

Humpback Whales in the Central North Pacific (*Megaptera novaeangliae*)

Humpback whales occur in all the world's oceans and were severely depleted by commercial whaling during the early 1900s. In the North Pacific alone, more than 28,000 whales were killed during that period. One analysis suggests that 15,000 humpback whales inhabited the North Pacific Ocean before commercial whaling began. By the mid-1960s their numbers may have been reduced to as few as 1,000 whales. Following a similar measure adopted for the North Atlantic humpback whales in 1955, the International Whaling Commission prohibited the taking of humpback whales in the North Pacific Ocean in 1966, and the ban has remained in place since then.

Three populations are currently recognized to occur in the North Pacific Ocean, the largest being the central North Pacific population. Like all humpback whale populations, this population migrates annually between winter calving and mating grounds in the Tropics and summer feeding grounds in temperate and boreal latitudes. Between November and May whales use the coastal waters of the main Hawaiian Islands as calving and mating grounds. Based on aerial surveys conducted



Figure 10. Humpback whales were severely depleted by commercial whaling. Their largest population in the North Pacific Ocean, the central North Pacific stock, migrates between winter calving grounds in coastal waters of Hawaii and summer feeding grounds along the coast of the Gulf of Alaska. (Photo by Ann Zoidis, courtesy of Allied Whale.)

throughout the main Hawaiian Islands in 1993, 1995, 1998, and 2000, the population appears to have been increasing at an average annual rate of about 7 percent per year. The most recent survey produced an abundance estimate of 4,491 whales (95 percent confidence interval 2,044 to 5,836).

The other two stocks of humpback whales in the North Pacific Ocean are the western stock, which calves in the Bonin and Ryukyu Islands south of the main islands of Japan (estimated to number a few hundred whales), and the eastern stock, which calves along the west coast of Mexico and Central America (estimated to number about 1,000 whales).

Humpback whales rarely feed while on their winter calving grounds. Instead they subsist on fat reserves stored in their blubber during the summer feeding season. At the end of the calving season, humpback whales in Hawaii migrate north to feeding grounds along the northern rim of the North Pacific Ocean, principally in coastal waters along the Gulf of Alaska from British Columbia to the Alaska Peninsula. The 2,000–3,000-mile trip requires about two months. Some individuals, however, have been tracked to waters along the Aleutian Islands and into the Bering Sea where their summer feeding range may overlap with the western North Pacific stock. The summer feeding range of the eastern stock occurs in coastal waters between California and British Columbia. They feed principally on krill and small schooling fish (e.g., herring, walleye pollock, anchovies, and capelin).

Many individual whales in the central North Pacific population exhibit strong patterns of site fidelity to specific feeding grounds off Alaska, but this does not appear to be the case on the Hawaiian wintering grounds. For example, there is little evidence that the whales that regularly use particular feeding areas in Alaska (e.g., Prince William Sound or southeastern Alaska) return repeatedly to the same islands in Hawaii year after year. There is, however, evidence that at least some whales travel in loose aggregations between islands in Hawaii. Although it has been suggested that the whales generally move in a northwesterly direction from the island of Hawaii toward Oahu as the winter season progresses, evidence for this is limited, and individual whales have been documented to move in both directions between individual islands within a season. Their distribution in the Hawaiian archipelago is principally in waters less than 100 fathoms (183 m) deep in the main Hawaiian Islands,

and they are rarely seen in the remote Northwestern Hawaiian Islands.

With an 11½-month gestation period and a one-year nursing period, adult females generally produce a single calf every two to three years. When competing for access to females in estrous, adult males frequently vocalize, breach, and slap the ocean surface with their tails in apparent attempts to attract females or ward off other males.

