveniles, remains in ice-free areas of the Bering Sea during summer.

**Abundance and Trends:** Counts of ringed seals on land-fast ice along the northern coast of Alaska made in 1970 (Burns and Harbo, 1972) indicated that the density of resident animals varies from 5.36 per square mile in the Chukchi Sea between Point Lay and Wainwright, to 1.06 per square mile in the Beaufort Sea between Oliktok and Flaxman Island. Overall, the population in the Bering and Chukchi Seas appears high and is probably stable. Estimates of population size made by the Soviets are difficult to evaluate because they recognize three subspecies with overlapping ranges. The Soviets estimate the total population of *P. hispida* at 5 to 6 million (Chapuskii, 1966); *P. h. hispida* (North Atlantic and Arctic Oceans) at 2,500,000; *P. h. krashchenikovii* (western Bering Sea) at 12,000; and *P. h. ochotensis* (Okhotsk Sea) at 800,000 to 1,000,000 animals (Fedoseev, 1969, from Bychkov, 1971). The Alaska Department of Fish and Game (1973) estimates the Bering-Chukchi Seas population at about 250,000 ringed seals. The U.S. harvest is now limited to an aboriginal harvest of 9,000 to 13,000 animals. Soviet pelagic sealing is now prohibited in the Bering Sea and limited to a quota of 18,000 pelagic and 7,000 shore animals in the Okhotsk Sea; harvest in the Bering and Chukchi areas is 2,000 to 3,000 animals annually.

**General Biology: Species Statistics.**—The ringed seal is the smallest of the northern seals. The adults of both sexes grow to about 125 cm in length and 66

kg in weight. A few individuals, usually females, become much larger. The animals undergo marked seasonal changes in weight, being heaviest in mid- to late winter. Newborn pups are 55 to 65 cm long, weigh about 4.0 kg, and bear white coats. Coloration of the adults is variable. Dorsally they may be brown to blueish-black in background with irregular creamy rings with dark centers. The ventral surface may be silvery white to creamy yellow with scattered black spots.

**Reproductive Data.**—Males become sexually mature at 6 to 8 years of age, females at 5 to 7 years. The ringed seal breeds annually, has a 10.5-month period of pregnancy (including delayed implantation) and is probably monogamous. The males are sexually active between mid-March and mid-May, but they do not collect harems. The females are monestrous, and the oestrous period is postpartum while the females are still lactating. The pups are born from March to about mid-May in a birth lair within an ice pressure ridge or under drifted snow. The females nurse their pups for a full 4 to 6 weeks. A longer nursing period in sheltered northern bays, where snow and ice remain longer, produces larger pups.

**Age-Growth Data.**—The weight of the pup triples during the nursing period. The annual molt occurs between mid-May and mid-July, but a few molting individuals have been noted as late as 1 September. Maximum longevity exceeds 35 years, but one individual (a male) was 43 years old according to annuli on the dentine layers of its teeth.

Predators of adults include sharks, killer whales, and polar bears. Polar bears and arctic foxes prey upon newborn "whitecoats" in their natural dens, and even the larger and more powerful gulls attack exposed young pups.

**Feeding Habits.**—Ringed seals tend to be solitary, but congregate in areas favorable for feeding, along extensive tide cracks in land-fast ice, and during seasonal migrations. The diet of these seals varies considerably, depending on their location and water depth. Their diving potential appears to be a depth of 91.5 m and for as long as 20 minutes. In western Alaska, this seal feeds mainly on mysids, amphipods, euphasiids, shrimps, saffron cod, polar cod, and sculpin. These seals fast from April to late June or July during their reproductive and molting seasons.

**Parasites and Diseases.**—The mammals commonly have internal parasites, including roundworms, acanthocephalans, and anopluran lice.

**Ecological Problems:** None known.

**Allocation Problems:** According to the Alaska Department of Fish and Game, hunting and the harvest of the ringed seal have declined markedly during the past year because of a reduced market for salable products from these species, mainly skins.

**Current Research:** The State of Alaska monitors the Eskimo harvest and conducts some biological research and conjunction with other programs. Canada conducts research on the ringed seal.

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- HARP SEAL**  
(*Phoca groenlandica*)
- Distribution and Migration:** The harp seal occurs in pack ice in the North Atlantic and Arctic Oceans from Europe to eastern Canada. In the spring, it migrates south for breeding to the White Sea, to the Greenland Sea north of 73° N, and to southern Labrador, northeastern Newfoundland, and the Gulf of St. Lawrence.
- Abundance and Trends:** Three breeding stocks of harp seals are known, the eastern (White Sea), central (Norwegian Sea around Jan Mayen Island), and western (Newfoundland). The last is divided into two substocks, one east of Belle Isle on winter pack ice drifting southward—the "Front," and the other in the southern Gulf of St. Lawrence on winter ice formed in situ—the "Gulf." Sergeant (1973) estimates the total eastern Canadian population at 1.3 million. The number of pups born decreased from about 400,000 in 1960 to 300,000 in 1970. The population size in 1970 was less than that giving maximum production, and estimates indicated the 1970 catch was well in excess of the sustainable yield (International Commission for the Northwest Atlantic Fisheries. 1971. Redbook, Part I, Standing Committee on Research and Statistics Proceedings, annual meeting). From an aerial survey, the west Atlantic stocks were determined to be 630-790,000 animals (Lavigne et al, 1975). Ronald et al, 1976, give the following estimates: White Sea, 600,000; Greenland Sea, 100,000; N.W. Atlantic, <1,000,000.
- In 1971 the International Commission for the Northwest Atlantic Fisheries banned seal hunting in the Gulf of St. Lawrence from large vessels and from aircraft and set a quota of 150,000 harp seals for the hunt off Newfoundland and Labrador by Canadian and Norwegian nationals.
- General Biology: Species Statistics.**—The adults grow to about 1.8 m and 135 kg; newborn pups are about 1.0 m long and weigh 11.8 kg.
- Reproductive Data.**—The females mature at age 4 to 6 year and bear a single pup annually after a gestation period of about 7.5 months. The pups are born from late January to early April, and are nursed for 10 to 12 days, by which time they have attained a weight of 38 to 40 kg. Apparently the female can delay birth until there is suitable ice.
- Age-Growth Data.**—Molting by the pups is completed at 4 weeks. The maximum life span is about 30 years.
- Feeding Habits.**—Pups feed in surface waters on small pelagic crustaceans and small fish. The food of adults includes capelin, herring, cod, polar cod, flatfish, redfish, skate, barracudina, and various crustaceans.
- Ecological Problems:** One species of helminth affecting the harp seal is also found in the muscles of groundfish, particularly cod, necessitating expensive removal by hand.
- Allocation Problems:** The harp seal may eventually conflict with man over capelin stocks as this fishery expands. Several animal protection societies object to the harvest of harp seals.
- Current Research:** Canadian, Danish, Norwegian, and Soviet Government scientists are studying the population of harp seals. At the University of Guelph, scientists are studying the biology of this mammal.
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- RIBBON SEAL**  
(*Phoca fasciata*)
- Distribution and Migration:** Geographically, the ribbon seal is separable into the Okhotsk and Bering-Chukchi Seas populations, and interchanges between these two groups are not known to occur. In the latter group, the center of abundance is in the central Bering Sea. The ribbon seal bears and nurtures its pup on the sea ice. During winter and spring, the entire population is concentrated along the southern edge of the seasonal ice pack. Only a few ribbon seals remain with the ice edge as it retreats northward through Bering Strait. In summer and autumn, ribbon seals are believed to be pelagic, mainly in the ice-free Bering Sea.
- Abundance and Trends:** The population of ribbon seals is relatively low, having been markedly reduced by commercial sealers of the Soviet Union during the 1960s. In recent years the species has been afforded increased protection by Soviet sealing regulations and its numbers may be increasing again. U.S. citizens harvest very few ribbon seals. The Alaska Department of Fish and Game (1973) estimates that the population probably does not exceed 100,000 animals. Soviet estimates indicate a population of 133,000 in the Okhotsk in 1969 (Popov, 1976). Soviet sealers took less than 3,000 ribbon seals in 1973 from Bering and Okhotsk Seas. In Alaska, the native harvest is usually less than 250 per year.
- General Biology: Species Statistics.**—Adults of both sexes average 155 cm in length and 80 kg in weight. A very large female was 179.7 cm long with a girth of 114.3 cm, had a blubber thickness of 6.1 cm, and weighed 148.2 kgs. The pups are born with white coats.
- Reproductive Data.**—Pups are born from late March to mid-April and average about 10 kg and 80 cm. Males become sexually mature between 3 and 5 years of age; females between 2 and 4 years of age. The species breeds annually and pregnancy (including delayed implantation) probably lasts 10.5 months. A very large 23-year-old female (see measurements given above) obtained in March was carrying a near-term fetus.
- Age-Growth Data.**—The pup nurses for about 4 weeks, during which time its weight triples. Maximum longevity is estimated at 26 years.
- Feeding Habits.**—The diet of these seals during late winter and early spring (in the ice edge zone) includes mainly pelagic and demersal fishes, cephalopods, and small crustaceans.
- Parasites and Diseases.**—Ribbon seals host anisakid roundworms in the stom-

ach and corynosomid acanthocephalans in the intestine.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

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- back, with lighter underparts. The pups are born in a long white coat which they molt when 3 to 4 weeks old to assume a dark gray, spotted juvenile coat.
- Reproductive Data.*—Sexual maturity is reported to be reached between 6 and 7 years of age for members of Canadian populations. In the Farne Islands, bulls do not breed until their 8th year, and most do so between 12 and 18 years of age. Cows do not enter the breeding population until their 10th year. The apparent gestation period is 11.5 months, and single births are the rule. Pups of the Canadian and Baltic populations are born mostly in February, whereas most of those in Britain are born in September and October. The pups are weaned in about 3 weeks, at which time mating occurs.
- Age-Growth Data.*—Following birth, the pup gains about 1.4 kg per day and weighs about 41 to 45 kg when weaned at about 3 weeks. It begins to molt after the third week. When the molt is completed, it makes its way to the sea and disperses. When they are yearlings they have changed little in weight (40 kg), but are 115 to 127 cm long. The cows molt annually between late January and April, and males between late February and May. Estimated by dental rings, captive gray seals have reached an age of 41 to 42 years, and wild seals have reached an age of up to 35 years.
- Feeding Habits.*—The adult seals feed chiefly on skates, mackerel, flounders, cod, hake, and herring; and occasionally salmon, haddock, sea bass, dogfish, squid, and crustaceans.
- Parasites and Diseases.*—In the Baltic Sea, the seals harbor an anisakine nematode, *Terranova (Porracaecum) decipines*.
- Ecological Problems:* People occasionally harass the animals and use them for target practice. An oil spill in the Georges Banks area could do irrevocable harm to the only U.S. colony located on Muskeget Island, Massachusetts.
- Allocation Problems:* A significant indirect cause of damage by gray seals to fisheries in the waters around the British Isles and off Canada is the harboring by the seals of an anisakine nematode, *Terranova (Porracaecum) decipines*, the larvae of which infest cod and other gadids, reducing their commercial value.
- Current Research:* Research on biology, ecology, and populations continues by Canadian and British Governments and private groups. Some work is also being carried out by the University of Massachusetts on Muskeget Island and by the State of Maine.

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### BEARDED SEAL

(*Erignathus barbatus*)

*Distribution and Migration:* The bearded seal is found in the North Pacific region in the Bering, Okhotsk, and northern Japan Seas and is circumpolar in the Arctic Ocean. In winter and spring it is found from the southern edge of the seasonal ice pack, north to permanent ice, wherever areas of broken, moving ice exist. During summer and autumn, it occurs along the edge of the permanent polar ice of the Arctic Ocean. Marked seasonal migrations are associated with the advance and retreat of the seasonal ice. The bearded seal is usually solitary, though very loose aggregations are sometimes observed during the breeding season. It does not normally come ashore.

*Abundance and Trends:* All populations seem to be at high levels and relatively stable. A Soviet estimate places the population of 450,000 animals in the East-Siberian, Chukchi, Bering, Okhotsk, and Japan Seas (Bychkov, 1971). The Alaska Department of Fish and Game (1973) estimates a population of 300,000 animals in the Bering, Chukchi, East-Siberian, and Beaufort Seas. The combined U.S. native and Soviet harvest in the Bering, Okhotsk, and Chukchi Seas is 8,000 to 10,000 seals per year, well within the biological productivity of this species. Hunting loss, however, is high (op. cit.). Soviet pelagic sealing has been prohibited since 1970. Land quotas are 5,000 for Okhotsk Sea and 3,000 for Bering Sea. U.S. subsistence catch has been less than 3,000 animals.

*General Biology: Species Statistics.*—The bearded seal is the largest phocid of the western arctic and subarctic. Large adults attain a winter weight in excess of 340 kg. From June through September the adults weigh from 215 to 240 kg and average 236 cm in length. Some adult females are slightly larger than adult males. The pelage is a smoky-gray with a darker brown cap and dorsum. Newborn pups weigh about 31 kg, are 132 cm long, and have a gray-brown natal coat.

*Reproductive Data.*—The males become sexually mature at 6 or 7 years. Some females ovulate at age 3 years, but

reproductive maturity is not attained until age 5 or 6 years. Female bearded seals are unique among northern seals in that they possess four mammary teats instead of the usual two, and produce one pup every other year instead of annually. A single pup is born, usually during late April or early May. The female does not ovulate until early June when the males are out of breeding condition; therefore, they must wait a year to be mated again. The period of pregnancy is 10.5 months, including 2.5 months of delayed implantation.

**Age-Growth Data.**—The weight of the pups triples by the end of the 12- to 18-day nursing period. They then molt their natal coat for one similar to the adult's, although it is sometimes spotted. The adults probably molt shortly after mating. Yearlings are about 160 cm long. Bearded seals attain full growth at about 10 years of age and average 235 cm long in the eastern Canadian arctic and 225 cm at Svalbard. At Svalbard, age groups are fully recruited at age 9 years and live to about 31 years.

Polar bears are a natural enemy of the bearded seal.

**Feeding Habits.**—The bearded seal consumes several species of invertebrates, principally crabs, shrimps, clams, and amphipods, and some demersal fishes, all from less than 200 meters.

**Parasites and Diseases.**—Most bearded seals, other than nursing pups, are heavily parasitized by anisakid roundworms in the stomach, acanthocephalans and diphylobothriid cestodes in the intestine, and lice on the skin.

**Ecological Problems:** The bearded seal is the final host for anisakid worms that infect fishes, but this problem is unimportant in Alaska at present. About 1% of these animals harbor *Trichinella spiralis*, the cause of trichinosis in man.

**Allocation Problems:** None known. Bearded seals consume commercially important pandalid and chironomid shrimps and lithode crabs; however, they do not compete directly for commercial fishes, nor do they damage fishing gear.

**Current Research:** None known.

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#### HOODED SEAL

(*Cystophora cristata*)

**Distribution and Migration:** The hooded seal occurs mainly in the east Greenland pack ice from Bear Island and Spitzbergen to Jan Mayen, Iceland, and Denmark Strait. It also occurs off southern Greenland, southeastern Labrador, and the Gulf of St. Lawrence. Stragglers appear on the American coast as far south as Cape Kennedy, Florida, along the Canadian Arctic coast as far west as Herschel Island, and on the European coast as far south as the Bay of Biscay, France. Hooded seals prefer deep water and thick, drifting ice floes.

In March 1974, an aerial survey by the Fisheries and Marine Service of Canada rediscovered a whelping population that had been reported by two different sources, one in 1840 and the second in 1873. The seals were located between 63° 30' and 64° 20' N, 56° 00' and 56° 30' W. There were adults, pups, and blood patches, indicating that births had taken place recently. Total numbers were estimated to be 50,000 animals. This population is believed to be the source of recruitment that maintains the herd of hooded seals at icefields east of Newfoundland where the species is heavily hunted.

**Abundance and Trends:** Hooded seals of all ages are harvested commercially when the animals are congregated for molting. According to Scheffer (1958), the herds in the middle of the 20th century were estimated 300,000 to 500,000. Sergeant (1965) states that the catch rate of hooded seals has been high. The average annual kill from the Jan Mayen Island heard declined from about 53,000 (1949-53) to about 40,000 (1959-63) (Popov, 1967). Since 1972, quotas of 15,000-30,000 animals have been imposed. Popov, 1976, estimates the population to be between 500,000 and 600,000.

**General Biology: Species Statistics.**—Adult males grow to 2.7 to 3.0 m and 408 kg; females are slightly smaller. The adult coat is gray, covered with black patches of irregular size. The pups shed their light gray embryonal hair before birth and when born have an exceptionally beautiful silver gray coat dorsally with a creamy white ventral surface.

**Reproductive Data.**—The pups are born from late March to early April, are 1.1 m long and weigh 23 kg. Seals of both sexes mature at age 4 to 6 years. The adults mate when the lactation period ends (about 2 weeks).

**Age-Growth Data.**—The pups are nursed about 2 weeks. The adults return to sea after mating, leaving the pups on the ice where they remain an additional 2 weeks before following the adults.

Hooded seals of all ages are preyed upon by polar bears.

**Feeding Habits.**—Hooded seals feed on octopus, squid, rosefish, herring, capelin, cod, shrimp, mussels, and starfish. Capable of deep diving.

**Ecological Problems:** Oil exploration shows signs of increase on the Labrador shelf and with it the stress on marine mammals may increase. There may also be competition for food with the human fishing industry.

**Allocation Problems:** None known.

**Current Research:** Research on the hooded seal is carried out by the Fisheries Research Board of Canada, Denmark (Grønlands Fiskeriumundersøgelse), Norway (Fiskeridirektoratets Havforskning Institut), and the Soviet Union (VNIRO).

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#### CARIBBEAN MONK SEAL

(*Monachus tropicalis*)

The Caribbean monk seal is classified as endangered in the Red Book of the International Union for the Conservation of Nature. From 17 to 29 March 1973, the Bureau of Sport Fisheries and Wildlife, Department of the Interior, conducted an aerial survey of this species' former habitat in the Gulf of Mexico and Caribbean Sea. The conclusion is that the Caribbean monk seal is now extinct (Kenyon, in press).

From the 1973 survey and from other field observations, it formerly inhabited shores and islands of the Greater Antilles, Bahamas, Yucatan Peninsula, and Florida Keys. It was reported at Seranilla Bank as late as 1952. A single pup was born, probably in alternate years. The adults grew to 2.4 m in length. The color was a uniform brownish gray above; the underparts were pale yellow or yellowish white. Monk seals were

vulnerable to hunters because they were sluggish, unwary, and not easily alarmed.

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#### HAWAIIAN MONK SEAL

(*Monachus schauinslandi*)

**Distribution and Migration:** The Hawaiian monk seal breeds only on French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, and Midway and Kure Atolls of the Leeward Hawaiian Islands. The first four of these islands are within the Hawaiian Islands National Wildlife Refuge (HINWR). Rarely do individuals wander southeastward to the main Hawaiian Islands. The species is not known to have a migratory pattern.

**Abundance and Trends:** The total population was estimated at 1,350 in 1958 (Rice, 1960). It was classified as endangered under the Endangered Species Act of 1973, on November 13, 1976. All monk seals are considered endangered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora, signed 3 March 1973. Counts in the 1960's and 1970's suggest that the population is declining (Kenyon, 1973), owing to human disturbance on pupping and nursing areas. During the 1976 pupping season on two surveys had counts of 695 individuals (R.L. DeLong, pers. comm.).

**General Biology: Species Statistics.**—An adult female measures 2.3 m, and her estimated weight is 273 kg. On the average, females outweigh adult males. A typical male is about 2.1 m long and weighs about 173 kg. The new born pups weight 16 to 17 kg and are about 100 cm long.

**Reproductive Data.**—Observations of 47 tagged individuals on Kure Atoll indicate an annual reproductive rate of 15 living pups per 160 adults. About 19% of the adult females breed in successive years, and only 56% of the adult females had pups in either of two seasons.

The age at which Hawaiian monk seals of either sex first breed is not known, but they may do so at age 3 years. Pups are born from late December to July, with the peak in April and May. They nurse about 6 weeks.

**Age-Growth Data.**—The pup grows from 100 to about 130 cm during its first year. The weights of 6 yearlings averaged 45 kg. Two seals tagged as yearlings doubled their weight in their second year, and one increased in length by 36% and the other by 15%. They probably do not attain full growth until at least 4 years of age. A technique developed for determining the ages of these seals by examination of the upper canine teeth indicated an age for one female of about 11 years and about 20 years for a male.

Sharks are serious predators.

**Feeding Habits.**—Spewings found on haul-out areas included the remains of reef and bottom fishes, eels, and cephalopods.

**Ecological Problems:** Harassment of the monk seal by humans and dogs on Midway and Kure Atolls may be causing a problem by preventing these animals from using sheltered dry pupping areas.

**Allocation Problems:** None known.

**Current Research:** A joint study has been undertaken by NMFS and U.S. Fish and Wildlife Service scientists. During 1976, the first year of the study, all breeding islands were surveyed in March and April. Recommendations were made to conserve and protect the monk seal. In 1977, research teams will intensively study the species on these islands.

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#### CRABEATER SEAL

(*Lobodon carcinophagus*)

**Distribution and migration:** The species is circumpolar and abundant in pack ice of the southern oceans. It is found as a straggler in Uruguay, New Zealand, Australia, Tasmania, and South America. Part of the population moves toward the coasts in summer and away from land in the winter.

