

## Harbor Seals in Alaska (*Phoca vitulina richardii*)

Harbor seals (Fig. 29) are nonmigratory marine mammals found in subarctic and temperate waters of the North Atlantic and North Pacific Oceans and contiguous seas. In the North Pacific, their distribution extends from San Ignacio Lagoon, Mexico, around the North Pacific Rim to Hokkaido, Japan, and into the Bering Sea to the Pribilof Islands and northern Bristol Bay. They generally are found near shore in estuaries or protected waters but may range far out to sea in deep pelagic waters or up freshwater rivers and into lakes.

The National Marine Fisheries Service is the lead federal agency responsible for the management and conservation of harbor seals in U.S. waters. The Protected Resources Division of the Alaska Regional Office has the lead management responsibility in Alaska. Harbor seals are taken by Alaska Natives for subsistence purposes and are co-managed by the Service and the Alaska Native Harbor Seal Commission. Research support is provided by the Service's National Marine Mammal Laboratory of the Alaska Fisheries Science Center and the Southwest Fisheries Science Center. Research is also conducted by the Alaska Department of Fish and Game, the Alaska Native Harbor Seal Commission, the Alaska SeaLife Center, scientists from various universities, and the National Park Service in Glacier Bay National Park and Preserve.



Figure 29. New genetic information on harbor seals may result in a redefinition of stock structure. (Photo courtesy of Lloyd Lowry and Kathy Frost.)

## Stock Identification

Until recently, the National Marine Fisheries Service recognized three management units of harbor seals in Alaska. However, it recently determined that these units are no longer consistent with the best available scientific information on stock structure. New genetic information shows that harbor seals in Alaska have limited dispersal patterns and may be divided into 12 or more stocks. For that reason, the Alaska Regional Scientific Review Group wrote to the Service on 13 December 2000 recommending that the Service redefine harbor seal stocks and stock boundaries in Alaska. Redefinition is required to (1) establish appropriate management units, (2) interpret counts and trends and determine stock status, (3) identify stock-specific research needs, and (4) ensure that appropriate management measures are in place for each stock. At the Commission's 14–16 November 2001 annual meeting in Anchorage, the Service presented the new genetic information and indicated that they would be proceeding with redefinition of stock structure based on that and other information. The Marine Mammal Commission concurred with that decision in a 31 December 2001 letter to the Service.

On 26 August 2002 the Service published in the *Federal Register* a notice indicating that the Service and the Alaska Native Harbor Seal Commission had outlined a process for redefining harbor seal stock structure. The process includes (1) public notification of the genetics results that indicated multiple stocks, (2) solicitation of additional information pertinent to the stock structure question, and (3) discussion and recommendations regarding the use of the existing information to designate stock structure. The genetics data have been peer-reviewed at a number of scientific meetings and published in a scientific journal. The *Federal Register* notice solicited additional information pertinent to this issue.

On 25 September 2002 the Marine Mammal Commission responded to the Service's notice and concurred with the overall importance of the genetics data in stock identification. The Commission questioned a reference by the Service to the use of nonscientific information for the purposes of determining harbor seal stock structure and requested that all information be made publicly available to allow meaningful review. The letter emphasized the need first to describe stocks on the

basis of the best available information and then adapt management programs to that information, rather than define stocks to suit existing management. Finally, the letter indicated that a number of harbor seal stocks in Alaska may be below their optimum sustainable population range. Suitable management responses to these declines have been delayed due, in part, to the need for resolving the stock structure issue. For that reason, the Marine Mammal Commission recommended that the Service, with the Alaska Native Harbor Seal Commission, move forward expeditiously to (1) redefine stock structure in accordance with the new scientific information, (2) review the status of the newly defined stocks, and (3) develop and implement suitable recovery and conservation measures. At the end of 2002 the Service and the Alaska Native Harbor Seal Commission had not yet held final discussions on the use of the new information to redefine stock structure.

## Abundance and Trends

In Alaska, the Service monitors harbor seal abundance by dividing the state into five regions and counting seals in a different region each year. Thus, the harbor seal population of the entire state is assessed every five years. In addition, the Alaska Department of Fish and Game assesses population trends in five areas by conducting annual or biennial counts near Ketchikan and Sitka, in Prince William Sound, around the Kodiak Archipelago, and in Bristol Bay. Additional research is conducted by the Service and the Department to (1) characterize haul-out patterns so that the number of seals counted can be adjusted or expanded to a total abundance estimate and (2) correct the counts by removing variability due to factors such as tide, time of day, weather, wind speed, direction, cloud cover, and visibility.