Hawaiian Humpback Whale Sanctuary

On 4 November 1992 Congress passed Public Law 102-587 designating certain waters within the 100-fathom (183 m) bathymetric contour around the main Hawaiian Islands as the Hawaiian Islands Humpback Whale National Marine Sanctuary (see Fig. 11). Its purposes are to help protect humpback whales and their habitat in Hawaii, educate the public about the relationship between the whales and Hawaii's marine habitat, manage human uses consistent with the enabling

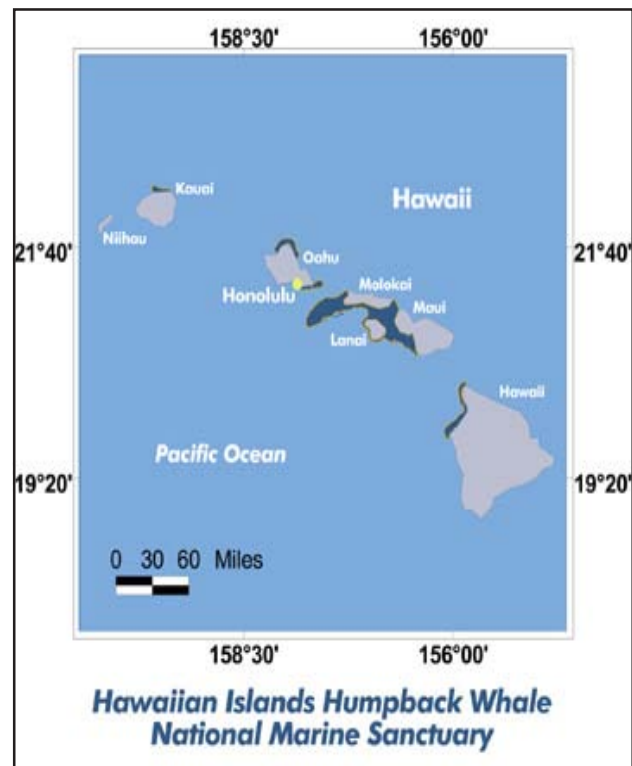


Figure 11. The Hawaiian Humpback Whale National Marine Sanctuary (shown in black) was designated in 1992 in certain Hawaiian waters within the 100-fathom contour to help protect humpback whales. (Figure courtesy of the National Marine Sanctuary Program.)

legislation, and identify marine resources of national significance for possible inclusion in the sanctuary at a later date. Approximately half of the 1,370-sq.-mi. sanctuary is included in a contiguous area between the islands of Molokai, Maui, and Lanai in the central portion of the main Hawaiian Islands. The remainder includes isolated strips of coastal waters on the north shores of Hawaii, Oahu, and Kauai.

The National Marine Sanctuary Program in the National Oceanic and Atmospheric Administration's National Ocean Service and the State of Hawaii manage the sanctuary. Sanctuary regulations prohibit approaching humpback whales closer than 100 yards and operating aircraft below 1,000 feet when over a humpback whale (except during takeoffs and landings).

When NOAA designated the sanctuary, it committed to the State of Hawaii that, within five years of adopting a sanctuary management plan, it would evaluate progress toward implementing the sanctuary. The agency also agreed to submit the results of its five-year evaluation and any proposed revisions that might affect state waters to the Governor of Hawaii for approval. The initial management plan and implementing regulations were adopted in the spring of 1997.

The National Ocean Service completed its review and a draft revised sanctuary management plan early in 2002. The Service proposed to leave sanctuary boundaries and regulations unchanged, but to modify its sanctuary management plan to include a revised set of goals, priorities, and programs for the next five years. On 21 March 2002 the Service wrote to the Commission and other agencies, organizations, and individuals asking for comments on its revised draft management plan.

The revised plan included a description of sanctuary accomplishments since 1997. Among other things, it noted that the sanctuary had trained and funded an enforcement officer to work on whale protection during the annual calving season, helped fund more than 20 studies and research projects, and implemented numerous community outreach efforts to promote public awareness and protection of the humpback whales in Hawaiian waters. During the five years, the number of whales observed had increased and Hawaii's whale-watching industry had grown to an estimated \$11 million per year in direct revenues. The National Ocean Service proposed restructuring the sanctuary man-

agement program according to lists of seven goals, 24 objectives, and numerous other activities.

On 14 May 2002 the Marine Mammal Commission responded to the National Ocean Service's request for comments on the revised draft management plan. The Commission concluded that the importance of the sanctuary for protecting humpback whales and continuing research and education programs would likely increase in the future. In general, the proposed provisions seemed appropriate and useful, and the Commission recommended that the plan be adopted subject to certain modifications described below.