**Abundance and Trends:** The crabeater seal is the most abundant species of seal in the Antarctic, with population estimates ranging from 2 to 5 million

(Scheffer, 1958) to 30 million (Erickson, et al., 1971). Laws (1973) believes that the later estimate is unreliable, but that earlier estimates were too conservative. Gilbert (1974) is in general agreement with Laws and provides an estimate of 15,000,000.

Laws (1972) reports that a total of 1,251 crabeater seals were killed or captured in the Antarctic Treaty area during the period 1964-69, which does not pose a direct threat to these seals.

**General Biology: Species Statistics.**—Adult males grow to a maximum length of about 2.6 m and 270 kg in weight. At birth the pups are about 1.4 m long and the natal color is gray-brown. Color ranges from black to silvery white, depending on the individual, its age, time of year in relation to the molt, and dampness of pelage.

**Reproductive Data.**—Little information available on the breeding habits; mating has not been observed, but sperm are present in the testes of males in October and November. Single pups are born during the Antarctic spring (mid-September to early November). Available data indicate that the adults attain sexual maturity between the 3d and 6th years.

**Age-Growth Data.**—By January or February the pups have grown so large that they are difficult to distinguish from adults. The adults molt in January and February while partly fasting. The life span as determined from tooth sections is 29 years or more.

Killer whales and leopard seals are known to prey upon crabeater seals, and may be responsible for the numerous scars on a high proportion of these animals.

**Feeding Habits.**—The principal food of the crabeater seal is krill.

**Parasites and Diseases.**—The species has lice on the skin, roundworms in the stomach, and, rarely, tapeworms in the intestine.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** The University of Minnesota is studying population dynamics of Antarctic seals.

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#### ROSS SEAL

##### (*Ommatophoca rossii*)

**Distribution and Migration:** The species is circumpolar in heavy pack ice of the Antarctic Ocean.

**Abundance and Trends:** The Ross seal is usually solitary. Scheffer (1958) lists the population at 20,000 to 50,000, but more recent estimates of population size are greater than 100,000 (Hofman et al., 1973) and 220,000 (Gilbert, 1974).

Laws (1972) states that only 23 Ross seals have been killed or captured in the Antarctic Treaty area from 1964 to 1969, and that clearly there is at present no serious direct threat to these animals.

The Ross seals account for 1.0 to 2.0% of the total Antarctic pinniped population (Hofman, et al., 1973).

**General Biology: Species Statistics.**—The adults reach a length of about 2.4 m. The animal is plump, with a short, wide head, a small mouth, and small teeth. The vocalizations of this mammal are striking and account for the common name "singing seal."

**Reproductive Data.**—Little is known of its reproduction, and newborn pups have never been seen. The males mature at 3 to 4 years, and the female at 2 to 7 years. Breeding probably takes place in November, and available evidence indicates that the pups are born about 11 months after implantation.

**Age-Growth Data.**—Molting probably occurs in January and February. These animals may live up to 12 years.

**Feeding Habits.**—Food consists primarily of fish, cephalopods, and krill.

**Parasites and Diseases.**—Roundworms are found in the stomach, tapeworms in the intestine, and lice on the skin.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** The University of Minnesota is studying the population dynamics of Antarctic seals.

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#### LEOPARD SEAL

##### (*Hydrurga leptonyx*)

**Distribution and Migration:** Leopard seals are circumpolar in Antarctic pack ice and in southern temperature regions and subarctic islands in the winter. They are occasionally seen off the southern tips of New Zealand, Australia, South America, and South Africa.

**Abundance and Trends:** The leopard seal is a solitary animal. Scheffer (1958) estimated the population at 100,000 to 300,000. More recently, in 1972, Laws (1973) estimated the population at 250,000 to 500,000.

Laws (1972) reports that 140 leopard seals were killed or captured in the Antarctic Treaty area, which does not indicate any threat to the population.

**General Biology: Species Statistics.**—The adult males grow to 3.0 m in length and 450 kg in weight; adult females reach 3.3 m in length and 500 kg in weight. Leopard seals have a long slim body, large head, and wide gape. Newborn pups are 1.6 m long and weight 29.5 kg. The color of adults is dark gray dorsally and light gray ventrally, and a variable amount of spotting is present.

**Reproductive Data.**—Males are sexually mature at 3 to 7 years, and females at 2 to 6 years. Analysis of random specimens indicates that parturition occurs between October and December, but, unlike crabeater and Weddell seals, breeding may not occur until January or March. The gestation period is 240 days. Lactation lasts about 2 months.

**Age-Growth Data.**—The life span for both sexes is judged to be more than 25 years, based on studies of tooth sections.

**Feeding Habits.**—The leopard seal, largest of the Antarctic seals, is the only seal that regularly feeds on warm-blooded animals. Their food consists of

other seals, euphausiids, penguins, whale carcasses, fish, and squid.

**Parasites and Diseases.**—Leopard seals suffer from diseased teeth, tumors, bony nodules in nasal passages, and stomach carcinomas.

**Ecological Problems:** Krill harvest could have deleterious effect upon population size.

**Allocation Problems:** None known.

**Current Research:** The University of Minnesota is studying population dynamics of Antarctic seals.

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#### WEDDELL SEAL

##### (*Leptonychotes weddellii*)

**Distribution and Migration:** This species is circumpolar in fast ice around Antarctica, occasionally reaching as far north as Uruguay (lat. 35°S). It is littoral in distribution and nonmigratory. Because of its occurrence near scientific stations it is the best known of the Antarctic seals.

**Abundance and Trends:** The population was estimated to be 200,000 to 500,000 by Scheffer (1958) and 250,000 to 500,000 by Laws (1973). Recent investigations (Erickson and Hofman, 1974) suggest a total population in excess of 756,000. Gilbert (1974) estimated 730,000 in pack ice alone (excluding animals in shore-fast ice).

Laws (1972) reports that a total of 893 Weddell seals were killed or captured in



the Antarctic Treaty area during the period 1964-69, which poses no threat to the population.

**General Biology: Species Statistics.**—Adult males grow to 3.2 m in length and may reach 450 kg in weight. Females are slightly larger than males. Newborn pups are 1.5 m long, weigh 29 kg, and have permanent dentition. Coloration of adults is dark brown to black, conspicuously mottled with white spots.

**Reproductive Data.**—Males reach sexual maturity at 6 to 8 years; females at 3 years of age. The average age of breeding females is 9 years. Pregnancy lasts 9 to 10 months. The pups are born from September to early November on fast ice, usually close to the Antarctic continent. The mating period has not been defined, but males with sperm and females that had ovulated have been collected between late November and mid-December. Lactation lasts 6 to 7 weeks, and pups are weaned at 6 weeks. The females protect their pups and are aggressive toward intruders.

**Age-Growth Data.**—The pups molt their natal fur and replace it with the adult pelage by the 44th day. Initial weight gains are dramatic: the pups gain an average of 12 kg or more per week for the first 6 weeks and weigh as much as 135 kg by the time the molt is completed. The life span, as determined by the teeth, is not over 20 years.

Tooth wear associated with maintaining breathing holes may be a mortality factor.

**Feeding habits.**—Weddell seals feed on mysids, decapod crustaceans, amphipods, cephalopods, euphausiids, and various species of fish.

**Parasites and Diseases.**—Wounds inflicted on this mammal heal slowly, and festering sores are common. Kidney stones and uterine fibroids have been found. Weddell seals are heavily infested with tapeworms, trematodes, and roundworms.

**Ecological Problems:** Local populations are discrete breeding units which could be eliminated by oil slicks.

**Allocation Problems:** None known.

**Current Research:** The University of Minnesota is studying population dynamics of Antarctic seals.

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### SOUTHERN ELEPHANT SEAL

#### (*Mirounga leonina*)

**Distribution and Migration:** The southern elephant seal is circumpolar on subantarctic islands, south to the ice edge of lat. 78° S. It breeds on the continental coast of Argentina and on subantarctic islands.

**Abundance and Trends:** The population of the southern elephant seal has been estimated at 600,000±100,000 (Laws, 1960). This species was once sought for its oil. It was nearly extinct by 1900, but since that time regulations have allowed the herds to increase. At South Georgia the average annual kill between 1952 and 1964 was 6,000 animals. There has been no commercial sealing there since 1964, although licenses to harvest these animals have been offered (Laws, 1973).

Laws (1972) reported a total of 25 southern elephant seals killed or captured in the Antarctic Treaty area during the period 1964-69, and states that clearly there is at present no serious direct threat to these seals, although one cannot rule out the possibility of restricted overexploitation of some local populations.

**General Biology: Species Statistics.**—The southern elephant seal is the largest pinniped. Males grow to 5.5 to 6.1 m in length and 3,628 kg in weight; females reach 3.1 to 3.7 m and 907 kg. The newborn pups are 1.2 m long and weigh from 37.6 to 49 kg.

**Reproductive Data.**—Males are sexually mature at 4 years, and hold harems at 5 to 7 years in commercially utilized populations. The females mature at age 2 years and bear single pups at age 3. In unutilized populations, the females ma-

ture at age 3 to 6 years, but the males do not reach harem status until 12 years old. The breeding season varies with locale and occurs from August through November. Most harems contain 20 to 40 females, but up to 100 have been counted. The pups are born in October, about 1 week after the females haul-out, and nurse about 23 days. The females mate about 18 days after their pups are born.

**Age-Growth Data.**—The pups weigh 113 to 181 kg at weaning. The molt usually starts in early November, when the pups, then 2 to 3 weeks old, shed their natal fur and older immature seals begin to haul-out to molt. Mature females begin their molt in late December or January and mature males in late January or February. The molt requires about 18 days to complete. After the molt, they return to the sea and probably spend the winter feeding near pack ice.

The females live about 12 years and the males up to 20 years.

The leopard seal and killer whale are natural enemies of the southern elephant seal.

**Feeding Habits.**—Shortly after weaning the pups feed on amphipods for a time, after which they feed primarily on cephalopods and fish.

**Ecological Problems:** None known.

**Allocation Problems:** According to Laws (1973), the southern elephant seal may become threatened because they compete with Soviet fishermen for commercial species of fish in the vicinity of Kerguelen Islands.

**Current Research:** The University of Minnesota makes incidental observations of this mammal while studying the Antarctic seal species.

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## NORTHERN ELEPHANT SEAL

*(Mirounga angustirostris)*

**Distribution and Migration:** This species originally occupied rookeries and hauling grounds on the mainland and islands from Cabo San Lazaro, Baja California, northward to Pt. Reyes, just north of San Francisco. Nonbreeding animals range at least as far north as southeastern Alaska.

This species is now known to breed on Isla San Benito, Islas Los Coronados, Isla Cedros, San Miguel Island, Santa Barbara Island, San Nicolas Island, and Ano Nuevo Island. Also, a northern elephant seal was born on southeast Farallon Island January 20, 1972, indicating that this species is continuing to expand its breeding range northward since its near-extirmination during the last century (LeBoeuf, et al., 1974).

**Abundance and Trends:** By 1890 the population had been reduced to 100 or fewer animals found only on Guadalupe Island, but this number increased to an estimated 15,000 animals by 1960 (Bartholomew and Hubbs, 1960). A total of 10,581 were counted in April 1968 on the six Mexican islands off Baja California (Brownell, et al., 1974). Peterson and LeBoeuf (1969) estimated a population of about 30,000 in 1969. This species has recolonized most or all of its historic rookeries and hauling grounds.

The California Department of Fish and Game has counted elephant seals during sea lion censuses in early June since 1965 (Carlisle and Aplin, 1971). Carlisle (1973) has counted *Mirounga* on San Miguel Island each year from 1965 through 1973 except 1968. Carlisle counted 3,600 *Mirounga* on San Miguel in 1973.

Odell (1974) believes that the San Nicolas Island population is increasing. The largest California population of *Mirounga* is found on San Miguel Island where DeLong and Johnson (in press) estimate the total island population to be 16,000.

**General Biology: Species Statistics.**—Maximum body lengths are about 5 m for adult males and 3.3 m for adult females. Newborn pups are about 1.2 m long and have black natal pelage.

**Reproductive Data.**—The adult males usually arrive first on the rookeries in November, followed by the pregnant females in December. Dominant adult males occupy choice locations within the breeding colonies and do most of the mating. The female usually bears a single pup about 7 days after her arrival and weans it about a month later. The female is bred during her last few days ashore. Most pups are born January 1 to February 10.

**Age-Growth Data.**—On San Nicolas Island most pups have molted their black natal pelage for the gray pelage of older animals by 1 March. The age at which the pups go to sea is not firmly established, but they spend at least 2 to 3 months ashore. Older animals return to shore to molt beginning with the fe-

males about 1 April, followed by immatures of both sexes, and the males are the last to return.

**Feeding Habits.**—Little information on the feeding habits of *Mirounga* is available. The stomach of one elephant seal contained seven ratfish, one 66.0 cm California dogfish shark, one swell or puffer shark, three skates, and four squids. The species apparently can feed at considerable depths, as indicated by prey species and the fact that three young *Mirounga* were taken on hooks set at about 100 fathoms. The stomach of a subadult male found dead in California contained the remains of cusk eels, toadfishes, scorpionfishes, flounder, cat sharks, and segments of undetermined teleosts and elasmobranchs.

**Ecological Problems:** Oil from the Santa Barbara spill of 28 January 1969 coated about 100 elephant seal pups ashore on one area of San Miguel Island. The pups had been weaned and apparently suffered no ill effects.

**Allocation Problems:** None known.

**Current Research:** Scientists from the University of California at Santa Cruz, California, are studying this species.

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## GRAY WHALE

*(Eschrichtius robustus)*

**Distribution and Migration:** The gray whale is now restricted to the North Pacific Ocean, although it once occurred in the North Atlantic Ocean.

Two geographically isolated populations are recognized: (1) the eastern Pacific ("California") stock, which spends the summer in the Chukchi, western Beaufort, and northern Bering Seas (and rarely along the coast as far south as central California), and migrates to the west coast of Baja California and the southern Gulf of California for the winter; and (2) the western Pacific Ocean ("Korean") stock, which spends the summer in the northern Sea of Okhotsk and migrates to the southern coast of Korea for the winter.

**Abundance and Trends:** Eastern North Pacific Ocean—contrary to earlier published estimates, the original population was almost certainly less than 15,000 (Henderson, 1972). During the late 18th and earlier 19th centuries the population was greatly reduced. Since complete protection was given the stock in 1947, the population has increased to about 11,000 and has remained stable since 1967 (Rice and Wolman, 1971). An average of about 160 gray whales are killed each year in a subsistence fishery on the Chukotski Peninsula of Siberia. In Alaska, no more than five per year have been taken by Eskimos in recent years.

Western North Pacific Ocean—in 1910, the population probably numbered between 1,000 and 1,500. The status of this population is uncertain at the present time, but it appears to be nearly extinct.

**General Biology:** The gray whale is identified by its mottled gray color and low hump in place of a dorsal fin. It feeds on benthic amphipods and other benthic invertebrates on the summering grounds, and fasts during migrations and on wintering grounds. Sexual maturity is attained at an age of 5 to 11 years, at a mean body length of 11.0 m for males and 11.6 m for females. The mating sea-

son is in late November and early December while the animals are on their southward migration. The calf is born following a 13-month gestation period after the pregnant females have arrived in certain shallow lagoons on the west coast of Baja California. The female bears a calf only once every 2 or more years. The calves average about 5.0 m long at birth and are weaned 7 months later when they are about 8.0 m long.

**Ecological Problems:** The gray whale is now valuable as a tourist attraction, and it supports a rapidly increasing cruise-boat industry, including ½-day cruises off San Diego and Los Angeles, and week-long cruises from these ports to Scammons Lagoon.

These activities have generated a problem of increasing harassment of the whales. In 1972, the Mexican Government declared Scammons Lagoon a whale refuge, so the cruise boats are now partly regulated.

**Allocation Problems:** None known.

**Current Research:** Studies on gray whales are being made by the National Marine Fisheries Service and the Soviet Union's Far Eastern Institute of Marine Fisheries and Oceanography.

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### MINKE WHALE

(*Balaenoptera acutorostrata*)

**Distribution and Migration:** The minke whale inhabits all oceans of the world, except equatorial regions, and ranges into the polar pack ice zones in the Northern and Southern Hemispheres. It makes extensive seasonal migrations between high-latitude summering grounds and low-latitude wintering grounds.

At least three geographically isolated populations are recognized, one in the North Pacific Ocean, another in the North Atlantic Ocean, and a third in the Southern Hemisphere. The affinities of the minke whale stocks in the northern Indian Ocean are unknown.

In the eastern North Pacific Ocean, the minke whale ranges from the Chukchi Sea south to northern Baja California during the summer, and from central California south to within 2 degrees of the Equator during the winter.

In the western North Atlantic Ocean, it ranges from Baffin Bay south to Chesapeake Bay during the summer, and from the eastern Gulf of Mexico and northeastern Florida south to Puerto Rico and the Virgin Islands during the winter.

**Abundance and Trends:** The exploitable population in the Southern Hemi-

sphere originally numbered about 183,000 and currently numbers about 157,000. For the North Atlantic there is no estimate of the original population, but the present population is about 80,000. No estimates are available for the North Pacific.

The minke whale has long been an important species in the "small whale" fisheries of the world. In 1975 (including the 1975/76 Antarctic season), catches were over 9,522, distributed as follows:

North Atlantic.....	1,969
Japan.....	370
Korea.....	( <sup>1</sup> )
Brazil.....	1,039
South Africa.....	110
Antarctic.....	6,034

<sup>1</sup> No data (566 in 1974).

**General Biology:** The minke whale is the smallest member of the genus *Balaenoptera*, not exceeding .10 m in length in the Northern Hemisphere. The northern animals are distinguished by a white band on the flipper; individuals from the Southern Hemisphere average about a meter longer, and usually lack the white flipper band. The minke whale feeds mainly on euphausiids, but also takes some small fishes. In the Northern Hemisphere, it attains sexual maturity at an age of 7 to 8 years and an average body length of 7.0 m in males and 7.9 m in females. The female bears a calf only once every 2 years (rather than annually, as once believed). During the summer, pregnant females migrate to much higher latitudes than do the lactating and immature females.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Research on minke whales is being conducted by the Japanese Far Seas Fisheries Research Laboratory, the South African Division of Sea Fisheries, and the Norwegian State Institute for Whale Research.

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### BRYDE'S WHALE

(*Balaenoptera edeni*)

**Distribution and Migration:** Bryde's whale is found in tropical and warm temperate waters around the world. In the western Atlantic Ocean, it ranges from Maryland south to Cabo Frio, Brazil, and in the eastern Atlantic Ocean from Morocco south to the Cape of Good Hope. In the Indian Ocean, it ranges from the Cape of Good Hope north to the Persian Gulf, east to the Gulf of Martaban, Burma, and thence south to Shark Bay, Western Australia. In the western Pacific Ocean, it is distributed from northern Hokkaido, Japan, south to Victoria, Australia, and North Island, New Zealand; in the eastern Pacific Ocean, it ranges from central Baja California, Mexico, south to Iquique, Chile.

At least some of the temperate zone populations (Japan, South Africa) make limited seasonal migrations. The tropical populations may be sedentary.

**Abundance and Trends:** The population in the western North Pacific, north of lat. 20°, originally numbered about 20,000, and has now been reduced to about 16,000. No estimates are available of population sizes elsewhere in the world.

Until recently, Bryde's whales have been of minor importance in the modern whaling industry, and only a few were taken by shore stations in Japan, South Africa, and rarely elsewhere. Since 1970, however, increasing numbers have been harvested by pelagic expeditions in the western North Pacific Ocean, as these expeditions have shifted operations more to the south. In 1975, 1,433 were killed there—1,317 by Japanese and Soviet pelagic expeditions, and 116 by Japanese shore stations. The only ones reported taken in the Southern Hemisphere were three taken by the shore station at Durban, South Africa. However, it is believed that most of the 151 "sei" whales taken by the combination catcher-boat/factory-ship *Sierra* (registered in Somalia) off Angola were actually Bryde's whales.

**General Biology:** Bryde's whales is similar in appearance to the sei whale, and the two species were formerly confused. The Bryde's whale is slightly smaller—usually less than 13.5 m long; its throat grooves extend posteriorly beyond the umbilicus, and it has a pair of lateral ridges on top of its snout, one on each side of the median ridge. The fringe on its baleen plates is much coarser than that of the sei whale. It feeds mainly on small schooling fishes, and also takes some euphausiids and other crustaceans. Males attain sexual maturity at an average length of 12.2 m and females at 12.5 m. The mating and calving season is usually during the winter, but in some areas—South Africa, for example, they breed year-round. The gestation period is about 1 year. The female does not bear a calf 2 years in succession.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Research on whale is being conducted by the South African Division of Sea Fisheries and the Japanese Far Seas Fisheries Research Laboratory.

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#### SEI WHALE

##### (*Balaenoptera borealis*)

**Distribution and Migration:** The Sei whale is nearly worldwide in distribution. In the eastern North Pacific, it summers from California to the Gulf of Alaska and Aleutian Islands; in the North Atlantic, from New England and British Isles to the Arctic Ocean. It winters at low latitudes. In Southern Hemisphere this species summers in all oceans from lat. 30°S southward, and in winter it is generally found north of lat. 40°S.