**Southeast Alaska**—The Service's most recent estimate of harbor seals in Southeast Alaska was 37,450 based on adjusted counts during the autumn molt in 1993. Trend surveys have shown that harbor seal numbers near Ketchikan increased about 7.4 percent annually from 1983 to 1998, with a slowing of population growth to about 5.6 percent annually from 1994 to 1998. Before passage of the Marine Mammal Protection Act, tens of thousands of harbor seals were killed in Alaska for commercial purposes and because they were considered to be competitors for commercially valu-

able fish species. The recent increase in harbor seal abundance near Ketchikan may represent recovery from the preceding period of population reduction. Near Sitka, adjusted counts increased at about 0.7 percent annually from 1984 to 2001, but suggest a decrease from 1995 to 2001 at about -0.4 percent annually. In Glacier Bay, recent analyses of data from 1992 to 2002 indicate an unexplained harbor seal decline of 14.5 percent annually. Although harbor seals in Southeast Alaska are generally thought to be increasing, this conclusion is based largely on trends in the Ketchikan region and is not consistent with the trends near Sitka or in Glacier Bay.

**Gulf of Alaska and Aleutian Islands**—The Service's most recent estimate of harbor seal numbers in the Gulf of Alaska (including the Aleutian Islands) is 35,981 based on surveys conducted in 1996. This number appears to have declined significantly over the past several decades. Counts in Prince William Sound decreased by about 63 percent from 1984 to 1997. The decline started before the *Exxon Valdez* oil spill in 1989, but was most severe in the year of the spill. Over the past decade seal abundance in this area has declined at 3 to 4 percent annually. Counts in the Kodiak Archipelago from 1976 to 1992 revealed an even more severe decline. During that period, counts on Tugidak Island (south of Kodiak Island) dropped from nearly 7,000 to fewer than 1,000, a decline of 85 to 90 percent. From 1993 to 2001 adjusted counts in the Kodiak area increased at about 6.6 percent annually although the number of harbor seals in this region still remains significantly depressed relative to numbers observed in the 1970s.

The first survey specifically designed to census harbor seals in the Aleutian Islands was conducted by the Service in 1994 and resulted in an unadjusted population estimate of 3,489. Because counts were not conducted in the Aleutian Islands before 1994, trends in this region cannot be assessed. The Service conducted harbor seal surveys in the Aleutian Islands in 1999 and in the Gulf of Alaska in 2001 but the results of these surveys are not yet available.

**Bering Sea**—The Service's most recent estimate of harbor seal abundance in the Bering Sea is 13,312, based on surveys conducted during the autumn molt in 1995. In this region, the status and trends of harbor seals are less clear due to lim-

ited baseline data and the undetermined influence of covariates (e.g., some counts were conducted during the pupping season whereas others were conducted during the molting season; the effects of tides may be considerable but were not accounted for in the surveys). Nonetheless, the available data suggest a significant decline, at least in some areas. Counts on Otter Island in the Pribilof Islands declined by more than 80 percent from 1,175 in 1974 to 202 in 1995. Counts on the north side of the Alaska Peninsula declined by more than 60 percent from 1975 to 1995, or about 3.5 percent per year. Harbor seal numbers in northern Bristol Bay also declined in the 1970s and 1980s. In the 1990s counts during the pupping and molting periods in Nanvak Bay in the northern Bristol Bay region increased at 9.2 percent and 2.1 percent annually, respectively, indicating that some reversal of the previous decline may be occurring. However, counts in this region (and elsewhere in the Bering Sea region) may be unreliable because of the possible misidentification of spotted seals as harbor seals. Adjusted counts in Bristol Bay from 1998 to 2001 indicate that harbor seal numbers in this region may be stable or declining slowly. The Service conducted a survey of harbor seals in the Bering Sea in 2000, but the results are not yet available.

**Factors Contributing to the Harbor Seal Decline**—A range of factors may have contributed to the observed declines of harbor seals in Alaska. These may vary by region and by time. Natural factors could include ecosystem changes that alter the quality and quantity of available food or habitat; predation by killer whales, sharks, and Steller sea lions; disease; and emigration. Human-related factors could include past commercial harvests, illegal killing, subsistence harvests by Alaska Natives, incidental mortality in fisheries, reduced fitness due to contaminants, entanglement in marine debris, and changes in the quality or quantity of available food or habitat due to fisheries removal of prey (e.g., competition for important prey species). Available data are not sufficient to evaluate the relative importance of each of these factors in the decline of harbor seals in Alaska.

### Co-Management of Harbor Seals

Beginning in 1992 the National Marine Fisheries Service contracted with the Alaska Department of Fish and Game to survey Native house-

holds to estimate the number of harbor seals taken annually for subsistence purposes. From 1992 to 2001 (excluding 1999), estimates of the annual harvest were between about 2,000 and 2,900 animals. The most recent survey was for 2001 and indicated 1,797 seals were harvested and 234 were struck and lost for an estimated total of 2,031 seals. Estimates of the subsistence harvest in 2002 are not yet available.