Whale-Watching Regulations—With respect to whale-watching, the Commission noted that several measures in the draft plan might be modified to improve protection of the whales. First, although the established regulations prohibit approaches closer than 100 yards to a humpback whale, a vessel may find itself closer than 100 yards because whale-watching vessels may drift toward the focal animal or whales may move toward a vessel. The regulations, however, provide no guidance or procedures for vessel operators should they decide to withdraw from a whale that has moved closer than 100 yards. The Commission therefore recommended that the National Ocean Service revise the regulations to describe procedures vessel operators should use when leaving whales that are closer than 100 yards (e.g., upon starting the engines for departure leave them running in idle for a brief period, move directly away from the whale at slow speed, and avoid sudden changes in engine speed or direction).

Second, the Commission noted that a recent review of collisions between whales and ships (see Laist et al. 2001 in Appendix B) had found that all types of vessels may hit and injure whales, including whale-watching vessels. In most cases, whales that are hit are not seen beforehand. The review also found that collisions causing serious injuries to whales had rarely been documented for vessels traveling at less than 14 knots. Noting that unseen whales may occur near observed whales and that collisions between whale-watching boats and humpback whales have been documented, the Commission recommended that the regulations be revised to require use of speeds of 12 knots or less when within one nautical mile of any observed whales.

Third, the Commission noted that compliance with approach rules could be improved substan-

tially if passengers aboard whale-watching vessels were aware of required approach procedures and phone numbers for reporting observed violations. This would provide an incentive for self-policing by commercial vessels and might help in identifying private vessels observed violating approach rules. The Commission therefore recommended that the regulations be revised to require that commercial whale-watching operators post placards aboard their vessels describing the rules for approaching humpback whales off Hawaii and providing the phone numbers to call to report violations.

Identification of Other Significant Resources—When the humpback whale sanctuary was designated in 1992, Congress directed that efforts be undertaken to identify and evaluate significant marine resources other than humpback whales that should be included within the sanctuary boundaries. During the process of developing the initial sanctuary management plan, a Sanctuary Advisory Committee and the public identified a number of additional significant resources, including Hawaiian monk seals, sea turtles, and coral reefs. Actions to address the Congressional directive, however, were deferred by the National Ocean Service. The draft revised plan therefore proposed a new schedule for this process that would begin in 2006 and be implemented in 2007 or thereafter. The Commission recommended that the Service accelerate the draft management plan schedule for considering new marine resources that might be added to the scope of the sanctuary management and that Hawaiian monk seals be among the added resources considered during that process.

Research and Management Information Exchange—The draft plan also called for continuing a number of research and monitoring studies to assess humpback whales and the effects of human activities on them and their habitat. Many researchers are conducting studies on aspects of humpback whale behavior and biology in Hawaii. To enhance communications among researchers, managers, and the public, the draft plan proposed various activities, including the development of a research web site and a research newsletter and holding informational workshops and seminars. Although noting that these measures seemed appropriate and helpful, the Commission recommended that the revised plan also explicitly include provisions to organize an annual meeting of re-

searchers, stakeholders, and managers to exchange information on recent activities, findings, and plans to promote arrangements for data sharing and discuss issues of mutual concern.

Final Revised Sanctuary Management Plan—The National Ocean Service responded to the Commission's recommendations by letter of 24 July 2002, and in August it published a new sanctuary management plan. In response to comments from the Commission and others, the Service amended its proposed plan to accelerate the schedule for considering other marine resources to be addressed under sanctuary management. Under the new schedule, consideration of other marine resources is to begin in 2004 with a decision on which resources to include to be made in 2005. The Service did not adopt the Commission's recommendations to modify the whale-watching regulations or to include explicit plans for convening annual meetings of researchers. The revised plan was subsequently provided to the Governor of Hawaii for approval and became effective on 9 September 2002.