**Abundance and Trends:** Information in this section is from the annual reports of the International Whaling Commission and from recent reports of the Bureau of International Whaling Statistics. The number of sexually mature animals originally numbered about 217,000 (excluding the North Atlantic, for which no estimates are available), and has now been reduced to about 110,000, distributed by major ocean areas as follows:

Ocean	Original population	Current population
North Atlantic.....	( <sup>1</sup> )	( <sup>1</sup> )
North Pacific.....	42,000	9,000
Southern Ocean.....	175,000	101,000

<sup>1</sup> No data.

Inclusion of sexually immature whales would increase these estimates by roughly 50 percent. The sei whale is the second most valuable baleen whale, and populations appear to be near the level of maximum sustainable yield. Catches of sei whales in recent seasons have been:

Season	North Pacific	North Atlantic	Southern oceans (south of 40° south) <sup>1,2</sup>	Southern land stations
1969.....	5,158	2222	5,857	917
1970.....	4,504	139	6,153	465
1971.....	2,993	476	5,452	446
1972.....	2,327	315	3,846	2,346
1973.....	1,856	139	4,392	2,30
1974.....	1,280	9	3,859	2,354
1975.....	504	138	1,820	2,49

<sup>1</sup> Southern oceans catches are for the seasons 1969-70 through 1976-76.

<sup>2</sup> No data from Chile.

**General Biology:** The species resembles the fin whale but is slightly smaller, with less white underneath, and a large dorsal fin. In the far north of the Northern Hemisphere it feeds mostly on copepods. The diet is much more varied in lower latitudes—including euphausiids, copepods, sauries, anchovies, herring, sardines, and jack mackerel. Sei whales usually travel in small pods of 2 to 5. They attain sexual maturity at 6 to 12 years of age, at a body length of about 13.1 m (males) and 13.7 m (females). Females bear calves every 2 or 3 years. The mating and calving season occurs in winter in the respective hemispheres. Gestation lasts 1 year, and the calf is weaned when about 7 months old.

Seven percent of the sei whales taken off California have been infected with a unique disease that causes progressive shedding of the baleen plates and their replacement by an abnormal papilloma-like growth.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** The National Marine Fisheries Service is conducting population and biological studies of this species. Other organizations carrying out research on this species are the Japanese Whale Research Institute and Japanese Far Seas Fisheries Research Laboratory (North Pacific and Antarctic), Fisheries Research Board of Canada (North Atlantic), Norwegian State Institute for Whale Research (Antarctic), South African Division of Sea Fisheries (South Africa), and Soviet All-Union Research Institute of Marine Fisheries and Oceanography.

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#### FIN WHALE

##### (*Balaenoptera physalus*)

**Distribution and Migration:** The fin whale is worldwide in distribution. In the eastern North Pacific it summers from California into the Chukchi Sea, and in the North Atlantic from Cape Cod and Spain into the Arctic Ocean. The fin whale migrates to more southern latitudes in winter. In the Southern Hemisphere it is generally found at lat. 47° to 60° south in summer and from 20° to 40° south in winter.

**Abundance and Trends:** Information in this section is from the annual reports of the International Whaling Commission and from the report of the Bureau of International Whaling Statistics, Sandefjord. The stocks available for com-

mercial harvest originally numbered about 470,000, but have now been reduced to about 107,000. These are distributed by major ocean areas as follows:

Ocean	Original population	Current population
North Atlantic.....	25,000	10,000
North Pacific.....	44,000	17,000
Southern Ocean.....	400,000	80,000

Inclusion of immature whales shorter than the legal length limit would increase these estimates by roughly 50 percent. Recent catches from the stocks have been:

Season	North Pacific	North Atlantic	Southern oceans <sup>1</sup>	Southern land stations
1969.....	1,276	2,800	3,002	224
1970.....	1,012	1,063	2,890	135
1971.....	802	751	2,883	104
1972.....	758	689	1,781	41
1973.....	460	342	1,288	452
1974.....	413	346	979	26
1975.....	508	245	206	426

<sup>1</sup> Southern ocean catches are for the seasons 1960-70 through 1975-76.

<sup>2</sup> An additional 122 "baleen whales" taken off Spain were probably fin whales.

<sup>3</sup> No data from Spain.

<sup>4</sup> No information from Chile.

The fin whale is commercially the most valuable baleen whale. Stocks in the North Pacific and southern oceans are below maximum sustainable yield levels.

**General Biology:** This species is second in size only to the blue whale; in the Northern Hemisphere it grows to at least 23.2 m and is distinguished by a gray back, white belly, and well-developed dorsal fin. Fin whales feed mostly on euphausiids, but often eat fish—especially anchovies in the North Pacific and capelin in the North Atlantic.

They usually travel in small pods of 2 to 5 animals. Fin whales are sexually mature at 6 to 12 years, and at a body length of about 17.7 m (males and 18.3 m (females). Females bear calves every 2 to 3 years. The mating and calving season occurs in winter in respective hemispheres. Gestation lasts 1 year, and the calf is weaned at about age 7 months.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** The National Marine Fisheries Service is conducting population and biological studies of this species. Other organizations carrying out research on this species are the Japanese Whales Research Institute and Japanese Far Seas Fisheries Research Laboratory (North Pacific and Antarctic), Fisheries Research Board of Canada (North Atlantic), British National Institute of Oceanography (South Africa and Antarctic), South African Division of Sea Fisheries (South Africa), and Soviet All-Union Research Institute of Marine Fisheries and Oceanography (North Pacific and Antarctic).

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### BLUE WHALE

(*Balaenoptera musculus*)

**Distribution and Migration:** The blue whale is found throughout all oceans from the Equator to the polar pack ice zones in the Northern and Southern Hemispheres. It makes seasonal migrations between rather restricted high-latitude summering grounds and low-latitude wintering grounds.

At least three geographically isolated populations are recognized, one in the North Pacific Ocean, another in the North Atlantic Ocean, and a third in the Southern Hemisphere. Each population is probably comprised of several more or less discrete stocks. The "pygmy blue whale" of the southern Indian Ocean is morphologically distinct from the stocks which spend the summer in Antarctic waters. The affinities of the blue whale populations in the Arabian Sea and Bay of Bengal are unknown.

In the eastern North Pacific Ocean, blue whales range from the Aleutian Islands and Gulf of Alaska south to central California during the summer, and from central Baja California south to within 8 degrees of the Equator during the winter.

In the western North Atlantic Ocean, they range from Davis Strait south to the Gulf of St. Lawrence during the summer and spend the winter in the waters east of the West Indies.

**Abundance and Trends:** During the first half of the 20th century, the blue whale was one of the most important cetaceans to the whaling industry, but it is now so rare that it will require probably half a century of complete protection to restore the stocks to a significant level. In the North Pacific Ocean, the population, which once numbered about 5,000, now contains about 1,700 individuals (Wada, 1975). This species apparently has been slowly increasing since 1966, the year it was first given complete protection.

The population in the western North Atlantic (off eastern Canada), which originally numbered about 1,100 (Allen, 1970), now numbers only a few hundred. Estimates of the eastern North Atlantic population have not been made.

The Southern Hemisphere population originally numbered about 200,000 (Chapman, Allen, and Holt, 1964), but was severely depleted before complete protection was given the stock in 1965.

The present population is estimated at about 9,000, half of which are pygmy blue whales (Masaki, 1975).

**General Biology:** The blue whale is the largest mammal that ever lived on Earth, reaching a known length of 29 m and a weight of 136 tons. It is distinguished from the fin whale by its mottled blue-gray color dorsally and ventrally, its smaller dorsal fin, its broad flat snout, and its black baleen plates. Blue whales feed exclusively on euphausiids during the summer and fast during the winter. They become sexually mature at an average age of about 10 years, when males of the Antarctic stocks average 22.5 m and females 24.0 m; whereas the "pygmy blue whales" of the southern Indian Ocean average about 2 m less in length. Every 2 or 3 years during the winter the female gives birth to a calf after a 12-month gestation period. At birth the calf is about 7 m long; when weaned 8 months later it is about 15 m long.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Observers aboard whaling and research vessels record sightings of blue whales and routinely report them to the International Whaling Commission.

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### HUMPBACK WHALE

(*Megaptera novaeangliae*)

**Distribution and Migration:** The humpback whale is found in almost all oceans from tropical waters to the edge of, but not into, the polar pack ice zones in the Northern and Southern Hemispheres. It makes extensive seasonal migrations between high-latitude summering ground and low-latitude wintering grounds—the latter along continental coasts or around islands.

Three geographically isolated populations are recognized, one in the North Pacific Ocean, another in the North At-

lantic Ocean, and a third in the Southern Hemisphere. Each population is comprised of several almost entirely discrete stocks.

In the eastern North Pacific Ocean, the humpback whale ranges from the Chukchi Sea south to southern California during the summer, and from southern California south to the Islas Revillagigedo and Jalisco, Mexico, and also around the Hawaiian Islands, during the winter.

In the western North Atlantic Ocean it ranges from Disco Bay in western Greenland south to Massachusetts during the summer, and from Hispaniola and Puerto Rico south to Trinidad during the winter.

**Abundance and Trends:** The humpback whale was important, especially to shore stations, during the first half of the 20th century. Now, however, this mammal is so scarce that it will require a half century of complete protection for it to increase to a significant level. A few are killed in subsistence fisheries in Greenland, the Lesser Antilles, and the Tonga Islands. It has a minor value as a tourist attraction in Hawaii and southeastern Alaska. The original population size of the North Pacific Ocean is unknown, but is now severely depleted to about 2,500 individuals (Wada, 1975). A summer resident population of about 60 animals occupies the inside waters of southeastern Alaska. The population has apparently not increased since complete protection was given the species in 1966.

The original population size of the North Atlantic Ocean is unknown, and the western North Atlantic Ocean stock is now reduced to about 1,000 animals (Winn, Edel, and Taruski, 1975). A small increase may have occurred in recent years. Estimates of the eastern North Atlantic Ocean population have not been made.

The original population of the Southern Hemisphere, which probably numbered about 100,000, now contains about 2,500 individuals (Masaki, 1975). The stock has apparently not increased since complete protection was given the species in 1964.

**General Biology.** The humpback whale is much more heavy bodied than members of the genus *Balaenoptera*, and is characterized by its extremely long flippers. It feeds mainly on euphausiids, but also eats anchovies and sardines when available. The species attains sexual maturity at an age of 6 to 12 years, when males average 11.6 m long and females 11.9 m. The mating and calving season is from October to March in the Northern Hemisphere, and April to September in the Southern Hemisphere. The gestation period is 12 to 13 months, and the calf nurses for about 11 months. The female rarely bears a calf 2 years in succession.

The humpback whale is heavily infested with three species of ectocommensal barnacles and with whale lice.

**Ecological Problems:** None known.

**Allocation Problems:** None at present.

**Current Research:** Observers aboard research vessels and foreign whaling ships record sightings of humpback

whales and routinely report them to the International Whaling Commission. The National Marine Fisheries Service is conducting research on the summer grounds in southeastern Alaska and the winter grounds around the Hawaiian Islands.

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### BLACK RIGHT WHALE

(*Balaena glacialis*)

**Distribution and Migration:** This right whale inhabits all temperate waters of the world. It migrates between summering grounds in cool temperate waters and wintering grounds in warm temperate waters; the wintering grounds are mostly along continental coasts or around islands.

Three geographically isolated populations are recognized, one in the North Pacific Ocean, another in the North Atlantic Ocean, and a third in the Southern Hemisphere.

In the eastern North Pacific Ocean, the right whale ranges from Bristol Bay and the Gulf of Alaska south to lat. 50°N during the summer, and from Oregon south to central Baja California during the winter.

In the western North Atlantic Ocean, it ranges from Labrador south to the Bay of Fundy during the summer, and Massachusetts south to Florida and Bermuda during the winter.

**Abundance and Trends:** The right whale was originally very abundant, but heavy exploitation, mostly during the 19th century, reduced all populations nearly to extinction by the turn of the century. At least some local stocks have increased in recent years. Present numbers are: North Pacific Ocean—about 220 (Wada, 1975). North Atlantic Ocean—no estimate; Southern Hemisphere—about 3,200 (Masaki, 1975).

**General Biology:** The black right whale is a heavy-bodied animal up to 18.0 m long and is characterized by lack of a dorsal fin and by a large head with a narrow arched rostrum. It feeds main-

ly on copepods. The reproductive biology is poorly known. Body length at sexual maturity is about 15.2-m in males and 15.8 m in females. Mating and calving occur in the winter so the gestation period is probably about 1 year. The female probably bears a calf only once every 2 (or more) years.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Research on the black right whale is being carried out by the South African Division of Sea Fisheries and off Argentina by a joint project of the National Geographic Society and the New York Zoological Society. Observers aboard whaling and research vessels record sightings of right whales and routinely report them to the International Whaling Commission.

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### BOWHEAD WHALE

(*Balaena mysticetus*)

**Distribution and Migration:** The bowhead whale inhabits arctic and subarctic waters in four principal areas: (1) from Spitzbergen west to east Greenland; (2) in Davis Strait, Baffin Bay, James Bay, and adjacent waters; (3) in the Bering, Chukchi, Beaufort, and East Siberian Seas; and (4) in the Okhotsk Sea. They migrate with ice movements.

**Abundance and Trends:** All bowhead whale populations were decimated by the end of the 19th century because of the great value of this species for oil and baleen (Tomilin, 1957). No commercial whaling for bowheads has taken place since about 1915. Bowhead whales have been completely protected from commercial whaling by the International Convention for the Regulation of Whaling since 1947, and, subsequently, by the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. These acts allow for a subsistence harvest of these whales by the Indians, Aleuts, and Eskimos. In the last two decades the take of bowhead whales by Eskimos in Alaska has varied between 1 (1959) and 48 (1976) (Maher and Wilmovsky, 1963; Marquette, unpublished records). Much of this variation in take is because of variation in hunting conditions, although in recent years

an increase in hunting intensity may have taken place. Bowhead whales are taken only occasionally by USSR nationals (Zemsky, 1973, pers. comm.). The bowhead whale population of Canada and the Bering, Chukchi, and East Siberian Seas appears to be increasing (Mansfield, 1971; Burns, pers. comm.). The stocks in the Spitzbergen area and the Okhotsk Sea are nearly extinct, but there have been a few sightings in these areas in recent years.

**General Biology: Species Statistics.**—The bowhead whale grows to 18 m in length. The color is generally black or dark gray, marked by some white, generally on the chin but sometimes also on the belly.

**Reproductive Data.**—Sexual maturity is reached at 11.6 m and 12.2 m in males and females, respectively. Mating probably occurs in early April or earlier. Gestation lasts 12 to 13 months, with a single calf (3-4.5 m long) born in April-May. The reproductive cycle is apparently 2 years long.

**Age-Growth Data.**—The calf is weaned at 6 months. Yearlings are from 6.7 to 7.9 m long. These whales travel singly, in pairs or threes during the spring. In autumn they are generally scattered, but may occur in groups of up to 50.

**Feeding Habits.**—The species feeds mainly on euphausiids and other krill, but occasionally on bottom-dwelling invertebrates.

**Parasites and Diseases.**—Bowhead whales appear to be remarkably free of external and internal parasites.

**Ecological Problems:** The north-slope oil project might alter the inshore southward migration should fall steamer and barge traffic increase to force the whales farther offshore.

**Allocation Problems:** Some conflict of interest may exist between the people who would like complete protection for bowhead whales and Eskimos who hunt these whales.

**Current Research:** The National Marine Fisheries Service contracted with the University of Southern California to gather biological data on bowhead whales in 1973. In the spring of 1973 a group of scientists from United States and Canadian universities attempted to record underwater sounds of the bowhead whale. The Fisheries Research Board of Canada makes annual surveys from planes of bowhead whales in Canadian waters. In the spring of 1974 the National Marine Fisheries Service re-instituted a research program on bowhead whale.

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## GANGES SUSU

## (GANGES RIVER DOLPHIN)

*(Platanista gangetica)*

**Distribution and Migration:** This species (with which the Indus dolphin, *P. minor*, was formerly thought to be identical) is confined to the Ganges-Brahmaputra river system of India and Bangladesh, from tidal limits to the foothills, and the Karnaphuli River, a small river that empties into the Bay of Bengal east of the mouth of the Ganges. During the summer monsoon season, these dolphins extend their distribution up stream into the smaller tributaries; during the winter dry season they retreat into the larger main streams.

**Abundance and Trends:** No data are available on population size, but the species is still fairly numerous, and there is no indication that it is currently endangered. A few are captured incidentally in seines by fishermen, who attempt to release the dolphins alive.

**General Biology:** Sexual maturity is attained at an average age (estimated from growth layers in the teeth) of 10 years, when females have attained a body length of 170 to 200 cm, and males a length of 170 cm. Physical maturity is attained at an age of about 20 years, and a body length of 250 cm for females and 200 to 210 for males. Mating is said to occur from July to September; and the single calf, 70 to 75 cm long, is born between April and July after an apparent gestation period of 8 to 9 months. Such a short gestation period is highly questionable, and Pilleri (1971) suggests evidence for mating in April. The calves are weaned by the beginning of the next winter. The mean interval between successive calves is at least 2 years. These dolphins, which are blind, feed on shrimps and mud-frequenting fishes which they apparently catch by probing about in the bottom of the rivers.

**Ecological Problems:** None known.

**Allocation Problems:** None at present.

**Current Research:** Several field studies have recently been made by biologists from the University of Tokyo, the Bangladesh Agricultural University, and the University of Berne.

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## INDUS SUSU

## (INDUS RIVER DOLPHIN)

*(Platanista minor)*

**Distribution and Migration:** This species (which until recently was thought to be the same as the Ganges dolphin, *P. gangetica*) is confined to the Indus River system of Pakistan and India. It originally occurred throughout the system from tidal limits to the foothills, but is now absent from many sectors. Its movements have been restricted by the construction of many dams ("barrages"), which have split it into several separate populations.

**Abundance and Trends:** In 1974 the total population was estimated to be between 450 and 500 animals; most (350-400) inhabited the 100 mile (160-km) sector of the lower Indus between the Sukkur Barrage and Baddu Barrage. The population appears to be decreasing at a rate of about 10 percent per year (Kasuya and Nishiwaki, 1975). These dolphins are captured with hoop nets by the local people who eat the meat and use the oil for its alleged medicinal properties.

**General Biology:** Almost nothing is known of the life history and ecology of this species, but it is presumably similar to the Ganges dolphin. The gestation period is said to be 1 year, with mating and calving in March and April. The annual reproductive rate has been roughly estimated at 0.05, and the annual mortality rate at 0.16.

**Ecological Problems:** The habitat has been greatly altered by the construction of barrages as part of the extensive irrigation systems in Pakistan.

**Allocation Problems:** The marked lowering of the water during the dry season greatly limits the area available to the dolphins. The dolphins would be benefited by more economical use of the water for irrigation, so as to maintain water levels above a certain minimum in the reservoirs and main river channels.

**Current Research:** Several field studies have recently been made by biologists from the University of Tokyo, the University of Berne, the California Academy of Sciences, and the International Union

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## ROUGH-TOOTHED DOLPHIN

*(Steno bredanensis)*

**Distribution and Migration:** The rough-toothed dolphin inhabits tropical and warm temperate seas. It ranges in the western Atlantic Ocean from Virginia south. In the North Pacific Ocean it ranges north to southern Japan (35° N) where it is rare, and to the Hawaiian Island where it is fairly common. It is known in the eastern Pacific from strandings near San Francisco and in the Galapagos Islands, and from several records in the tropical tuna fishery where it occasionally is captured together with bottlenosed, spotted, and spinner dolphins.

**Abundance and Trends:** The rough-toothed dolphin is uncommon, but not rare throughout most of its range. It is caught infrequently in the Japanese dolphin fishery (Ohsumi, 1972).

**General Biology: Age-Growth Data.**—This dolphin grows to about 2.4 m.

**Feeding Habits.**—Very little is known about feeding habits of this species. The stomachs of specimens captured in the tuna fishery contained remains of fish and squid.

**Ecological Problems:** None known.

**Allocation Problems:** Rough-toothed dolphins are occasionally trapped accidentally in commercial fishing gear. In this way, a small number are lost in the eastern Pacific international tuna seine fishery.

**Current Research:** The Oceanic Institute in Hawaii is studying this species in the wild and had a *Steno-Tursiops* hybrid in captivity. Specimens retrieved from the incidental kill in the eastern Pacific international tuna fishery are examined at the Southwest Fisheries Center, La Jolla, California.