Because harbor seals are a traditional subsistence resource for Alaska Natives, the Service works with Alaska Native groups on matters pertaining to subsistence hunting and related research. On 29 April 1999 the Service and the Alaska Native Harbor Seal Commission signed a co-management agreement pursuant to section 119 of the Marine Mammal Protection Act. The purposes of the agreement were to (1) develop an annual action plan for co-management of the subsistence harvest of harbor seals, (2) promote the sustained health of harbor seal populations to protect Alaska Native culture, (3) promote scientific research to support management decisions, (4) identify and resolve management conflicts, and (5) provide information to subsistence hunters and the public at large to increase understanding of the sustainable use, management, and conservation of harbor seals. The agreement establishes a harbor seal co-management committee comprising three members each from the Alaska Native Harbor Seal Commission and the National Marine Fisheries Service. The primary purpose of the committee is to develop the annual action plan, the main elements of which are population monitoring, harvest management, education, and research recommendations.

In September 2000 the Service and the harbor seal commission held a workshop in Juneau, Alaska, to identify specific objectives for the first action plan under the co-management agreement. Workshop participants were invited from academia, federal and state governments, and Alaska Native tribes on the basis of their expertise in population monitoring, harvest management, and education. The workshop resulted in the formulation of an action plan for 2001 setting forth responsibilities for both the Service and the commission.

The co-management agreement between the Service and the Alaska Native Harbor Seal Commission provides for cooperative monitoring of the subsistence harvest and an opportunity for research-

ers and Alaska Native hunters to conduct cooperative research using biological samples collected from harvested animals. The sampling efforts provide tissues and information that can be used to address research questions on topics including, but not limited to, stock structure, diet, health and condition, contaminant loads, and age and sex composition of harvested animals and the wild population. By taking advantage of the sampling opportunities provided by the subsistence harvests, scientists and hunters provide important information that is difficult to collect with nonlethal study methods.

At its 2001 annual meeting, the Marine Mammal Commission was informed that the Alaska Native Harbor Seal Commission and the Service were working to improve cooperation on joint research efforts. The Alaska Department of Fish and Game, which has played a key role in harbor seal research in Alaska for several decades, has also participated in cooperative research on harbor seals. The contributions of these and other research participants (e.g., the Alaska SeaLife Center and researchers from various universities) should enhance the results of the sample program, but the infrastructure for such cooperation appears to require additional development. For that reason, in its letter of 31 December 2001 the Commission recommended that the Service continue to work closely with the Alaska Department of Fish and Game and the Alaska Native Harbor Seal Commission to ensure that they are able to take full advantage of the sampling opportunities associated with the subsistence harvest.

## Funding

Over the past decade Congress has allocated funds for various research and management projects related to harbor seals in Alaska. Those funds have been administered through the National Marine Fisheries Service in the form of grants and contracts, and have provided the support for basic research on harbor seals, monitoring of subsistence harvests, and related activities. In each of fiscal years 2000 and 2001, the total amount to be allocated for these purposes was about \$900,000. Although historically the majority of these funds were directed toward the harbor seal research program in the Alaska Department of Fish and Game, Congress revised the allocation of those funds for fiscal year 2002, dividing the allocation between the

Alaska Native Harbor Seal Commission and the Alaska SeaLife Center. The state's research program was continued through cooperative efforts with the Service and the Alaska SeaLife Center. At the end of 2002 funding to maintain the state's program in 2003 and beyond had not been identified. This program carries out important long-term research to provide scientific information needed for management. Such research includes studies of population abundance and trends, vital rates (survival and reproduction), other life history characteristics (e.g., pupping and molting phenology), foraging patterns and diet, distribution and movement patterns, and contaminant levels in seals and their effects. The loss of funding for the state program will likely have a significant impact on management of harbor seals in Alaska.

In 2002 the Alaska Native Harbor Seal Commission received \$439,000. The commission used those funds to assess statewide subsistence harvests of harbor seals and Steller sea lions (in collaboration with the Subsistence Division of the Alaska Department of Fish and Game); hire a survey coordinator; support collection, processing, and archiving of tissue samples from harvested animals; coordinate with researchers who may use the samples for research; and hold a workshop of researchers from around the state to review studies of vessel disturbance and its effects on harbor seals.

In 2002 the Alaska SeaLife Center also received \$439,000. They used those funds to deploy remote-controlled video cameras to monitor harbor seal numbers and haul-out activity in Aialik Bay; document vessel traffic in the region and the effects of vessels on harbor seal activity patterns; study the health, condition, and diet of harbor seals using captive animals; monitor movement patterns, health and condition, and vital rates of wild seals; process and distribute samples from the subsistence harvest to examine contaminant levels; and obtain reproductive tracts to investigate reproductive parameters.

Each of these organizations—the Alaska Department of Fish and Game, the Alaska Native Harbor Seal Commission, and the Alaska SeaLife Center—has the potential to contribute significantly to research needed for management and conservation purposes. The amount of funding and the manner in which the funds are distributed among these programs could have significant implications for harbor seals in Alaska. At the end of 2002 it

was not clear how much funding will be available from federal sources in fiscal year 2003 or how the funds would be distributed.