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### BOTTLENOSED DOLPHIN

(*Tursiops truncatus*)

**Distribution and Migration:** The bottlenosed dolphin is widely distributed in temperate and tropical waters, but strays into much colder latitudes. In the western North Atlantic, it ranges at least as far north as Nova Scotia and southern Greenland, but is best known from New England southward to Florida, westward throughout the Gulf of Mexico, and thence throughout the West Indies and Caribbean to Venezuela. From about North Carolina northward this species begins to distribute offshore, and southward its members are nearshore, riverine, and estuarine with far fewer distributed to the edge of the continental shelf. In the eastern Atlantic, it is found from the northeast Scandinavian coast to South Africa. In the eastern north Pacific it infrequently occurs in offshore currents, perhaps as far north as southern Oregon, but is far more common south of Point Conception, where individuals may be encountered primarily within the coastal zone but also less frequently on the continental slope and beyond. The species is probably continuous to central Chile. In the western Pacific, it is found north to Japan and south to Australia and New Zealand. Its Pacific range includes the Hawaiian Islands, where it is said to be common. Nominal species have been named from the tropical Indo-Pacific (*T. aduncus*), and the northern Gulf of California and waters along the west coast of Baja California and southern California (*T. gilli*). The geographical ranges characters delimiting these named forms are still poorly defined. The Small Cetaceans Subcommittee of the International Whaling Commission commented on the taxonomy of *Tursiops*, as follows: "The necessary taxonomic work has not yet been done, it seems likely that there is only one species of *Tursiops*, with sharply-defined geographical races varying in body size and tooth size and distributed differentially relative to sea temperature and depth. There is great need to gather materials that will allow definitive examination of the nominal species *T. aduncus*, *T. gilli*, and *T. nuanu*, and materials from as many other populations as possible. These names are currently used by some workers." Subjective impressions and limited data from regional surveys and radio and static tagging programs suggest that populations are localized within about a 100-mile radius and that this species does not make long migrations. Bottlenosed dolphins are often seen in large loose schools

of several hundred animals, which appear to consist of aggregations of small groups of no more than a dozen individuals. Humpback and right whales traveling along the Atlantic coast of Florida and pilot whales off the southern California coast are almost always accompanied by bottlenosed dolphins. Gray whales along southern and Baja, California are also frequently accompanied by one or more *Tursiops*.

**Abundance and Trends:** In 1974-75, populations from Mobile Bay to western Louisiana alone were estimated from aerial surveys to number 3,500 to 10,000 animals (Leatherwood and Evans, 1976). Population estimates currently are not available for other areas.

In North Carolina, from 500 to 1,500 animals were killed annually during the early 20th century (Townsend, 1914). A few bottlenosed dolphins are now taken for food in small open-boat pilot whale fisheries in the Lesser Antilles (St. Vincent, St. Lucia, Dominica), and some are harvested by Venezuelan fishermen. In the past, several hundred bottlenosed dolphins have been taken each year off Florida, Mississippi, and Texas for display in marine aquariums and for research. Based on subjective data it is believed that local populations of the southwestern United States are not now being significantly affected by these activities (D. K. Caldwell, pers. comm.).

Small numbers are taken for food off Baja California and mainland Mexico, in the nets of tuna fishermen in the eastern tropical Pacific, and for aquarium display in southern California and Hawaii.

**General Biology: Reproductive Data.**—Gestation lasts about 1 year, and calves may nurse for 1.5 to 2 years, although they begin to take solid food at age 6 months. Breeding apparently occurs throughout the year, but the fact that most of the young are born during a certain time of year suggests that breeding, as well as calving, takes place in the spring and summer.

**Age-Growth Data.**—Bottlenosed dolphins are 1.0 m long at birth and grow to 3.6 m in length and 650 kg. in weight. Captive animals have become sexually mature at 6 years, but recent evidence suggests that this species normally breeds at about 12 years. The estimated life span for this species is about 25 years, but it may be longer indicating that natural mortality is low.

**Feeding Habits.**—Bottlenosed dolphins feed on several species of fish, squid, and a few crustaceans. In many areas they are catholic in their food selection, seasonally capitalizing on the most abundant or accessible food species.

**Ecological Problems:** None known.

**Allocation Problems:** Some fishermen state that bottlenosed dolphins harass fishing efforts by biting fish and shrimp nets, and some attempt to drive them away. Bottlenosed dolphins are occasionally trapped accidentally in commercial fishing gear. In this way, a small number are lost in the eastern Pacific international tuna seine fishery. As indicated in the *Tursiops truncatus* Assess-

ment Workshop (Odell, et al., 1975), the effect on the population of taking these animals for display and research off the southeast United States requires further study.

**Current Research:** Several agencies and institutions conduct or support research on the bottlenosed dolphin. Included are the Office of Naval Research, National Institutes of Health, and the National Science Foundation. The University of Florida concentrates its research on general life history, intraspecific communication, and ecological studies. The U.S. Fish and Wildlife Service is conducting similar detailed studies of the life history of the animals near Tampa Bay, Florida. The Florida State Museum is studying systematics. Research on physiology, echolocation, anatomy, life history, and the behavior of captive and wild individuals has been done at the Naval Undersea Centers in San Diego and Hawaii. These laboratories are also assessing numbers and viability of regional stocks. Texas A&M University is conducting a detailed population study of Aransas Bay, Texas. Studies on vision are being carried out by scientists from the University of Miami. The Dolfinarium at Hardewijk, Netherlands, has recently conducted studies of the physiology and handling of these animals. Specimens retrieved from the incidental kill in the eastern Pacific international tuna fishery are examined at the Southwest Fisheries Center, where studies are underway on their systematics, distribution, life history, and feeding habits.

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### SPINNER DOLPHIN

(*Stenella longirostris*)

**Distribution and Migration:** The spinner dolphin inhabits tropical inshore and offshore waters around the world. In the United States, it has been recorded on the Gulf of Mexico but not on the U.S. Pacific Coast. In the eastern tropical Pacific, this species commonly associates with the spotted dolphin in mixed aggregations of up to several thousand animals. It is involved in the international tuna fishery in the eastern tropical Pacific, from Cabo San Lucas to Peru and west to about long. 145°W. Little is known of its migrations.

There are at least three races of spinner dolphin in the eastern Pacific and one in Hawaiian waters differing modally in several characters. One form that occurs very near the coast of Central America, referred to below as the "Costa Rican" form, is relatively long, slender, and gray.

A second race, called "eastern spinner" occurs along the coast of Mexico and seaward about 800 km and is relatively short, slender, and gray. A third, called "whitebelly spinner," occurs in far offshore waters west to about long. 145°W and is relatively short, robust, and white below. A fourth form, relatively long, robust, and white below, occurs in Hawaiian waters and possibly to the south and west. The ranges of the eastern and whitebelly forms overlap. In the area of overlap, the two forms are occasionally captured together. A few apparent intergrades have also been collected. The eastern and whitebelly forms are involved in the international tuna fishery.

The maximum recorded straight-line movement of a single animal is 280 miles (448 km) in 396 days.

**Abundance and Trends:** The size of the population of eastern spinner dolphin was estimated to be 1.2 million as of January 1, 1974. Projecting ahead to the beginning of 1976 on the basis of net reproductive rate and annual kills of 22,000 and 26,000 in 1974 and 1975, the population size was 1.248 million, indicating a recent annual increase of 2%. This population size was determined to be 54% of the pre-exploitation size in 1976 and, therefore, very near the lower limit of optimum sustainable population (SWFC, 1976).

The population size of whitebelly spinner dolphin was estimated to be 566,400 (78% of initial) as of January 1, 1976. This estimate was determined using the ratio of sightings of whitebelly spinner dolphin and offshore spotted dolphin in 1976 and the estimate of spotted dolphin population size in 1976. The annual kills in 1974 and 1975 were 18,000 and 39,000, respectively. Thus, it was determined that the population size of whitebelly spinners is decreasing at a rate of about 3% per year. Exploitation of whitebelly spinners has not been subjected to in-

cidental mortality as long as the other forms of *Stenella*; therefore, the expected increase in reproduction due to a decreasing population size probably has not fully occurred yet.

Data to be obtained from the aerial survey should improve the above estimates, especially for whitebelly spinners. The survey data will provide considerable information from the geographical areas where no information was previously available.

**General Biology:** Average length at birth is 77.0 cm. Gestation is 10.6 months. Average length of males at attainment of sexual maturity is 170 cm. Average length of adult males is 175.5 cm (range 160 to 192 cm). Average length of females at attainment of sexual maturity is 165 cm. Average length of adult females is 171 cm (range 152 to 187 cm). Approximately 1% of adult females are postreproductive. Estimates of annual pregnancy rate range from 0.450 (based on 1973 data) to 0.474 (based on 1974 data). The pooled estimates for all years' data is 0.461. The corresponding estimates of calving interval (reciprocal of pregnancy rate) are 2.22 years, 2.11 years, and 2.17 years. Estimates of gross annual reproductive rate based on the 1973, 1974, and 1975 data are 0.099, 0.103, and 0.105, respectively. The estimate based on pooled data for the 3 years is 0.102.

**Feeding Habits.**—The spinner dolphin feeds on small pelagic fishes and squids.

**Ecological Problems:** None known.

**Allocation Problems:** Because of its association with yellowfin tuna, this species is taken incidentally by fishermen from the United States, Canada, France, Japan, Mexico, Panama, and other countries in coastal and international waters of the eastern tropical Pacific.

The foreign share of the tuna catch has been increasing in recent years resulting in an increasing proportion of the total incidental kill being caused by foreign fishermen. The increase is expected to continue.

**Current Research:** The National Marine Fisheries Service and the tuna fishing industry are assessing the effects of porpoise mortality and improving rescue methods and gear to eliminate losses associated with the tuna harvest. No other nation involved in the Pacific tuna fishery is conducting research aimed at improving rescue methods and gear to eliminate porpoise losses associated with the tuna harvest.

Other research includes systematics and ecological studies by P. J. H. van Bree at the Zoological Museum in Amsterdam, W. Dawbin at Sydney University, and E. D. Mitchell at the Arctic Biological Station of the Fisheries Board of Canada in Ste. Anne de Bellevue, Quebec; and ethological studies by K. S. Norris at the University of California at Santa Cruz.

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### SPOTTED DOLPHIN

(*Stenella attenuata*, *S. frontalis*, *S. graffmani*, *S. dubia*)

**Distribution and Migration:** Knowledge of the spotted dolphins is scanty, and their taxonomy is confused, but two species probably exist. The taxonomy used here is provisional. One form is confined to warm waters of the Atlantic and probably is *Stenella plagiodon*, which is discussed in a separate status report. The other apparent species occurs in all tropical waters of the world, including the Atlantic Ocean, and has been identified as belonging to the four above-listed nominal species. Taxonomists do not agree on the taxonomy. The two apparent species are different in basic color pattern, but both have spots.

The spotted dolphin occurs in the Gulf Stream adjacent to the U.S. east coast. Nothing is known of its migrations. It has not been recorded from the U.S. Pacific coast, but it is the primary cetacean species involved offshore in the international yellowfin tuna fishery in the eastern tropical Pacific, from Cabo San Lucas to Peru and west to approximately long. 145° W. In the eastern tropical Pacific, this species commonly associates with the spinner dolphin in mixed aggregations of up to several thousand animals.

Skull measurements and other features indicate that there are at least two races of spotted dolphin in the eastern Pacific and another in Hawaiian waters. They differ in several features. A coastal form is relatively large and robust, has heavy jaws and teeth, and is restricted to onshore waters from Guaymas, Sonora, Mexico, to northern Peru. An offshore race is relatively small and slender, has lightly built jaws and teeth, is spotted to varying degrees, and occurs in offshore waters west to about long. 145° W. The races of the two forms may overlap, or the boundary between them may move seasonally or from year to year. They have not been observed or captured together, but in the central latitudes of the range the coastal form has been collected as far offshore as 50 km and the offshore form as far inshore as 20 km from the coast. The offshore form predominates in the eastern tropical Pacific yellowfin tuna fishery. Another race inhabits the waters around Hawaii and may extend into the South Pacific and to the west. This form is also small and slender, but relatively lightly spotted.

**Abundance and Trends:** The size of the offshore spotted dolphin was estimated by a stock assessment workshop (SWFC, 1976) to be 3.5 million animals at the start of 1974. Projecting forward on the basis of net reproductive rate and annual mortalities of 25,000 and 106,000 in 1974 and 1975, respectively, the population size as of January 1, 1976, was estimated to be 3.598 million (64% of initial size) with a range of 2.417 to 4.865 based upon two standard errors of the parameters. Using the above midpoint estimates, a recent annual increase in population size of 1.4% is indicated. Additionally, the population was determined to be within the lower end of the range of optimum sustainable population (SWFC, 1976).

The above statistics are based upon assumptions of (1) geographical range of the spotted dolphin, (2) average school size estimates being unbiased, (3) the composition of the kill in relation to age, sex, and species to be representative of the populations, (4) foreign kill rates being equal to the average 1972-1973 U.S. kill rate, and (5) nonregulated trips having the same kill rates as regulated trips. The planned aerial survey in January-March 1977 should provide data for testing the first two assumptions, while data from nonregulated trips in 1976 should test the last assumption.

**General Biology:** Average length at birth is 82.5 cm. Gestation is 11.5 months. Average length at 1 year is 138 cm. Age is estimated from dentinal layers in thin sections of teeth. A two-phase Laird-Gompertz growth model has been fitted to layer-length data. Direct calibration of the dentinal layers beyond the first year (two layers) is not possible, and three alternative hypotheses are considered: (1) Two layers per year, until pulp cavity occluded, (2) two layers per year in first year, and then one per year thereafter, and (3)

two layers per year until puberty, and one per year thereafter. The second alternative is most probably the correct one, but reproductive parameters below are estimated in terms of layers. Breeding is diffusely seasonal, with prolonged calving seasons in spring and fall and a pronounced low in winter. A third calving season may exist in the summer. Average age at attainment of sexual maturity of males is approximately 12 layers (average length about 195 cm and average weight about 75 kg). Females attain sexual maturity on the average at about 9 layers and 181 cm. Apparently post-reproductive females are encountered in the samples. Corpora albicantia of ovulation and pregnancy persist indefinitely in the ovaries. It is not possible to distinguish between the two types of corpora. Ovulation rate changes with age, from about four per layer in very young adult females to about one per layer in older females. The average reproductive cycles lasts 26 months and consists of 11.5 months of pregnancy, 11.2 months of lactation and 3.3 months of "resting" (not pregnant or lactating). About 4% of lactating females are pregnant. Pregnancy rate decreases with age, from about 0.6 per year at 8 to 10 layers, to about 0.3 at 16 layers. The sex ratio in the population overall is 44.9% males and 55.1% females. Sex ratio changes with age, from near parity at birth, indicating higher mortality rates for males. Average gross annual production of calves, 1973-1975, based on age and sex structures of the sample and the estimated pregnancy rate, is 13.1% of the population per year. No evidence has been found of age or sex segregation in schooling. The estimated parameters differ in a consistent way from those estimated for a population of *Stenella attenuata* in the western Pacific, possibly reflecting the exploitation in the eastern Pacific.

**Feeding Habits.**—Spotted dolphins feed on small mesopelagic and epipelagic fishes and squids.

**Ecological Problems:** None known.

**Allocation Problems:** Because of their association with yellowfin tuna, many of these mammals are taken incidentally during tuna harvesting operations by fishermen from the United States, Canada, France, Japan, Mexico, Panama, and other countries in coastal and international waters in the eastern tropical Pacific.

The foreign share of the tuna catch has been increasing in recent years resulting in an increasing proportion of the total incidental kill being caused by foreign fishermen.

**Current Research:** The National Marine Fisheries Service and the tuna industry are assessing the effects of porpoise mortality and improving rescue methods and gear to eliminate losses associated with the tuna harvest. No other nation involved in the Pacific tuna fishery is conducting research aimed at improving rescue methods and gear to eliminate porpoise losses associated with the tuna harvest.

Other Research includes systematic and ecological studies by P. J. H. van Bree at the Zoological Museum in Amsterdam, W. Dawbin at Sydney University, and E. D. Mitchell at the Arctic Biological Station of the Fisheries Research Board of Canada in Ste. Anne de Bellevue, Quebec.

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#### ATLANTIC SPOTTED DOLPHIN (*Stenella plagiodon*)

**Distribution and Migration:** The Atlantic spotted dolphin (exact taxonomic position not yet known) is probably confined to tropical and subtropical waters of the Atlantic Ocean. It occurs on the U.S. Gulf coast and off the east coast in Gulf Stream waters, and may be restricted to continental waters, being replaced in the West Indies by some other species in this genus (probably *Stenella frontalis*). Seasonal inshore-offshore migrations occur in Florida waters, perhaps elsewhere in the Gulf of Mexico, with animals moving close to shore in late spring.

**Abundance and Trends:** Population estimates have not been made for this species. The only known fishery for the species has taken 12 or fewer animals per year for display; however, these animals do not easily withstand handling and captivity. Thus, an increased fishery for display animals is not likely.

**General Biology:** The newborn are about 0.8 m long, and the adults reach 2.0 to 2.2 m in length. Little is known of the life history of this species. Except for the annual spring migrations to near shore, this species is considered a mammal of the outer continental shelf or adjacent high seas. Spotted dolphins appear to feed primarily on squid in the wild, but they readily adopt to a fish diet in captivity. Newborn and young animals are not spotted, but progress through a series of color changes until the adults become spotted all over except for the ventral surface near the belly. This species is subject to infestations externally by barnacles and whale lice, internally by trematodes in the stomach, liver, and pancreas, and nematodes in the lungs and stomach. In captivity and in cold weather, these animals easily contract pneumonia.

**Ecological Problems:** Little is known about the ecology of this dolphin, but because it normally lives well offshore, it seems likely that it is little affected by man.

**Allocation Problems:** None known.

**Current Research:** Some information on this species has been gathered incidental to studies by the Office of Naval Research on the bottlenosed dolphin. Most of the recent research has been on various aspects of sound production by this species. However, David K. and Melba C. Caldwell have long been gathering general biological information at the Marine Mammal Center of the Communication Sciences Laboratory of the University of Florida located at Marine-land, Florida (near St. Augustine).

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#### STRIPED DOLPHIN (*Stenella coeruleoalba*)

**Distribution and Migration:** The striped dolphin inhabits temperate and tropical waters around the world, and has been recorded from both U.S. Coasts. Nothing is known about the movements of striped dolphins in waters contiguous to the United States.

**Abundance and Trends:** Population estimates were made for the striped dolphin involved in the eastern tropical Pacific yellowfin tuna fishery (SWFC, 1976). The estimate was 248,000. The annual kill averages about 700 in this area, indicating no major impact.

**General Biology:** (Biological data are based on studies carried out on the population off Japan.

**Reproductive Data.**—The gestation period is 12 months long. Lactation lasts about 18 months, and the mean length of the reproductive cycle is about 3 years. Schools of striped dolphins segregate somewhat by age and sex.

**Age-Growth Data.**—The mean length of the newborn is 1 m. The mean age at sexual maturity in males and females is 9 years at 2.2 and 2.1 m, respectively.

**Feeding Habits.**—The stomachs of 27 specimens taken off Japan contained remains of mesopelagic fishes, squids, and crustaceans; myctophid fishes dominated.

**Ecological Problems:** None known.

**Allocation Problems:** The striped dolphin is involved in the eastern Pacific international tuna fishery to a minor extent.

**Current Research:** A Federal program of research recently begun by Japan is expected to yield an estimate of population size in the northwestern Pacific Ocean. Studies of striped dolphins incidentally killed in the international tropical tuna fishery are underway at the Southwest Fisheries Center.

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#### COMMON DOLPHIN (WHITEBELLY PORPOISE)

(*Delphinus delphis*)

**Distribution and Migration:** This species is worldwide in distribution in temperate to tropical waters of from 12°-28°C. There may be more than one species; pronounced variation in size, shape, and coloration has been demonstrated for three distinct populations in the eastern Pacific (W.E. Evans, pers. comm.). In the northwestern Atlantic Ocean, where this animal is also known as the saddleback dolphin, this mammal ranges from Newfoundland to the Caribbean Sea. In the northeastern Pacific Ocean, the primary distribution of this species is from the California-Oregon border to Costa Rica, but one stranded animal was found in British Columbia. Large populations occur off southern California (Santa Barbara to San Diego), the west coast of Baja California, Mexico (Cedros Island to Cape San Lucas), and Costa Rica. A relatively large population also occurs in, and may be a resident of, the Gulf of California. In southern California waters *Delphinus* is present throughout the year, but is most abundant from August to January. An observed decrease in herd size during the spring and summer may be due primarily to the animals breaking up into small subgroups of 50 to 200 animals, and a general movement offshore and northward.

**Abundance and Trends:** Population estimates were made for the common dolphin involved in the eastern tropical Pacific yellowfin tuna fishery (SWFC, 1976). The estimate was 1.4 million. The average annual kill of common dolphin in this area is about 9,600 animals. This indicates that there is probably no major impact.

**General Biology: Reproductive Data.**—Males and females may segregate between mating seasons, especially when the latter are nursing calves or are about to bear their young. The gestation period lasts 10–11 months with a postparturition estrus. The young dolphin is weaned at about age 5–6 months (110–120 cm overall length), but may stay with the female up to 1 year. In the northeastern Pacific Ocean, this species appears to have two mating seasons (January–April and August–November), and two calving seasons (March–May and August–October).

**Age-Growth Data.**—The young are 75–85 cm at birth. The males grow to 2.6 m and are an average of 14 cm longer than females. The average individual of the northeastern Pacific Ocean is larger than that of the Black and Mediterranean Seas. The largest known specimen from the Black Sea was 212 cm; however, in the northeastern Pacific Ocean a male 259 cm long was taken.

**Parasites and Disease.**—Parasitism has been implicated in natural mortality. The brains of 12 stranded specimens contained flukes and their eggs, which in most cases had caused abscesses and lesions.

**Feeding Habits.**—This species is seldom found inside the 100-fathom line, but it frequents seamounts, escarpments, and other prominent offshore features. The animal makes most of its dives in excess of 10 fathoms after sunset. The deepest dive recorded is 140 fathoms, but the average dive is to 30 fathoms. During feeding the animal stays under water for 2 to 3 minutes, but dives of 5 minutes have been recorded. It feeds mainly on anchovy, sprat, pelagic pipefish, and cephalopods in the Black Sea; whiting, horse mackerel, sardine, and hake in the Atlantic Ocean; and anchovy, cephalopods, myctophids, and hake in the northeastern Pacific Ocean.

**Ecological Problems:** None known.

**Allocation Problems:** Because the northern anchovy and squid constitute the bulk of this mammal's diet in the northeastern Pacific Ocean, a substantial increase in the fishery for these resources might have a noticeable effect on the porpoise populations. *Delphinus* is the third most important species of porpoise taken incidentally in the eastern tropical Pacific International tuna purse-seine fishery.

The final estimated incidental kill in the international tuna fishery during 1974 was 4,000 animals. Estimates of incidental kills in previous years are 4,000 animals in 1971, 9,000 animals in 1972, and 22,000 animals in 1973.

**Current Research:** The National Marine Fisheries Service and the tuna fishing industry are assessing the effects of porpoise mortality and improving rescue methods and gear to eliminate losses associated with the tuna harvest. Studies of behavior, distribution, and abundance have been conducted by the Naval Undersea Center, San Diego, California, since 1968. This research terminated at

the end of FY '73 at NUC, but will continue at the Southwest Fisheries Center.

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#### FRASER'S (SARAWAK) DOLPHIN

(*Lagenodelphis hosei*)

**Distribution and Migration:** Only a single specimen of Fraser's dolphin, from Borneo, was known to science until 25 of the mammals were taken in a tuna purse seine in the eastern tropical Pacific. Since then, it has been recorded from several widely separated localities in the Pacific and Indian Oceans: Durban, South Africa; near Sydney, Australia; Tokyo, Japan; and the Central Pacific south of Hawaii.

**Abundance and Trends:** The animal is rare in collections and presumably not common in its habitat (Perrin, et al., 1973.)

**General Biology: Age-Growth Data.**—Length at birth is about 1 m, and the adults are about 2.5 m long.

**Feeding Habits.**—This dolphin feeds on deep-living fishes and squids.

**Ecological Problems:** None known.

**Allocation Problems:** Loss of Fraser's dolphins in the eastern Pacific international tuna fishery is minor in terms of absolute numbers, but may be significant considering the apparent extreme rarity of the animal. Of 34 identified specimens worldwide, 29 have been taken incidentally by tuna seiners.

**Current Research:** None.

#### References

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#### WHITE-BEAKED DOLPHIN

(*Lagenorhynchus albirostris*)

**Distribution and Migration:** The white-beaked dolphin inhabits the coastal waters of the North Atlantic Ocean from the Barents Sea and Davis Strait to France and Massachusetts. It is most common in the North Sea from the east coast of the United Kingdom to the Faroe Islands, and may winter in the southerly parts of the North Atlantic Ocean. It appears in Davis Strait in the spring and summer after the beluga and narwhal migrate north and leaves in autumn sometimes as late as November. It apparently ranges farther north into Arctic waters than its relative, the white-sided dolphin.

**Abundance and Trends:** This species is one of the more abundant of North Atlantic toothed whales. Schools of as many as 1,500 have been reported from the coast of Norway where it is attracted by herring (Fraser, 1949).

Tomilin (1957) reports schools of several hundred and states that this species is taken commercially in Norway, but gives no statistics on the catch. He also mentions that it was once taken commercially in Davis Strait. Mitchell (1975) summarized a small-scale harvesting in Newfoundland.

**General Biology:** This gregarious species grows to 3.0 m and matures at 2.0 m or larger; the calves are as long as 1.2 m when born. The mating period is long, but limited to the warmer half of the year. Most of the calves are born during midsummer. Food is mainly fish such as herring, cod, whiting, and capelin, but also crustaceans and mollusks such as hermit crabs, whelks, and squids.

**Ecological Problems:** Strandings of schools of up to 30 animals have been reported.

**Allocation Problems:** None known.

**Current Research:** None.

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#### ATLANTIC WHITE-SIDED DOLPHIN

(*Lagenorhynchus acutus*)

**Distribution and Migration:** The Atlantic white-sided dolphin ranges the

coastal waters of the North Atlantic Ocean from the Barents Sea and Davis Strait south to France and Cape Cod.

**Abundance and Trends:** The status of this species is unknown. According to Tomilin (1957), "this dolphin is taken only in summer in the waters of Norway; the animals are trapped in the fjords, which they enter in vast schools pursuing herring. The take may reach 1,500 individuals at a time." It is sometimes taken in association with pilot whales in Newfoundland drive fisheries (Sergeant and Fisher, 1957).

**General Biology:** This species grows to 3.0 m. Gestation is 10 months. The young are born mostly in midsummer and are about 1.0 m long. The age of a 1.5-m animal was estimated at 3 years (Sergeant and Fisher, 1957). It feeds mostly on squid, pelagic and benthopelagic fish such as mackerel, salmonids, and herring, and some crustaceans and mollusks such as *Pagurus* and *Buccinum*. Schools in excess of 1,000 animals have been reported while they were feeding; groups of 10 to 50 are normally seen.

**Ecological Problems:** Stranded schools of up to 30 have been reported.

**Allocation Problems:** None known.

**Current Research:** None.

#### References

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### PACIFIC WHITE-SIDED DOLPHIN

(*Lagenorhynchus obliquidens*)

**Distribution and Migration:** The Pacific white-sided dolphin ranges the northern North Pacific from the coast of Japan and Baja California northward. It is found year-round off California and Washington and in Alaska and Kurile Islands waters during the summer, but has not been reported from the Bering Sea. It frequents the waters of the continental shelf and slope, but on occasion has been sighted in large schools in offshore waters. Small numbers, which are "resident" from Point Conception south to Cedros Island, appear to be morphologically different from northern forms (being larger and more robust). These resident stocks are supplemented in southern California and Baja California by migrants coming south and inshore. Inshore migrations into Monterey Bay and the central California continental shelf also apparently occur during mid-winter.

**Abundance and Trends:** Norris and Prescott (1961) report the species as common off southern California in inshore waters in winter and spring and offshore in summer and fall. According to sighting reports in the files of the National Marine Fisheries Service, Seattle, the University of California, Santa Cruz,

and the Naval Undersea Center, San Diego, as reported by Pike and MacAskie (1969), this species may be the most abundant dolphin north of southern California. No estimate of the size of the population along the west coast of North America has been made.

Nishiwaki (1972) estimates the population in Japanese waters to be between 30,000 and 50,000. Klumov (1959) reports that the Pacific white-sided dolphin is one of the two most numerous dolphins found in the late summer and fall in the Kurile Islands area, and forms schools of up to several thousand animals.

A few of these animals are taken for display in ocean aquaria.

**General Biology:** This species grows to 2.3 m, and weighs up to 181 kg. A male 1.2 m long with milk in its stomach was taken off Washington. It probably breeds in late spring to autumn, with a gestation period of 10 to 12 months. Schools of thousands are seen, often together with common and right-whale dolphins and less frequently with Grampus. It is active day and night, frolics, follows ships, dashes across ships' bows, and occasionally jumps clear of the surface. It adapts well to captivity. This dolphin feeds primarily on cephalopods and small fish such as herring, sardine, anchovy, and saury.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** A study of the natural history and behavior has been funded by the Marine Mammal Commission.

#### References

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### NORTHERN RIGHT WHALE DOLPHIN

(*Lissodelphis borealis*)

**Distribution and Migration:** Little is known about the distribution of the northern right whale dolphin other than that it inhabits temperate waters of the North Pacific Ocean.

In the western North Pacific Ocean, the northern right whale dolphin is found from Cape Inubo, Japan, north as far as Etorofu and Paramushir Islands, from which it apparently migrates southward in autumn or winter to near the southern Kurils and is common, at least seasonally, in the northern Sea of Japan.

In the eastern North Pacific, this species has been reported from lat. 29° to 50°N, though mostly from California. It occurs in the southern California continental borderland only from October or November to about April.

Though it is also oceanic, the right whale dolphin has been observed most frequently along the continental slope and near such features as seamounts and banks. It has been seen close to the California Channel Islands and the mainland coast near San Diego and Palos Verdes. Two sightings and one specimen from the central Pacific suggest that the species may be continually distributed across the temperate North Pacific.

**Abundance and Trends:** Groups of 200 are most common, but herds of an estimated size of from 300 to 1,000 off Japan and up to 2,000 off southern California have been seen. Although the species was once thought to be uncommon, aerial surveys have revealed that it is abundant off the Pacific Coast of North America (Leatherwood, pers. comm.). This species is reportedly common in the northern Sea of Japan (Okada and Hanaoka, 1940), where it is harvested.

**General Biology:** Newborn animals are about 0.6 m long and generally lighter in color than adults. They grow to 3.1 m. The species is gregarious and is frequently reported in close association with the whitesided dolphin, with which it shares an extensive common range.

Right whale dolphins may reach speeds in excess of 25 knots in bursts. One entire herd averaged over 15 knots for 30 minutes while attempting escape from a helicopter. When approached, the animals may move away quietly or in a series of low angle leaps, each covering as much as 7 m. Individuals that are widely scattered when approached bunch together tightly while fleeing from the cause of their disturbance.

Food is primarily squid, but also miscellaneous fishes, including myctophids and engraulids. Parasites include trematodes and cestodes.

**Ecological Problems:** If migrations are food dependent, as they appear to be, decimation or contamination of food supplies in the southern end of its range could adversely affect the species.

**Allocation Problems:** None known.

**Current Research:** The only research known is an unfunded examination of all museum materials, collection of beached specimens, and survey of literature being conducted by J. S. Leatherwood, NUC, San Diego, R. F. Green, Ventura College, California, and W. A. Walker, Palos Verdes, California.

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#### RISSO'S DOLPHIN

(*Grampus griseus*)

**Distribution and Migration:** Risso's dolphin ranges through all temperate and tropical seas. In western North America its northern limit is British Columbia, and it is sighted during the winter in central California. In the eastern United States it ranges from Massachusetts south. Strandings in Britain are most common during the summer. The species probably migrates to higher latitudes in the warmer months.

**Abundance and Trends:** Risso's dolphin was described in 1894 as "abundant" near Monterey Bay, California (Daugherty, 1972). The species is uncommon but not rare throughout most of its range. Over 200 of these animals were sighted in one group during 1972 off the Washington Coast (Fiscus, Unpublished field notes, 1972)

**General Biology:** Risso's dolphin grows to 3.6 to 4.0 m. Its skin commonly has long, narrow, white marks believed to be scars caused by others of the same species. Solitary animals or schools of 12 or less are generally observed. This species is frolicsome, and sometimes leaps clear of the water. Known foods are almost exclusively cephalopods.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Studies of distribution and abundance in the eastern Pacific are currently underway by K. S. Norris and a group of co-workers at University of California, Santa Cruz, and by J. S. Leatherwood of the Naval Undersea Center, C. S. Hubbs of Scripps Institution of Oceanography, and the Southwest Fisheries Center.

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#### MELON-HEADED WHALE

(*Peponocephala electra*)

**Distribution and Migration:** *Peponocephala* inhabits the tropical Atlantic, Indian, and Pacific Oceans.

**Abundance and Trends:** The status of this species is unknown, except that it is apparently rare (Nishiwaki and Norris, 1966).

**General Biology:** Unknown.

**Ecological Problems:** None known.

**Allocation Problems:** A few are taken annually in the eastern Pacific international purse-seine fishery for tuna. This small take is probably insignificant.

**Current Research:** None.

#### References

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#### PYGMY KILLER WHALE

(*Feresa attenuata*)

**Distribution and Migration:** The pygmy killer whale probably inhabits most tropical waters.

**Abundance and Trends:** The status of this species is unknown except that it is apparently rare (Caldwell and Caldwell, 1971). The species has been captured for exhibit in the oceanaria of Hawaii and Japan. In the continental U.S. it has been recorded only three times, twice in Florida, once in Texas.

**General Biology:** The adults reach about 2.4 m. In appearance they resemble a small false killer whale. They are aggressive in captivity, with captives of other species showing fright reactions to them.

**Ecological Problems:** None known.

**Allocation Problems:** This species has been reported as captured to a very minor extent in the yellowfin tuna fishery in the eastern tropical Pacific.

**Current Research:** None.

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#### FALSE KILLER WHALE

(*Pseudorca crassidens*)

**Distribution and Migration:** The false killer whale ranges through all temperate and tropical seas. It is an oceanic form, found on the Atlantic side of the

United States from North Carolina south, and on the Pacific side from the Aleutian Islands south.

**Abundance and Trends:** This species is uncommon throughout most of its range. It is seldom caught in the Japanese small-whale fishery, but is common on the Pacific side of Honshu (Ohsumi, 1972).

**General Biology:** The males grow to 6.1 m and the females to 4.9 m; adult animals weigh up to 1,360 kg. Mating appears to be over a protracted period, with young born at about 1.8 m. False killer whales are found in schools of both sexes and all ages. They have been seen eating dolphinfish (mahimahi) off Hawaii.

**Ecological Problems:** Schools of up to 835 of these animals have stranded.

**Allocation Problems:** The Japanese state that a toothed whale (shachi), which may or may not be the false killer whale, does much damage to their long-line tuna industry by feeding on hooked fish.

**Current Research:** None.

#### References

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#### LONG-FINNED PILOT WHALE

(*Globicephala melana*)

**Distribution and Migration:** This pilot whale ranges from Greenland, Iceland, and the Barents Sea south to Virginia and the Mediterranean. It is a schooling mammal and appears regularly off the Canadian and United States coasts. It also inhabits temperate waters of the Southern Ocean. It generally favors pelagic regions, but often moves close to shore in search of food.

**Abundance and Trends:** Mercer (1975) estimates the original Newfoundland stock prior to 1947 at less than 60,000. There are no estimates for other parts of its range. About 40,000 were killed from 1951 to 1959 in local Newfoundland fisheries (Sergeant, 1962), but only 6,902 have been taken between 1962 and 1973. About 177,000 were taken in the Faeroe Islands from 1584 to 1883 (Tomilin, 1957), and 16,564 were taken by Norway and Denmark between 1962 and 1973 (Christensen, 1975). A total of 468 were driven ashore in Ireland in 1840, 1844, 1851, 1853, and 1957; one school of undetermined number was taken in 1965 (O'Riordan, 1975).

**General Biology:** The adults grow to about 6.5 m; females are usually mature at age 6 to 7 years and males at about

age 12. Calves are about 1.8 m long at birth, in July to August, although full-term fetuses have been found year-round. Cows probably bear calves every 3 years, gestation period is about 16 months, and lactation lasts about 2 years. Pilot whales are gregarious, and occur in schools of hundreds and thousands. They have a distinct social organization; however, the sex ratio is not always equal in stranded groups. They are believed polygynous, with bachelor males sometimes forming separate schools. They travel in tight schools when not feeding, and disperse into scattered groups when on feeding grounds. Captive pilot whales feed at night and sleep days. They have a top swimming speed of over 25 mph, and a longevity of about 50 years. They feed almost exclusively on squids, but also eat small fish such as clupeids and gadids. Sergeant (1962) estimates food intake per year at about 11.5 times the weight of the animal.

**Ecological Problems:** Whole schools sometimes strand.

**Allocation Problems:** None known.

**Current Research:** None.

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#### SHORT-FINNED PILOT WHALE

(*Globicephala macrorhynchus*)

**Distribution and Migration:** In the North Atlantic Ocean, this pilot whale has been reported from New Jersey (though it is far more common south of about Cape Hatteras) and Madiera and ranges south to at least northern Brazil and Dakar, Senegal. In the North Pacific Ocean it is found from Japan and the Aleutian Islands to probably Peru. It is an oceanic species with a very wide range. Schools of pilot whales appear regularly off U.S. coasts. It generally favors offshore waters, but often moves closer to land in search of food. Greatest numbers are seen in the eastern North Pacific in winter, fewer in summer.

**Abundance and Trends:** The status of this species is unknown except that it is

fairly abundant around the California Channel Islands (Norris and Prescott, 1961). The population of pilot whales around the Channel Islands has been fished for live specimens to supply U.S. oceanaria since about 1955. Many pilot whales are taken in the Japanese small-whale fishery. This species is also taken in the lesser Antilles.

**General Biology:** The adults grow 4.6 to 6.7 m. Little work has been done on this species, but indications are that the general biology is similar to *G. melana*.

**Ecological Problems:** Schools of this species often strand.

**Allocation Problems:** None known.

**Current Research:** The taxonomy of Pacific *Globicephala* is being studied by R. L. Brownell and D. K. Caldwell in the United States, and T. Kasuya and M. Nishiwaki in Japan. The U.S. Naval Undersea Center is studying the behavior and distribution of the pilot whale in southern and Baja California.

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#### KILLER WHALE

(*Orcinus orca*)

**Distribution and Migration:** The killer whale is worldwide and ranges north and south to polar ice. It is more common in cooler waters, and in more productive coastal areas. The Strait of Georgia in British Columbia, Prince William Sound in Alaska, and Puget Sound in Washington State are areas of concentration. Migratory habits probably depend on food supply, and killer whales are most numerous in Puget Sound in November and late summer. In Japan, most of these mammals are taken from April to November, with the greatest number from August to November. In the Norway fishery, killer whales seem dependent on distribution and migration of herring, capelin, and cod.

**Abundance and Trends:** Authoritative estimates of the world population are not available. A limited cooperative effort of the Fisheries Research Board of Canada and the Washington State Department of Game primarily in the inside waters of Washington and British Columbia gave counts of 459 killer whales in 1971, 255 in 1972, and 249 in 1973. About 65 individuals have been removed from inside waters of British Columbia and northern Washington State since 1962 for display by marine aquariums in 25 captive operations. Eleven of these whales were killed during U.S. capture operations, mostly during the early years. Two killer whales were killed in Cana-

dian capture operations. The Japanese fishery took 1,439 killer whales from the Okhotsk Sea to south of Japan from 1948 to 1974. Norwegians harvested 2,096 in the northeastern North Atlantic between 1938 and 1974. The USSR took 444 animals in the Antarctic and North Pacific between 1958 and 1974. South Africa took 27 whales from 1972 to 1974.

**General Biology: Species Statistics.**—Females grow to 7.0 m and males to 8.2 m. Males weigh up to about 8,000 kg, with about 4,000 kg the apparent limit for females. An adult male dorsal fin may be 1.8 m high, considerably higher than that of the female. The body has conspicuous white markings on a black background.

**Reproductive Data.**—Breeding appears to occur year-round although it may peak in May to July; gestation lasts 13 to 16 months. In the Northern Hemisphere births occur mostly in autumn.

**Age-Growth Data.**—Newborn calves are about 2.4 m long and weigh about 180 kg.

**Feeding Habits.**—Killer whales usually are found in groups of 10 to 100 or even more. The males are probably polygynous. Killer whales hunt successfully in packs, but there are no records of attacks on people.

The stomach contents of 364 killer whales taken off Japan from 1948 to 1957 included (in order of occurrence): fish (mostly cod, flatfish, and sardines), squid, octopus, dolphins, whales, and seals. Salmon constituted 1.6% of all stomach contents. Soviets in the Kurils recorded "fish and squid" but no marine mammal remains in 10 animals. Of eight killer whales examined by the National Marine Fisheries Service, Seattle, six adult males had only marine mammal remains except for one squid; one adult female and one immature male had only fish remains. Food consumption has been estimated at 4% of the body weight per day.

**Parasites and Diseases.**—The most common diseases are those caused by wearing of tooth crowns and denudation of the pulp cavity, which results in abscesses. Other diseases include bony outgrowths and bone tumors. Parasites include nematodes, cestodes, and trematodes. One Puget Sound killer whale stomach contained 5,000 nematodes.

**Ecological Problems:** This species has no natural enemies except man. Stranding probably is the greatest nonhuman hazard.

**Allocation Problems:** Public interest in killer whales was stimulated by the first live capture in 1964 in British Columbia. Growing public interest is increasing in killer whales as a recreational resource, especially in Puget Sound (Haley, 1970). The animals are commercially valuable in the United States for display in oceanariums. United States, Japanese, and Canadian fishermen contend that the whales cause gear damage and interfere with salmon and tuna longline fisheries. Many consider killer whales an important predator of salmon and herring; others defend them as the natural enemy of other fish eaters, includ-

ing harbor seals and sea lions. Some sports salmon fishermen claim their presence spoils fishing.

**Current Research:** The National Marine Fisheries Service and the Fisheries Research Board of Canada are studying killer whale distribution in western United States and Canadian waters.

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### HARBOR PORPOISE

(*Phocoena phocoena*)

**Distribution and Migration:** The harbor porpoise is circumpolar in distribution in ice-free seas, ranging south in the Atlantic Ocean to the Delaware River and the Mediterranean Sea. In the Pacific Ocean it is found south to Japan and southern California, although it is not abundant south of San Francisco.

The harbor porpoise is an inshore species, frequenting coastal waters, the mouths of large rivers, harbors, and bays, and sometimes ascending freshwater streams.

**Abundance and Trends:** The harbor porpoise is especially abundant in the waters of Washington (Scheffer and Slipp, 1948) and western Canada (Pike and MacAskie, 1969). It is common at certain sites off the coast of Maine during the summer (Gaskin, Arnold, and Blair, 1974). Tomilin (1957) reports single catches of 2,000 to 2,500 harbor porpoises at the time they migrate between the Sea of Azov and the Black Sea.

Mohl-Hansen (1954) reporting on biological investigations of the harbor porpoise in Danish waters examined 188 harbor porpoises in 1941-42, 230 in 1942-43, and 212 in 1943-44, so at least those numbers were commercially harvested in Denmark during those years. He also states that these harbor porpoises were from the Baltic Sea populations.

Catches of *P. phocoena* in west Greenland recently have averaged over 2,500 annually. During 1972, an estimated 1,500 animals were taken in the non-Greenlandic salmon driftnet fishery. No estimates are available for Greenlandic driftnetters. In addition, about 1,000 are taken annually in direct catches (Kapel, 1975). In the Black Sea, where a moratorium has existed since 1967, an estimate of the present population is 25,000 to 30,000. Incidental catches of *P. sinus* have ranged from tens to the low hundreds annually.

**General Biology:** This species grow to 1.8 m, and weights up to 72 kg. The females are sexually mature at about age 3 to 4 years. Newborn calves are half the length of the mother. They breed annually during late spring and summer. The gestation period is 10 to 11 months, and the calves nurse up to 8 months. Harbor porpoises travel in pairs and schools of up to 200 or more, especially on the feeding grounds. This species is less playful than most dolphins or porpoises; they seldom jump out of the water, and usually ignore passing boats. Schools containing all "bachelors" are common; the females stay in groups of mixed sex. Usually they swim just below the surface, rising about four times per minute to breathe when not feeding. They feed mainly on bottomfishes such as cod, herring fry, flounder, and occasionally on invertebrates such as squids, clams, and crustaceans. Parasites of the alimentary canal and respiratory system are common (Gaskin, Arnold, and Blaire, 1974).

**Ecological Problems:** These animals occasionally strand for unknown reasons, and because of their feeding habits, a few tend to get trapped in fishermen's nets. (See Abundance and Trends.) They are preyed upon to an unknown degree by Greenland sharks, great white sharks, and killer whales. Significant residues of chlorinated hydrocarbon insecticides and PCB's have been recorded from the Baltic, United Kingdom, and Bay of Fundy.

**Allocation Problems:** None known.

**Current Research:** None.

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### DALL'S PORPOISE

(*Phocoenoides dallii*)

**Distribution and Migration:** The Dall porpoise inhabits the North Pacific Ocean from Japan and central Baja California north into the Bering and Okhotsk Seas. In both areas the southern limits of distribution appear to expand with the cooling of waters to at least 56°F, and individuals are seen in areas having surface temperatures of up to 62°F. It has been observed in the Bering Sea in locations and at periods when surface waters were 36°F. In the northeastern Pacific, Dall porpoises are year-round residents as far south as the northern Channel Islands, but are found further south and further inshore, as far as Cedros and Guadalupe Islands, from about October to late May. They are observed off Monterey Bay throughout the year, though there appears to be a separation of smaller juveniles inshore from more heterogenous groups offshore, and apparent inshore migrations tend to increase numbers of all animals there during winter and early spring. Dall porpoises are reported off San Francisco Bay from at least March through November. The southern and inshore movements appear closely related to movements of squid, a primary food item. The species is found offshore of the eastern Pacific coast to at least 1,047 km. The Marine Mammal Division has many records of Dall porpoise ranging from the Bering Sea and the eastern Aleutian Islands south to lat. 34° in California waters (MMD files, Marine Mammal Observations, 1958-72). The NMFS Southwest Fisheries Center and the Naval Undersea Center, San Diego, have similar detailed records of occurrences south to Cedros and Guadalupe Islands.

**Abundance and Trends:** The Dall porpoise is one of the most abundant small cetaceans found in Alaska inside waters (U.S. Forest Service) and in British Columbia waters (Pike and MacAskie, 1969). It is commonly seen off northern California (W. J. Houck, pers. comm.). The species appears to be abundant throughout its range. Kasuya (1974) also stated that between 4,500 and 7,500 are caught annually in coastal eastern Japan waters, but there has been a decrease in catch per unit effort in recent years.

**General Biology:** There may be two forms of Dall porpoise (*P. dallii* and *P. truei*). They grow to lengths of about 2.2 m and weights of about 218 kg. They and the killer whale have the most conspicuous color patterns among cetaceans. Calves are born in the spring and summer, and young are observed in August. These animals are usually found in groups of 2 to 20, but occasionally 200 or more are seen on favorable feeding grounds. It plays in the bow waves of ships, and is among the swiftest of all marine mammals. This mammal consumes squid and such fish as saury, hake, herring, jack mackerel, and bathypelagic and deepwater benthic fish.

**Ecological Problems:** None known.



**Allocation Problems:** Kasuya (1974) reports on annual accidental catch of more than 20,000 Dall porpoises in the Japanese high-seas salmon gillnet fishery in the northern North Pacific and Bering Sea west of long. 175°W.

Mizue and Yoshida (1965) state the Dall porpoise is abundant east of long. 175°W but that the Japanese fishing fleet does not operate east of the boundary.

**Current Research:** W. J. Houck is studying *P. dallii* and *P. truei* at Humboldt State College in California, and M. Nishiwaki is studying these species in Japan. G. V. Morejohn is studying feeding habits, migration, behavior, and morphology of the species at the Moss Landing Marine Station, California. S. Leatherwood is monitoring seasonal movements of the species into waters of southern and Baja California.

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### WHITE WHALE

#### (BELUGA, BELUKHA)

#### (*Delphinapterus leucas*)

**Distribution and Migration:** The beluga inhabits the Arctic Ocean and adjacent seas, including the Okhotsk and Bering Seas, Cook Inlet, Hudson Bay, and Gulf of St. Lawrence. Belugas ascend several hundred miles up the large rivers of Siberia and Alaska. Populations of white whales from different areas show marked size differences through the Arctic. Three races are recognized by some authorities: *dorozevi* from the Okhotsk Sea, *marisalbi* in the Barents and White Seas, and *leucas* in the rest of the range. In the Pacific, belugas are common along Alaska as far south as Bristol Bay; the population found in Cook Inlet is apparently separate.

**Abundance and Trends:** The population in the Soviet Arctic and Far East is estimated at between 32,000 and 58,000 (Yablokov, 1974). The population in the Canadian Arctic numbers at least 30,000 animals (Sergeant and Brodie, 1975). The Cook Inlet, Alaska, population is estimated at 300 to 500; in Bristol Bay the population is estimated at 1,000 to 1,500 and is considered stable; the size

of the beluga population in Alaska north of Bristol Bay is unknown, but is much greater than that residing in Bristol Bay (Alaska Department of Fish and Game, 1973). In Alaska belugas have been used as a source of muktuk, meat, and oil for both people and dogs by residents of villages on the Bering Sea and Arctic Ocean coasts and along rivers that belugas periodically ascend. Belugas also provide a significant amount of fresh and preserved food for native peoples in the Mackenzie River delta region and Baffin Island, where beluga hunting is culturally and economically important (Brodie, pers. comm.). In recent years the demand for beluga products has been reduced in the Arctic. In Bristol Bay only a few belugas are now taken, and the estimated annual harvest of the Bering Sea and Arctic Ocean coasts of Alaska is 150 to 300 (Alaska Department of Fish and Game, 1973). Sergeant (1962) states that from 1948 to 1960 the catch of belugas in the Canadian Arctic averaged 1,200 annually. The present catch in Arctic Canada averages 500 animals per year (Sergeant and Brodie, 1975). A few animals are occasionally taken from the St. Lawrence River estuary population, which number 500-1,000 animals. In the late 1950's the annual catch of belugas averaged 3,000 to 4,000 in the U.S.S.R., 500 to 800 in Greenland, and 100 to 200 from Spitsbergen (Kleinenberg, et al., 1964). Present catches in the Asian Arctic range from 530 to 825 annually.

**General Biology:** Males grow to 4.6 m and the females to 4.0 m in the Beaufort Sea, and to 5.2 m and 4.6 m, respectively, in the Soviet Arctic. The beluga is polygamous, breeds in the spring, and has a gestation period of 15 months; newborn are about 1.5 m long. Lactation lasts about 20 months, with a 3-year reproductive cycle. They are gregarious and travel in groups of two or three to hundreds. Belugas feed from midwater to the bottom, with a diet including fish such as salmon, capelin, cisco, pike, char, cod, squid, crustaceans, and nereid worms.

They frequently occur in shallow areas with a bottom of mud, sand, and stones. The beluga produces high-pitched whistles and squeals, ticking and clucking sounds, and have been given the name "sea-canary." Animals break the ice with their backs to reach air for breathing.

Parasites include nematodes in the respiratory organs, ears, circulatory system, intestine, and urogenital system; trematodes are found in the intestine, as well as cestodes and acanthocephalans. Helminths are apparently one cause of mortality.

**Ecological Problems:** Known natural enemies include the killer whale and polar bear.

**Allocation Problems:** These mammals take salmon at the mouths of large Alaskan rivers, and are important predators of salmon smolt in Bristol Bay, Alaska. Recorded killer whale sounds have been used experimentally to prevent beluga predation in the Kvichak River.

**Current Research:** Research on the beluga is being conducted by the Fisheries Research Board of Canada.

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### NARWHAL

#### (*Monodon monoceros*)

**Distribution and Migration:** The narwhal is the most northern cetacean and occurs in north polar seas, mainly in the North Atlantic sector. It is most common in northwestern Greenland and the eastern Canadian Arctic, particularly Jones and Lancaster Sounds, the north and east coasts of Baffin Island, Repulse Bay, and occasionally in northern Foxe Basin and Hudson Strait. Narwhals also occur near Franz Josef Land and Novaya Zemlya. They are rare in the Laptev, East Siberian, Chukchi, and Beaufort Seas.

**Abundance and Trends:** The Canadian and northwest Greenland population is at least 10,000 (Mansfield, 1975). Numbers elsewhere are unknown. Rare occurrences in Great Britain (4) and Holland (1) are documented. Narwhals are hunted in Greenland and the eastern Canadian Arctic for dog food, muktuk, sinew, and ivory.

**General Biology:** Females attain a length of 400 cm and a weight of 900 kg. Each female bears a single calf about once every 3 years. Mating takes place in April, and the 1.5-m-long young are born in July after a 14.5-month gestation period. Lactation probably lasts about 20 months. Narwhals are gregarious, forming schools of up to 1,000 to 2,000, and made up of small groups of up to about 20 (Mansfield, pers. comm.). Food of the narwhal consists mainly of cephalopods, Arctic cod, Greenland halibut, and shrimps.

Ectoparasitic whale lice occur in cuts, skinfolds, and around the base of the tusk. Endoparasitic nematodes occur occasionally in the stomach, and frequently in basicranial sinuses.

**Ecological Problems:** Narwhals are occasionally trapped in large numbers by rapid freeze-up. In such situations, Greenlanders may kill entire groups of these mammals. Although it is not adapted to drift ice areas, the killer whale probably occurs there and may be a natural enemy of the narwhal.

**Allocation Problems:** None known.

**Current Research:** The narwhal is being studied by the Fisheries Research Board of Canada.

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### SPERM WHALE

#### (*Physeter macrocephalus*)

**Distribution and Migration:** The sperm whale is nearly worldwide in distribution except for the pack ice of the polar regions. Females and immature animals are generally found between lat. 40° S and 50° N. Sperm whales appear to migrate north during the northern summer and south during the northern winter. In the North Pacific, male sperm whales are found as far north as the Bering and Okhotsk Seas; in the North Atlantic they move into Davis Strait and near Spitsbergen.

**Abundance and Trends:** In 1946, the world stock of exploitable males (i.e., males over the legal length limit of 9.2 m) and sexually mature females was over one million, of which almost half were males. The present stock is about 700,000, of which only about one third are males. These are distributed by major ocean areas as follows (Mitchell, 1974; Chapman, 1976; International Whaling Commission, 1977):

Ocean	1946 population (In thousands)	Current population (In thousands)
North Atlantic.....	1 (227)	1 22
North Pacific.....	400	300
South Atlantic.....	120	90
Indian.....	220	140
South Pacific.....	360	180

<sup>1</sup> Estimate of total population, including immature animals.

The total populations of each sex, including undersized males and immature females, are approximately 2.5 times the number of exploitable males and 1.67 times the number of mature females (Gambell, 1976).

The sperm whale is currently the most important species of the world whaling industry. Stocks in most areas are at or above maximum sustainable yield levels. Catches of sperm whales in recent seasons have been:

Season	North Pacific	North Atlantic	Southern oceans, pelagic <sup>1</sup>	Southern land stations
1970.....	14,815	649	5,891	4,135
1971.....	10,890	831	7,335	4,498
1972.....	6,323	691	5,172	2,665
1973.....	5,567	613	5,394	2,652
1974.....	8,127	2 238	8,930	2 281
1975.....	7,859	4 37	7,046	2 3,701

<sup>1</sup> Southern ocean catches are for the seasons 1970-71 through 1975-76.

<sup>2</sup> No data from Azores or Madeira.

<sup>3</sup> No data from Chile.

<sup>4</sup> No data from Azores, Madeira, or Spain.

In most areas, males dominate the catches, and in the Antarctic (south of lat. 40°S) the catch is almost exclusively males.

**General Biology: Species Statistics.**—The sperm whale's large squarish head is distinctive because it bears a tanklike "case" containing spermaceti. The lower jaw is long and narrow, and has about 25 pairs of teeth. Females reach 11.6 m in body length, males 16.8 m.

**Reproductive Data.**—The females mature sexually about age 8 to 11 years when body length is about 8.5 to 9.1 m, physically at 25 to 30 years and body length of 11.0 m. Males are not sexually mature until about 10 years and 11.9 m, and are not "socially" mature until about age 25 years. Females and juveniles of both sexes form schools of 10 to 50 animals, averaging about 25. Younger, sexually mature males (ca. 11.0-13.4 m, age 15-25 years) form "bachelor" schools usually containing not more than 10 animals. Older males (13.7 m, 22-27 years) are usually solitary except when with schools of females for breeding for about 5 months in the spring and early summer. The female bears a calf (about 4.0 m) once every 3 to 5 years. Gestation lasts 14 to 15 months, and the calf nurses 1 to 2 years and is weaned at about 6.7 m long.

**Age-Growth Data.**—Newborn calves are about 3.5 to 5 m, and weigh about 1,000 kg. Growth of males continues until they are 45 to 60 years old, and about 15.5 m long.

**Feeding Habits.**—This species dives to at least 1,000 m, can remain submerged for about an hour, and feeds mainly on large squid. It also consumes significant quantities of octopuses and demersal and mesopelagic fishes.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** The National Marine Fisheries Service is studying the life history of the sperm whale. Other organizations carrying out research on this species are the Japanese Whales Re-

search Institute and Japanese Far Seas Fisheries Research Laboratory (North Pacific and Antarctic), Fisheries Research Board of Canada (North Atlantic), British National Institute of Oceanography (South Africa and western South America), South African Division of Sea Fisheries (South Africa), Australian Commonwealth Scientific and Industrial Research Organization (Australia), the University of Chile (Chile), the Marine Institute of Peru (Peru), and the Marine Department of New Zealand (New Zealand).

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### PYGMY SPERM WHALE

#### (*Kogia breviceps*)

**Distribution and Migration:** The pygmy sperm whale occurs in all the warmer seas of the world. In the Pacific Ocean it ranges north to Washington and Japan; in the Atlantic Ocean it ranges north to Nova Scotia and the Netherlands. Its southern range limit is not well known.

**Abundance and Trends:** The status of this species is unknown other than the fact that it is apparently rather rare. There are many more records of stranding than there are for *Kogia simus*, the dwarf sperm whale (C. O. Handley, Jr., pers. comm.). This species is occasionally taken in the Japanese small-whale fishery (Yamada, 1954).

**General Biology:** Adult pygmy sperm whales are 2.7 to 3.4 m long. Their dorsal fin is low and posterior to the center of the back. This species was long confused with the dwarf sperm whale, and the following composite statement is based on both species. They are usually solitary or in small pods. They feed mostly on squids, but also take pelagic crustaceans such as shrimps and giant mysids. Females simultaneously pregnant and lactating have been found, suggesting that they may bear a calf 2 years in succession.

Parasites include tapeworm cysts in the blubber, roundworms in the stomach, and giant kidney worms.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** D. K. Caldwell and M. C. Caldwell have been gathering data on the life history in Florida (D. K. Caldwell, pers. comm., 1974). D. K. Caldwell, M. C. Caldwell, and C. O. Handley,

Jr., have been working on the distribution (seasonal as well as geographical) in southeastern U.S. (Caldwell, pers. comm., 1974).

#### References

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### DWARF SPERM WHALE

(*Kogia simus*)

**Distribution and Migration:** The dwarf sperm whale apparently has a discontinuous distribution around the world. It has been found in the seas adjacent to South Africa, India, Ceylon, Japan, Hawaii, South Australia, and the west and east coasts of the United States. On the west coast it has been recorded only from Cabo San Lazaro, Baja California, and San Luis Obispo County, California. On the east coast it ranges from Cape Henry, Virginia, south and west to Texas.

**Abundance and Trends:** The status of this species is unknown other than the fact that it is apparently rather rare over much of its range. However, it strands rather frequently on the southeast coast of the United States and is taken in the Japanese small-whale fishery (Yamada, 1954).

**General Biology:** Adult dwarf sperm whales are 2.1 to 2.7 m long. Their dorsal fin is high and near the center of the back. This species was long confused with the pygmy sperm whale, and the following is a composite statement based on both species. They are usually solitary or in small pods. They feed mostly on squid, but also take pelagic crustaceans such as shrimps and giant mysids. Females simultaneously pregnant and lactating have been found, suggesting that they may bear a calf 2 years in succession.

Parasites include tapeworm cysts in the blubber, roundworms in the stomach, and giant kidney worms.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** D. K. Caldwell and M. C. Caldwell have been gathering data on the life history in Florida (D. K. Caldwell, pers. comm., 1974). D. K. Caldwell, M. C. Caldwell have been gathering data have been working on the distribution (seasonal as well as geographical) in southeastern U.S. (Caldwell, pers. comm., 1974).

#### References

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### BAIRD'S BEAKED WHALE GIANT BOTTLENOSE WHALE

(*Berardius bairdii*)

**Distribution and Migration:** The giant bottlenose whale is endemic to the North Pacific Ocean, where it ranges from St. Matthew Island in the Bering Sea south to central Honsuh on the western side and southern California on the eastern side. Its migrations are poorly known. **Abundance and Trends:** The status of this species is unknown except that it is uncommon but not rare. According to information taken from the Bureau of International Whaling Statistics, between 100 and 400 giant bottlenose whales have been taken annually in the Japanese small-whale fishery during the past 20 years.

**General Biology:** This species is the largest of the beaked whales. Males attain a maximum length of 11.9 m and females 12.8 m. Their long narrow beak, bulging forehead, and size distinguish them from other species of beaked whales in the North Pacific Ocean. They usually travel in tight schools of up to 30 individuals. Their main foods are deepwater fishes and squids. Males attain sexual maturity at a length of about 10.0 m, and females at about 10.3 m. Sexual maturity is not attained earlier than age 3 years, and probably much later. Mating takes place mostly in February, and calves are born in December.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Research on this species has been conducted incidentally to other studies in Japan by the Whales Research Institute and the Ocean Research Institute; in California by the National Marine Fisheries Service; and in British Columbia by the Fisheries Research Board of Canada.

#### References

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### CUVIER'S BEAKED WHALE

(*Ziphius cavirostris*)

**Distribution and Migration:** The goose-beaked whale is found in all oceans except Arctic and Antarctic waters. In the North Pacific Ocean it ranges north to Hokkaido, the Commander and Aleutian Islands, and the Queen Charlotte Islands. In the North Atlantic Ocean it ranges north to Cape Cod, Massachusetts, on the western side and the Shetland and Orkney Islands on the eastern side. Its migrations are not understood.

**Abundance and Trends:** The status of this species is unknown. The goose-beaked whale is the most frequently observed ziphiid, at least in the eastern North Pacific Ocean, and throughout its range has been found stranded far more often than any other species of the family (Mitchell, 1968). Between 13 and 16 goose-beaked whales have been taken annually in the Japanese small-whale fishery during a recent 5-year period (Nishiwaki and Oguro, 1972).

**General Biology:** The goose-beaked whale is distinguishable from other ziphiids by its relatively short beak, the dorsal profile of which forms an almost straight line with the steeply sloping forehead, and by its brown coloration; older males have snow-white heads. The maximum body length in both sexes is about 7.0 m. These whales usually travel in tight schools of up to about 10 individuals, but old males are often solitary. Their main foods are squids and deep-water fishes. Sexual maturity is attained at a length of about 5.5 m in both sexes.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** Research on this species has been conducted incidentally to other studies in Japan by the Whales Research Institute and the Ocean Research Institute.

#### References

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### NORTHERN BOTTLENOSE WHALE

(*Hyperoodon ampullatus*)

**Distribution and Migration:** This species of bottlenose whale is endemic to the colder waters of the North Atlantic Ocean. On the western side it ranges from Davis Strait south to Rhode Island; on the eastern side it ranges from Novaya Zemlya south to the Azores and English Channel. It migrates south in the autumn and north in the spring.

**Abundance and Trends:** The initial population in all waters east of Greenland is estimated to have been between 40,000 and 100,000; by 1915 it was reduced to about half its initial size (Christensen, 1974). It is not known whether it has since increased. Norwegian catches in the North Atlantic ranged from 2,000 to 3,000 annually between 1890 and 1900. Catches ranged from 20 to 100 per year from 1920 to 1954. From 1955 to 1971, a few hundred have been caught annually, peaking at about 700 in 1965. Catches have been near zero since then. A few individuals are sometimes taken by whalers operating from Nova Scotia and the Faeroe Islands.

**General Biology:** The bottlenose whale is easily recognized by a conspicuous beak that is sharply demarcated from the high bulging forehead which, in old males, becomes almost vertical and flattened in front and slightly overhangs the

base of the beak. Bottlenose whales are black when young, turn brown when adult, and almost yellow with a white head when very old. Males attain a maximum length of 10.7 m, and females 9.7 m. Females attain sexual maturity at about 9 years, males at 9 to 11 years. Mating occurs in April, and the 3.0-m calf is born about 12 months later. Bottlenose whales usually travel in small herds of 4 to 10, but the adult males are often by themselves. Their food appears to be mainly squids. Females attain sexual maturity when about 6.5 m long. The calves are born from early spring to early summer.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

*Current Research:* This species is being studied by the Statens Institute for Hvalforskning, Oslo, Norway.

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Murray, J., and J. Hjort. 1912. The depths of the ocean. MacMillan and Co., London, 821 p.

### TRUE'S BEAKED WHALE

(*Mesoplodon mirus*)

*Distribution and Migration:* The True's beaked whale has been found in the western North Atlantic Ocean from Nova Scotia south to Northern Florida, and in the eastern North Atlantic Ocean from the Outer Hebrides south along the west coast of Ireland. There is another population off the coast of South Africa. Its migrations are unknown.

*Abundance and Trends:* The status of this species is unknown, except that it is apparently rare (Moore, 1966; 1968).

*General Biology:* These whales are known mostly from stranded individuals, which suggest that they are usually solitary. Otherwise, nothing is known of their biology.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

*Current Research:* None.

#### References

Moore, J. C. 1966. Diagnoses and distributions of beaked whales of the genus *Mesoplodon* known from North American waters. In K. S. Norris (ed.), *Whales, dolphins, and porpoises*. Univ. Calif. Press, Berkeley and Los Angeles, pp. 32-61.

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### GERVAIS' BEAKED WHALE

(*Mesoplodon europaeus*)

*Distribution and Migration:* The Antillean beaked whale ranges from Trinidad, Jamaica, and the Gulf of Mexico, north to Long Island, New York. One record for the English Channel has been obtained. Its migrations are unknown.

*Abundance and Trends:* The status of this species is unknown, except that it is apparently rare (Moore, 1966).

*General Biology:* These whales are known mostly from stranded individuals, which suggest that they are usually solitary. Otherwise, nothing is known of their biology.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

*Current Problems:* None.

#### References

Moore, J. C. 1966. Diagnoses and distributions of beaked whales of the genus *Mesoplodon* known from North American waters, pp. 32-61. In K. S. Norris (ed.), *Whales, dolphins, and porpoises*. Univ. Calif. Press, Berkeley and Los Angeles.

### GINKGO-TOOTHED WHALE

(*Mesoplodon ginkgodens*)

*Distribution and Migration:* The ginkgo-toothed whale has been recorded from Ceylon, in the western North Pacific Ocean from Taiwan to the Sanriku coast of Hokkaido, and in the eastern North Pacific Ocean at Del Mar in southern California. Its migrations are unknown.

*Abundance and Trends:* The status of this species is unknown, except that it may not be so rare in the western part of the North Pacific as once thought (Nishiwaki, et al., 1972).

*General Biology:* These whales are known mostly from stranded individuals, which suggest that they are usually solitary. Otherwise, nothing is known of their biology.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

*Current Research:* None. Present knowledge is based on opportunistic examination of specimens.

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### HUBB'S BEAKED WHALE

(*Mesoplodon carlhubbsi*)

*Distribution and Migration:* The arch-beaked whale has been recorded only in the North Pacific Ocean, from the Sanriku coast of Hokkaido on the western side and from British Columbia south

to southern California on the eastern side. Its migrations are unknown.

*Abundance and Trends:* The status of this species is unknown, except that it is apparently rare (Moore, 1966; 1968).

*General Biology:* These whales are known mostly from stranded individuals, which suggest that they are usually solitary. Otherwise, nothing is known of their biology.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

*Current Research:* None.

#### References

Moore, J. C. 1963. Recognizing certain species of beaked whales of the Pacific Ocean. *Am. Midl. Natur.* 70:396-428.

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Pike, G. C., and I. B. MacAskle. 1969. Marine mammals of British Columbia. *Fish. Res. Bd. Can.*, Bull. 171, 54 p.

### STEJNEGER'S BEAKED WHALE

(*Mesoplodon stejnegeri*)

*Distribution and Migration:* The Bering Sea beaked whale is endemic to the North Pacific Ocean. It ranges from the Commander and Pribilof Islands, Bristol Bay, and the northern Gulf of Alaska south to the Sea of Japan on the western side and Oregon on the eastern side. Its migrations are unknown.

*Abundance and Trends:* The status of this species is unknown, except that it is apparently rare (Moore, 1966; 1968).

*General Biology:* These whales are known mostly from stranded individuals, which suggest that they are usually solitary. Otherwise, nothing is known of their biology.

*Ecological Problems:* None known.

*Allocation Problems:* None known.

*Current Research:* None.

#### References

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### SOWERBY'S BEAKED WHALE

(*Mesoplodon bidens*)

*Distribution and Migration:* The North Sea beaked whale ranges mostly from the western Baltic Sea and central Norway south to the Bay of Biscay. It has been recorded in the western North At-

lantic Ocean from Newfoundland and Massachusetts. Its migrations are unknown.

**Abundance and Trends:** The status of this species is unknown, except that it is apparently rare (Moore, 1966).

**General Biology:** This species is the only one of its genus for which even rudimentary life history data are available. The beaked whales attain a maximum length of 5.5 m for males and 4.9 m for females. Mating and birth usually take place in late winter and spring. The gestation period is about 1 year. At birth the calf is between 1.8 and 2.1 m long, nurses for about 1 year, and at weaning is probably about 3.0 m long.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** None.

#### References

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### BLAINVILLE'S BEAKED WHALE

(*Mesoplodon densirostris*)

**Distribution and Migration:** The dense-beaked whale is widely, but perhaps discontinuously, distributed in tropical and warm temperate waters around the world. In the North Pacific Ocean it has been recorded from Taiwan, Japan, and Midway Island. In the North Atlantic Ocean it has been recorded from Nova Scotia south to the Bahamas on the western side, and from Madeira on the eastern side.

**Abundance and Trends:** The status of this species is unknown, except that it is apparently rare (Besharse, 1971; Moore, 1966).

**General Biology:** These whales are known mostly from stranded individuals, which suggest that they are usually solitary. Otherwise, nothing is known of their biology.

**Ecological Problems:** None known.

**Allocation Problems:** None known.

**Current Research:** None.

#### References

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- Moore, J. C. 1966. Diagnoses and distributions of beaked whales of the genus *Mesoplodon* known from North American waters, pp. 32-61. In K. S. Norris (ed.), Whales, dolphins, and porpoises. Univ. Calif. Press, Berkeley and Los Angeles.

#### CONTRIBUTORS OUTSIDE DEPARTMENT OF COMMERCE (TO THE STATUS OF STOCKS REPORT)

- Brodie, Paul F., Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute, Dartmouth, Nova Scotia, Canada.
- Brooks, James W., Alaska Department of Fish and Game, Subport Building, Juneau, AK 99801.
- Brownell, Robert L., Jr., Division of Mammals, National Museum Natural History, Smithsonian Institution, Washington, DC.
- Burns, John J., Alaska Department of Fish and Game, 1300 College Road, Fairbanks, AK 99701.
- Caldwell, David K., Communication Sciences Laboratory, Route 1, Box 122, St. Augustine, FL 32804.
- Caldwell, Melba C., Communication Sciences Laboratory, Route 1, Box 122, St. Augustine, FL 32804.
- Carlisle, John G., California State Fisheries Laboratory, Marine Resources Region, 350 Golden Shore, Long Beach, CA 90802.
- Chapman, Douglas G., College of Fisheries, University of Washington, Seattle, WA 98195.
- Drury, William H., Massachusetts Audubon Society, Lincoln, MA 01773.
- Durham, Floyd, Department of Biology, University of Southern California, Los Angeles, CA 90007.
- Evans, William E., Naval Undersea Research and Development Center, San Diego, CA 92132.
- Fay, Francis H., University of Alaska, College, AK 99701.
- Gates, Doyle, California Department of Fish and Game, Marine Resources Region, 350 Golden Shore, Long Beach, CA 90802.
- Handley, Charles O., Jr., Department of Vertebrate Zoology, Smithsonian Institution, Washington, DC 20560.
- Houck, Warren J., Division of Biological Sciences, Humboldt State University, Arcata, CA 95521.
- Kenyon, Karl W., 11964 Lakeside Place NE, Seattle, WA 98125.
- Leatherwood, J. Stephen, Marine Life Sciences Laboratory, Naval Undersea Research and Development Center, San Diego, CA 92132.
- Mansfield, Arthur W., Arctic Biological Station, Fisheries Research Board of Canada, P. O. Box 400 Ste. Anne de Bellevue, P. Q., Canada.
- Mead, James G., Smithsonian Institution, National Museum of Natural History, Washington, DC 20560.
- Norris, Kenneth S., University of California at Santa Cruz, Santa Cruz, CA 95060.
- Ray, G. Carleton, Department of Pathology, Johns Hopkins University, 615 North Wolfe Street, Baltimore, MD 21205.
- Scheffer, Victor B., 14806 SE. 54th Street, Bellevue, WA 98006.
- Siniff, Don B., Department of Ecology and Behavior, JFB Museum of Natural History, University of Minnesota, Minneapolis, MN 55455.
- Vania, John S., Marine Mammal Studies, Alaska Department of Fish and Game, 1018 International Airport Road, Anchorage, AK 99502.
- Ximenez, Isalas, SOYP Depto Cientifico y Tecnico del Servicio, Oceanografico y de Pesca, Juan Lindolfo Cuestas 1409, Montevideo, Uruguay.

#### LAWS AND TREATIES GOVERNING THE PROTECTION OF MARINE MAMMALS

Each marine mammal of U.S. concern is protected by one or more U.S. laws or acts, and the conservation of some species is at least partially assured by international treaty or law. A summary of the various laws, conventions, and commis-

sions designed and enacted to protect marine mammals follows:

1. **Marine Mammal Protection Act of 1972:** A U. S. Federal law that prohibits U.S. citizens from taking, harassing, or importing any marine mammal or its by-products into the United States, except when authorized to do so by special permit. Indians, Eskimos, and Aleuts of the North Pacific and Arctic Oceans can take marine mammals for subsistence, and for creating and selling handicraft items and clothing as long as the stocks can support the harvest.

2. **Endangered Species Act of 1973:** The purpose of this U.S. Federal law, which became effective December 28, 1973, are to provide a program for the conservation of species that are either endangered (presently) or threatened (within the foreseeable future) with extinction and their dependent ecosystems, and implement certain international conservation conventions (including the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Marine Mammals, under the jurisdiction of NMFS, which are listed as endangered species are the blue whale, bowhead whale, gray whale, humpback whale, right whales, fin whale, sei whale, sperm whale, Mediterranean monk seal, and Hawaiian monk seal. No marine mammals are listed as threatened species.

3. **International Whaling Convention:** The International Whaling Commission was established under a convention signed in Washington, D.C. in December 1946. The membership includes all countries that catch significant numbers of whales except Spain, Portugal, Chile, Peru, and Brazil. The IWC is responsible for whale conservation worldwide. Since 1964, the IWC has acted to bring world whaling under control by prohibiting the taking of some species, sharply reducing the authorized catches of species in certain areas, establishing catch quotas by species, and implementing an international observer plan for policing quotas and regulations at land stations and on factory ships. The IWC appears to be extending its authority to cover all cetaceans and to implement regulations for threatened species. The IWC now regulates the harvest of fin, sei, Bryde's, minke, and sperm whales. A subcommittee of the IWC may be established to improve data collection on small cetaceans and review problems. The gray, bowhead, right, blue, and humpback whales are completely protected, except for some hunting by aborigines.

4. **International Convention on Trade in Endangered Species of Wild Fauna and Flora:** This Convention, which entered into force on July 1, 1975, provides additional protection for the following marine mammals under the jurisdiction of NMFS: Appendix I—blue whale, bowhead whale, gray whale, humpback whale, right whales, certain stocks of fin and sei whales, Ganges River dolphin, Mediterranean monk seal, Hawaiian monk seal, Caribbean monk seal, and northern elephant seal; Appendix II—certain stocks of fin and sei whales,

southern elephant seal, Galapagos fur seal, Guadalupe fur seal, Juan Fernandez fur seal, southern (South American) fur seal, Amsterdam Island fur seal, Kerguelen fur seal, New Zealand fur seal, and South African fur seal. Trade is more strictly controlled for Appendix I animals than for Appendix II animals. The import, export, re-export, and introduction from the sea of convention animals are controlled by the U.S. management authority for the Convention (U.S. Department of the Interior) by a system of permits and enforcement. Implementation by regulating commerce began in February 1977.

5. *Interim Convention on North Pacific Fur Seals*: This convention prohibits most citizens of Japan, Canada, the U.S.S.R., and the United States from taking northern fur seals. The exceptions are aboriginal Indians, Aleuts, and Eskimos, who may take them only at sea and by primitive methods. The convention also provides for intensive research on this species by the four countries. The economic utilization of northern fur seals on their breeding grounds is conducted by the respective governments and is regulated on a scientific basis.

6. *International Convention for the Northwest Atlantic Fisheries*: Under terms of a convention signed in 1949, ICNAF is responsible for the investigation, protection, and conservation of the fisheries of the Northwest Atlantic in order to make possible the maintenance of a maximum sustained catch from these fisheries. The harp seal harvest is regulated by ICNAF, which imposes quotas for the taking of these mammals.

7. *International Convention for the Conservation of Antarctic Seals, 1972*: The purpose of this convention is to safeguard all species of Antarctic seals and to ensure that, if commercial sealing begins on floating ice of the Southern Ocean, the killing of certain species will be prohibited and the taking of other species will be subject to strict limitations. Measures adopted under the Antarctic Treaty of 1959 provide only for the protection of seals and other animals around the shoreline of the Antarctic Continent, but not on floating ice. The convention of 1972 may be applicable to any crabeater, and Ross seals, and southern fur seals.

8. *Canadian-Norwegian Agreement on Sealing*: On December 22, 1971, these two governments ratified an agreement on sealing and the conservation of seal stocks in the Northwest Atlantic. The agreement applies to the harp seal, but provision is made for extension to hooded and bearded seals and to the walrus.

9. *Miscellaneous regulations and agreements of some U.S. interest*: a. Harp seal—The U.S.S.R. and Norway signed an agreement in 1958 entitled "Preservation of Seals in the Greenland Sea." The agreement provides for the regulation of harp seal catches by these

two nations. The U.S.S.R., however, has not hunted harp seals since 1965.

b. Gray seal.—The U.S.S.R. has prohibited (since 1970) the hunting of gray seals for sport and by amateurs, but permits the taking of these animals for subsistence. Canada uses an 1886 law for authority in regulating the take of gray seals. England has prohibited the hunting of gray seals on the Farne Islands since 1932 and on Orkney Island since 1923. Norway has forbidden hunting at Sör Trondelag (since 1923). Finland and Sweden offer bonuses for gray seals taken.

c. Hooded seal.—Canada and Norway prohibit the taking of hooded seals near Newfoundland before 10 March, near Jan Mayen Island before 13 March, in Denmark Strait from 15 June to 15 July, and in northern waters from 20 March to 5 May. The U.S.S.R. and Norway in 1958 agreed to prohibit the harvest of hooded seals near Jan Mayen Island before 13 March, and banned hunting in Denmark Strait.

d. Bearded seal.—The U.S.S.R. has, since 1970, banned the commercial hunting of bearded seals from vessels, and regulates the take of this species by aborigines and the harvest from shore by others.

e. Ribbon seal.—Since the 1960's, the U.S.S.R. has forbidden the hunting of ribbon seals at sea from 1 March to 1 September, and in 1970 stopped hunting by amateurs.

f. Ringed seal.—The U.S.S.R. banned sport hunting of *Pusa hispida hispida* beginning in 1970. Sport hunting of another subspecies (apparently accepted by the U.S.S.R. as *P. h. krascheninikovi*) was also banned by the U.S.S.R. In that year, local harvests were regulated, and hunting of the subspecies between 1 March and 1 September was prohibited. The U.S.S.R. has also, since 1970, prevented commercial hunting of *P. h. ochotensis* from vessels, and regulated the take of this subspecies by aborigines and the harvest from shore by others.

g. Harbor seal—Ice-dwelling populations.—The U.S.S.R. has prohibited sport hunting of these populations of the harbor seal since 1970, protects its rookeries from harassment and pollution, and regulates the harvest.

Land-dwelling populations. — The U.S.S.R. has prohibited the sport hunting of these populations since 1970, and regulates the take of harbor seals from the White and Barents Seas.

h. Northern sea lion.—The U.S.S.R. regulates the harvest of northern sea lions and protects its rookeries from harassment.

i. Walrus.—In 1958, the U.S.S.R. and Norway agreed to ban the hunting of walrus except to satisfy local needs and those of expeditions.

j. Guadalupe fur seal.—Mexico has safeguarded the breeding grounds of the Guadalupe fur seal on the Guadalupe Is-

lands by making this island a wildlife refuge.

k. South American fur seal.—The Uruguayan and Argentinian Governments protect the South American fur seal on land and out to 200 miles at sea. In addition, the Uruguayan Government regulates the harvest by protecting all female seals except the 1-year-olds, controlling take of pups by season restrictions, and imposing quotas in some instance.

l. South African fur seal.—The harvest of South African fur seals is largely a state enterprise in South Africa, however, the system includes one of control and leasing of rookeries to private contractors. The South West African Administration has not entered the harvesting business, but licenses private firms, restricts gear to be used, establishes closed seasons, and places limits on sex and condition of catch.

m. Narwhal.—Canada allows its Eskimos to take five narwhals annually for personal use and issues permits to capture this mammal for exhibition.

n. Killer whale.—Canada allows this species to be taken under a permit system.

#### PART IV—APPENDICES

##### APPENDIX A—PERMIT STATISTICS TABLES

Table I—Common and Scientific Names of Marine Mammals Involved in Scientific Research/Public Display Permit Applications.

Table II—Synopsis of Permit Applications.

Table III—Number of Cetaceans Requested in Scientific Research/Public Display Permit Applications.

Table IV—Number of Pinnipeds Requested in Scientific Research/Public Display Permit Applications.

Table V—Number of Cetaceans Authorized to be Taken or Imported Under Scientific Research/Public Display Permits; and

Table VI—Number of Pinnipeds Authorized to be Taken or Imported Under Scientific Research/Public Display Permits.

TABLE I.—Common and scientific names of marine mammals involved in scientific research/public display permit applications

CETACEANS	
Common name:	Scientific name
Black Right Whale.....	<i>Balaena glacialis</i> .
Bowhead Whale.....	<i>Balaena mysticetus</i> .
Gray Whale.....	<i>Eschrichtius robustus</i> .
Minke Whale.....	<i>Balaenoptera acutorostrata</i> .
Bryde's Whale.....	<i>Balaenoptera edeni</i> .
Sei Whale.....	<i>Balaenoptera borealis</i> .
Fin Whale.....	<i>Balaenoptera physalus</i> .
Blue Whale.....	<i>Balaenoptera musculus</i> .
Humpback Whale.....	<i>Megaptera novaeangliae</i> .
Rough-toothed Dolphin.....	<i>Steno bredanensis</i> .
Bottlenosed Dolphin.....	<i>Tursiops truncatus</i> .
Risso's Dolphin.....	<i>Grampus griseus</i> .
Lagenorhynchine	<i>Lagenorhynchus</i> sp.
Dolphins	
White-beaked Dolphin....	<i>Lagenorhynchus albirostris</i> .
Atlantic White-sided	<i>Lagenorhynchus acutus</i> .
Dolphin	
Pacific White-sided	<i>Lagenorhynchus</i>
Dolphin	<i>obliquidens</i> .
Dusky Dolphin.....	<i>Lagenorhynchus obscurus</i> .
Fraser's Dolphin.....	<i>Lagenodelphis hosei</i> .
Stenella Dolphins.....	<i>Stenella</i> sp.
Spinner Dolphin.....	<i>Stenella longirostris</i> .
Spotted Dolphin.....	<i>Stenella attenuata</i> .
Striped Dolphin.....	<i>Stenella coeruleoalba</i> .
Common Dolphin.....	<i>Delphinus delphis</i> .
Northern Right Whale	<i>Lissodelphis borealis</i> .
Dolphin.	

CETACEANS—Continued

Common name:	Scientific name
Melon-headed Whale.....	<i>Peponocephala electra</i> .
Pygmy Killer Whale.....	<i>Feresa attenuata</i> .
False Killer Whale.....	<i>Pseudorca crassidens</i> .
Pilot Whales.....	<i>Globicephala</i> sp.
Long-finned Pilot Whale..	<i>Globicephala melana</i> .
Short-finned Pilot Whale..	<i>Globicephala</i> <i>macrorhynchus</i> .
Killer Whale.....	<i>Orcinus orca</i> .
Harbor Porpoise.....	<i>Phocoena phocoena</i> .
Cochito.....	<i>Phocoena sinus</i> .
Finless Porpoise.....	<i>Neophocoena phocaenoides</i> .
Dall's Porpoise.....	<i>Phocoenoides dallii</i> .
White Whale.....	<i>Delphinapterus leucas</i> .
Sperm Whale.....	<i>Physeter catodon</i> .
Pygmy Sperm Whale.....	<i>Kogia breviceps</i> .
Dwarf Sperm Whale.....	<i>Kogia simus</i> .
Blainville's Beaked Whale.....	<i>Mesoplodon densirostris</i> .
Hubb's Beaked Whale....	<i>Mesoplodon carlhubbsi</i> .
Cuvier's Beaked Whale...	<i>Ziphius cavirostris</i> .
Baird's Beaked Whale....	<i>Berardius bairdii</i> .
Bottlenose Whales.....	<i>Hyperoodon</i> sp.

PINNIPEDS

South American Sea Lion.....	<i>Otaria flavescens</i> .
California Sea Lion.....	<i>Zalophus californianus</i> .
Northern Sea Lion.....	<i>Eumetopias jubatus</i> .
Arctocephaline Fur Seals.....	<i>Arctocephalus</i> sp.
Antarctic Fur Seal.....	<i>Arctocephalus gazella</i> .
South African Fur Seal...	<i>Arctocephalus pusillus</i> .
Northern Fur Seal.....	<i>Callorhinus ursinus</i> .
Pacific Harbor Seal.....	<i>Phoca vitulina richardii</i> .
Ice-breeding Harbor Seal...	<i>Phoca vitulina largha</i> .
Atlantic Harbor Seal.....	<i>Phoca vitulina vitulina</i> .
Western North Atlantic Harbor Seal.....	<i>Phoca vitulina concolor</i> .
Ringed Seal.....	<i>Phoca hispida</i> .
Gray Seal.....	<i>Halichoerus grypus</i> .
Ribbon Seal.....	<i>Phoca fasciata</i> .
Bearded Seal.....	<i>Erignathus barbatus</i> .
Hawaiian Monk Seal.....	<i>Monachus schauinslandi</i> .
Crabeater Seal.....	<i>Lobodon carcinophagus</i> .
Ross Seal.....	<i>Ommatophora rossii</i> .
Leopard Seal.....	<i>Hydrurga leptonyx</i> .
Weddell Seal.....	<i>Leptonychotes weddelli</i> .
Southern Elephant Seal...	<i>Mirounga leonina</i> .
Northern Elephant Seal...	<i>Mirounga angustirostris</i> .

TABLE II.—Synopsis of permit applications

	Scientific research	As of Mar. 31, 1976		Apr. 1, 1976 to Mar. 31, 1977			As of Mar. 31, 1977—cumulative total
		Public display	Scientific and public display	Scientific research	Public display	Scientific and public display	
Number of applications submitted.....	79	99	0	17	39	4	1 238
Number of animals requested (total).....	57,270	707	0	11,530	165	168	170,040
Of these:							
Taken by killing.....	4,731	0	0	9,009	0	0	13,740
Taken and kept alive.....	300	657	0	96	165	33	1,251
Killed in captivity.....	57	0	0	0	0	0	57
Taken and released.....	50,850	0	0	2,625	0	135	53,610
Found dead.....	1,332	50	0	0	0	0	1,382
ACTION TAKEN							
Number of applications forwarded to Marine Mammal Commission.....	71	84	0	17	34	3	200
Number of applications reviewed by Marine Mammal Commission.....	65	81	0	22	33	2	203
Number of applications withdrawn.....	4	8	0	0	2	0	14
Number of applications referred to States.....	3	1	0	0	0	0	4
Number of applications resolved through interagency agreement.....	1	0	0	0	0	0	1
Number of applications returned due to inappropriate submittal.....	0	5	0	0	1	0	6
Number of applications inactivated.....	1	5	0	1	0	0	7
Number of applications denied.....	2	5	0	0	1	0	8
Number of applications approved.....	60	67	0	19	27	2	175
Number of animals approved (total).....	50,109	331	0	17,754	106	152	68,452
Of these:							
Taken by killing.....	4,027	0	0	9,739	0	0	13,766
Taken and kept alive.....	283	331	0	0	106	23	743
Killed in captivity.....	49	0	0	0	0	0	49
Taken and released.....	44,978	0	0	7,465	0	129	52,572
Found dead.....	772	0	0	550	0	0	1,322

<sup>1</sup> Included in the application totals above are 42 applications in which no numbers of animals are specified. The total number of animals requested, therefore, does not include the animals which would be taken under these applications.

TABLE III.—Number of Cetaceans requested in scientific research/public display permit applications

Common name <sup>1</sup>	Requested (As of Apr. 30, 1976)					Requested (Apr. 1, 1976, through Mar. 31, 1977)					Cumulative total requested <sup>2</sup>
	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	
Black Right Whale.....				615							615
Bowhead Whale.....				130	40						170
Gray Whale.....				324	11						336
Minke Whale.....				1,359	3				50		1,412
Bryde's Whale.....				930							930
Sel Whale.....				935					100		1,035
Fin Whale.....				875					125		1,000
Blue Whale.....				625					25		650
Humpback Whale.....				775	30				100		905
Rough-toothed Dolphin.....		7		100		410	2				519
Bottlenosed Dolphin.....		265		804	3	410	99		129		1,710
Risso's Dolphin.....		2		174		410	6				592
Lagenorhynchine Dolphins.....				50							50
White-beaked Dolphin.....				24			2				26
Atlantic White-sided Dolphin.....		6		24							30
Pacific White-sided Dolphin.....		23		521	3				6		553
Dusky Dolphin.....				61							61
Fraser's Dolphin.....				100		410					510
Stenelline Dolphins.....				174							174
Spinner Dolphin.....		17		4,500		3,269			530		8,316
Spotted Dolphin.....				8,500	3	5,265			530		14,298
Striped Dolphin.....				100		440					540
Common Dolphin.....		6		1,011	3	495	2		530		2,047
Northern Right Whale Dol- phin.....		2		130	3						135
Melon-headed Whale.....				100		385	4				489
Pygmy Killer Whale.....		4		100		385	4				493
False Killer Whale.....		7		74			9		6		96
Pilot Whales.....				160							160
Long-finned Pilot Whale.....		2		24	60						86
Short-finned Pilot Whale.....		23		44	3	410	2				482
Killer Whale.....		8		134	23				50		215
Harbor Porpoise.....				50	3		1		100		154
Cochito.....					2						2
Finless Porpoise.....							6				6
Dall's Porpoise.....				330	3				280		613
White Whale.....	55	4			50		6				115
Sperm Whale.....				1,475					225		1,700
Pygmy Sperm Whale.....					3						3
Dwarf Sperm Whale.....											
Blainville's Beaked Whale.....											
Hubb's Beaked Whale.....					3						3
Cuvier's Beaked Whale.....		2									2
Baird's Beaked Whale.....									25		25
Bottlenose Whales.....				25							25
Total <sup>2</sup> .....	55	352	0	20,222	249	8,889	149	0	1,805	0	31,721

<sup>1</sup> Please refer to table I of this appendix, entitled "Common and Scientific Names of Marine Mammals Involved in Scientific Research/Public Display Permit Applications," for the appropriate scientific names.

<sup>2</sup> In some cases, permit applications or permits specify a number of animals to be taken, without specifying the numbers to be taken from a particular species or population stock. Therefore, the figures given for a particular species represent the total number of animals which might be taken if all possible alternatives were selected for that species. However, the total number given for a category of taking activity represents the maximum number of animals which might be taken, discounting any multiple takings arising from the identification of more than one species. As a result, taking category totals may be less than the sum of the individual entries for that category.

TABLE IV.—Number of Pinnipeds requested in scientific research/public display permit applications

Common name <sup>1</sup>	Requested (As of Mar. 31, 1976)					Requested (Apr. 1, 1976 thru Mar. 31, 1977)					Cumulative total requested <sup>2</sup>
	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	
South American Sea Lion.....		9									9
California Sea Lion.....	600	414	20	1,036	243	80	117				2,510
Northern Sea Lion.....	360			12,500	3						13,133
Arctocephaline Fur Seals.....									65		65
Antarctic Fur Seal.....	8			100	550						658
South African Fur Seal.....									10		10
Northern Fur Seal.....		12			3						15
Pacific Harbor Seal.....	946	207	20	3,160	3	40	2				4,378
Ice-breeding Harbor Seal.....	170	6		300							476
Atlantic Harbor Seal.....		1									1
Western North Atlantic Har- bor Seal.....		35		145	20		21				221
Ringed Seal.....	1,220	4			25						1,249
Gray Seal.....		28					2				30
Ribbon Seal.....	140										140
Bearded Seal.....	890				10						900
Hawaiian Monk Seal.....		2							880		882
Crab-eater Seal.....	24			300							324
Ross Seal.....	8			106							114
Leopard Seal.....	24	2		200							226
Weddell Seal.....	48		37	3,635							4,969
Southern Elephant Seal.....	8			100							108
Northern Elephant Seal.....		141		9,046	276		3				9,466
Total <sup>2</sup> .....	4,676	605	57	30,628	1,133	120	145	0	955	0	38,319

<sup>1</sup> Please refer to table I of this appendix, entitled "Common and Scientific Names of Marine Mammals Involved in Scientific Research/Public Display Permit Applications," for the appropriate scientific names.

<sup>2</sup> In some cases, permit applications or permits specify a number of animals to be taken, without specifying the numbers to be taken from a particular species or population stock. Therefore, the figures given for a particular species represent the total number of animals which might be taken if all possible alternatives were selected for that species. However, the total number given for a category of taking activity represents the maximum number of animals which might be taken, discounting any multiple takings arising from the identification of more than one species. As a result, taking category totals may be less than the sum of the individual entries for that category.



TABLE V.—Number of cetaceans authorized to be taken or imported under scientific research/public display permits

Common name <sup>1</sup>	Authorized (As of Mar. 31, 1976)					Authorized (Apr. 1, 1976 through Mar. 31, 1977)					Cumulative total authorized
	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	
Black Right Whale									120		120
Bowhead Whale				50	40				80		170
Gray Whale				209	10				90		309
Minke Whale				774					100		874
Bryde's Whale				350					70		420
Sei Whale				330					170		500
Fin Whale				230					220		450
Blue Whale				30					70		100
Humpback Whale				30	20				250		300
Rough-toothed Dolphin		7		100		410					517
Bottlenosed Dolphin		151		604		410	46		329		1,540
Risso's Dolphin				124		410			50		584
Lagenorhynchine Dolphins									50		50
White-beaked Dolphin				24							24
Atlantic White-sided Dolphin		6		24							30
Pacific White-sided Dolphin		15		521							536
Dusky Dolphin				61							61
Fraser's Dolphin				100		410					510
Stenelline Dolphins				124					50		174
Spinner Dolphin		11		4,500		3,269			530		8,310
Spotted Dolphin				8,500		5,465			530		14,235
Striped Dolphin				100		440					540
Common Dolphin		6		961		495			580		2,041
Northern Right Whale Dolphin				130							130
Melon-headed Whale				100		385					485
Pygmy Killer Whale				100		385					485
False Killer Whale		5		24			2		50		81
Pilot Whales				110					50		160
Long-finned Pilot Whale		2		24	60						86
Short-finned Pilot Whale		15		44		410	3				472
Killer Whale		4		59	20				100		183
Harbor Porpoise									150		150
Cochito					2						2
Dall's Porpoise				330					280		610
White Whale	15	4			50						69
Sperm Whale				650					350		1,000
Pygmy Sperm Whale											
Hubb's Beaked Whale											
Cuvier's Beaked Whale											
Bottlenose Whales											
Unidentified	75			200							275
Total <sup>2</sup>	90	202	0	19,277	203	9,089	58	0	2,069	0	30,887

<sup>1</sup> Please refer to table I of this appendix, entitled "Common and Scientific Names of Marine Mammals Involved in Scientific Research/Public Display Permit Applications," for the appropriate scientific names.

<sup>2</sup> In some cases, permit applications or permits specify a number of animals to be taken, without specifying the numbers to be taken from a particular species or population stock. Therefore, the figures given for a particular species represent the total number of animals which might be taken if all possible alternatives were selected for that species. However, the total number given for a category of taking activity represents the maximum number of animals which might be taken, discounting any multiple takings arising from the identification of more than one species. As a result, taking category totals may be less than the sum of the individual entries for that category.

TABLE VI.—Number of Pinnipeds authorized to be taken or imported under scientific research/public display permits

Common name <sup>1</sup>	Authorized (As of Mar. 3, 1976)					Authorized (Apr. 1, 1976 through Mar. 31, 1977)					Cumulative total authorized
	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	Taken by killing	Taken and kept alive	Killed in captivity	Taken and released	Found dead	
South American Sea Lion	9										9
California Sea Lion	600	308	12	1,035	240	80	52				2,327
Northern Sea Lion	380			10,000		250			2,500		13,130
Arctocephaline Fur Seals									65		65
Antarctic Fur Seal	8			100						550	658
South African Fur Seal									10		10
Northern Fur Seal											
Pacific Harbor Seal	846	155	12	580		120	4		2,500		4,217
Ice-breeding Harbor Seal	70	6		309		100					476
Atlantic Harbor Seal											
Western North Atlantic Harbor Seal		25		145	20		10				200
Ringed Seal	1,120	4			25	100					1,249
Gray Seal		22							2		24
Ribbon Seal	40					100					140
Bearded Seal	700				10	100					900
Hawaiian Monk Seal				54							54
Crab-eater Seal	30			400					450		880
Ross Seal	9			206							215
Leopard Seal	26	2		300							328
Weddell Seal	50		37	3,635							3,722
Southern Elephant Seal	8			100							108
Northern Elephant Seal		331		9,046	275		3				9,455
Total <sup>2</sup>	3,937	412	49	25,701	570	850	71	0	5,525	550	37,665

<sup>1</sup> Please refer to table I of this appendix, entitled "Common and Scientific Names of Marine Mammals Involved in Scientific Research/Public Display Permit Applications," for the appropriate scientific names.

<sup>2</sup> In some cases, permit applications or permits specify a number of animals to be taken, without specifying the numbers to be taken from a particular species or population stock. Therefore, the figures given for a particular species represent the total number of animals which might be taken if all possible alternatives were selected for the species. However, the total number given for a category of taking activity represents the maximum number of animals which might be taken, discounting any multiple takings arising from the identification of more than one species. As a result, taking category totals may be less than the sum of the individual entries for that category.

APPENDIX B—NOTICES AND REGULATIONS

B-1—REGULATIONS RELATING TO THE DEFINITION OF OPTIMUM SUSTAINABLE POPULATION

- a. Proposed rulemaking, October 6, 1976, FEDERAL REGISTER reference 41 FR 44049.
- b. Final rulemaking, December 21, 1976, FEDERAL REGISTER reference 41 FR 55536.

B-2—NOTICES AND REGULATIONS RELATING TO THE INCIDENTAL TAKING OF MARINE MAMMALS IN THE COURSE OF COMMERCIAL FISHING OPERATIONS

- a. Final rulemaking, September 5, 1974, FEDERAL REGISTER reference 39 FR 32117.
- b. Amended rulemaking, September 25, 1974, FEDERAL REGISTER reference 39 FR 34417.
- c. Amended rulemaking, December 5, 1975, FEDERAL REGISTER reference 40 FR 56899.
- d. Notice of methodology to be used in determining whether to impose a quota, April 5, 1976, FEDERAL REGISTER reference 41 FR 14401.
- e. Amended rulemaking to implement the Order of a U.S. District Court, May 28, 1976, FEDERAL REGISTER reference 41 FR 21782.
- f. Correction to amended rulemaking, June 4, 1976, FEDERAL REGISTER reference 41 FR 22,565.
- g. Amended rulemaking to implement the Order of a U.S. Court of Appeals, June 9, 1976, FEDERAL REGISTER reference 41 FR 23205.
- h. Amended rulemaking establishing a quota, June 11, 1976, FEDERAL REGISTER reference 41 FR 23680.
- i. Proposed amended rulemaking, July 27, 1976, FEDERAL REGISTER reference 41 FR 31227.

j. Rulemaking on expedited procedures for consideration of proposed regulations for calendar year 1977, October 1, 1976, FEDERAL REGISTER reference 41 FR 43550.

k. Amended rulemaking, October 4, 1976, FEDERAL REGISTER reference 41 FR 43726.

l. Proposed rulemaking for calendar year 1977, October 14, 1976, FEDERAL REGISTER reference 41 FR 45015.

m. Amended rulemaking, October 15, 1976, FEDERAL REGISTER reference 41 FR 45569.

n. Proposed rulemaking, interim regime, November 11, 1976, FEDERAL REGISTER reference 41 FR 49859.

o. Final rulemaking, interim regime, January 5, 1977, FEDERAL REGISTER 42 FR 1034.

p. Final rulemaking for calendar year 1977, March 1, 1977, FEDERAL REGISTER reference 42 FR 12009.

q. Notice of decision for calendar year 1977, March 1, 1977, FEDERAL REGISTER reference 42 FR 12015.

B-3—NOTICES AND REGULATIONS RELATING TO THE SOUTH AFRICAN FUR SEAL WAIVER OF THE MORATORIUM

a. Final rulemaking, February 19, 1976, FEDERAL REGISTER reference 41 FR 7510.

b. Notice of waiver, February 19, 1976, FEDERAL REGISTER reference 41 FR 7537.

c. Notice of supplemental decision, March 15, 1976, FEDERAL REGISTER reference 41 FR 10940.

d. Notice of correction, April 13, 1976, FEDERAL REGISTER reference 41 FR 15437.

e. Rulemaking, notice of annual review of management program, July 23, 1976, FEDERAL REGISTER reference 41 FR 30337.

f. Rulemaking, notice of decision, August 30, 1976, FEDERAL REGISTER reference 41 FR 36496.

g. Proposed rulemaking, September 17, 1976, FEDERAL REGISTER reference 41 FR 40167.

h. Amended rulemaking, November 24, 1976, FEDERAL REGISTER reference 41 FR 51795.

i. Amended rulemaking, December 16, 1976, FEDERAL REGISTER reference 41 FR 54946.

B-4—NOTICES AND REGULATIONS RELATING TO STATE MANAGEMENT OF MARINE MAMMALS

a. Proposed rulemaking regarding approval and monitoring of State laws, and regarding the taking and importing of marine mammals for which the moratorium has been waived, April 9, 1976, FEDERAL REGISTER reference 41 FR 15173.

b. Revised notice of public hearings; revised pre-hearing order; May 28, 1976, FEDERAL REGISTER reference 41 FR 21832.

c. Final rulemaking regarding approval and review of State laws and regulations, August 31, 1976, FEDERAL REGISTER reference 41 FR 36659.

B-5—REGULATIONS RELATING TO THE DEPLETED STATUS OF HAWAIIAN MONK SEALS

a. Proposed rulemaking, June 16, 1976, FEDERAL REGISTER reference 41 FR 24393.

b. Final rulemaking, July 22, 1976, FEDERAL REGISTER reference 41 FR 30120.

APPENDIX C—FUNDING TABLE

The table which follows details the status of authorization and funding for fiscal year 1977-78.

APPENDIX C.—Marine mammal conservation—status of authorization and funding—fiscal year 1977 and 1978

Authorizing legislation	Fiscal year 1977 Base+increase		Fiscal year 1977 Requested authorization		Fiscal year 1978 Base funding		Fiscal year 1978 Increase request		Fiscal year 1978 Requested total		Fiscal year 1978 Requested authorization	
	Positions	Funding	Amount	Expiration date	Positions	Funding	Positions	Funding	Positions	Funding	Amount	Expiration date
Marine Mammal Protection Act of 1972 (Public Law 92-522, Oct. 21, 1972):												
Sec. 110 research grants....	0	\$1,667,000	\$1,667,000	Sept. 30, 1977	0	\$1,667,000	0	0	0	\$1,667,000	\$1,667,000	Sept. 30, 1980
Sec. 114 administration, enforcement and research.	77	2,778,000	4,000,000	.....do.....	77	2,778,000	1	\$206,000	78	2,984,000	8,000,000	.....do.....
MMPA—Subtotal.....	77	4,445,000	5,667,000	.....do.....	77	4,445,000	1	206,000	78	4,651,000	9,667,000	.....do.....
Endangered Species Act of 1973.....	6	294,000	2,000,000	.....do.....	6	294,000	0	0	6	294,000	2,000,000	.....do.....
Fur Seal Act of 1966.....	14	595,000	(1)	(1)	14	595,000	0	0	14	595,000	(1)	(1)
Saltonstall Kennedy funding.....	0	600,000									(2)	(2)
Other authorizations—Subtotals.....	20	1,489,000			20	889,000	0	0	20	889,000		
Marine mammal conservation—total.....	97	5,934,000			97	5,334,000	1	206,000	98	5,540,000		

<sup>1</sup> Open.

<sup>2</sup> One-time funds made available by the Office of Management and Budget solely for support of the enforcement plan submitted to the U.S. Circuit Court of Appeals for the District of Columbia Circuit, February 1977.

[FR Doc.77-21718 Filed 7-29-77;8:45 am]