Alaska Whale-Watching Regulations

On 31 May 2001 the National Marine Fisheries Service adopted final rules that established a 100-yard approach limit in Alaska waters and required that vessels operate "at slow, safe speed when near a whale." In adopting the rule, the Service noted that specific speed limits, as had been recommended by the Commission in comments provided to the Service, were not adopted because the Service had concluded that they were not enforceable or practical. In this regard, it indicated that some vessels had "clutch-in speeds" (i.e., the slowest speed a vessel could go without disengaging the engine) of 10 to 14 knots and could not operate safely at slower speeds. The Commission had recommended that the Service require whale-watching vessels to travel at less than 13 knots.

The Commission wrote to the Service on 18 June 2001 questioning the rationale for its speed provision and recommending that the rules be revised to set forth specific speed limits within explicit distances around whales. The Service's 16 October 2001 response advised that it did not plan to revise the regulations and reiterated its conclusions that specific speed limits were not enforceable or practical. In the opinion of the Commission, the Service's rationale was not compelling.

Nevertheless, the Service advised the Commission that it likely would interpret the term slow, safe speed as 15 knots or less.

The Commission disagreed with the Service on its interpretation of available data, and on 27 December 2001 it again wrote to the Service. It noted that whales have been killed or seriously injured by collisions with ships traveling at 14 to 15 knots and that the Service's interpretation of those speeds as "slow, safe speeds" would still pose a risk to whales. It also noted that vessels frequently operate safely at less than their "clutch-in speed" and requested a detailed explanation as to what vessels had clutch-in speeds greater than 10 knots. To the extent that using speeds slower than a cited speed may endanger vessel safety, the Commission noted that speed restrictions could exempt situations where vessel or human safety could be compromised.

Noting that the public had not had an opportunity to comment on the speed restriction adopted by the Service, the Commission therefore recommended that the Service develop and seek public comments on a revised rule limiting approach speeds to 12 knots within a one-half mile of any humpback whale in inland waters and within a mile in offshore waters of Alaska. It also recommended that a provision be added to the rules to require the posting of approach rules aboard whale-watching vessels so that passengers would be aware of the provisions and vessel operators would be less likely to violate them. Finally, the Commission noted that the Service had no requirements for vessel operators to report to the Service when they knowingly hit a whale. The Commission therefore recommended that the Service develop regulations to require such reporting.

On 30 April 2002 the Service responded to the Commission's letter. The Service noted that it would continue to monitor interactions between whales and vessels in Alaska, but that it did not have data to determine that there was a need to modify the approach rules at this time. The Service also noted that enforcement constraints were its primary concern about citing a specific speed limit and that such concerns were expressed by its office of enforcement and the Coast Guard's 17th District. The Service further noted that most whale-watching vessels in Alaska had a top speed of 20 knots. It may therefore be difficult to argue that 15 knots is indeed slow. Nevertheless, the

letter stated that the Service believed that "a sufficient case for violations could be made for vessels traveling above the 12–15 knot range."

With regard to identifying vessels that have clutch-in speeds greater than 10 knots, the Service stated that some Coast Guard vessels had such clutch-in speeds. It did not dispute the Commission's understanding that such vessels could operate safely below their clutch-in speeds. It therefore remains unclear why the Service concluded that a speed limit of 12 knots is impractical. With regard to requiring that commercial whale-watching operators post approach rules, the Service noted that brochures and placards are currently distributed to vessel operators to provide to their customers and to post and that it conducts regular training sessions with tour companies to explain approach guidelines and regulations. Concerning the recommendation on requiring reports of collisions that kill or seriously injure whales, the Service noted that it would consider the recommendation further.

Stock Structure

During its November 2001 annual meeting, the Commission considered information from recent photo-identification analyses that suggests that humpback whales in the central North Pacific population are partitioned into relatively discrete groups of whales that use individual feeding grounds (e.g., southeastern Alaska, Prince William Sound, the Kodiak Island area, and the eastern Aleutian Islands area). For example, of 287 whales photographed in southeastern Alaska between 1990 and 1993, only four were observed on other Alaska feeding grounds. Thus, although whales using different feeding grounds may interbreed on the winter calving grounds in Hawaii, whales in different feeding grounds seem to form discrete subpopulation units.

With little exchange between feeding groups, the replacement of animals lost from any one group by those of another group is likely to occur very slowly. For this reason, the Alaska Scientific Review Group (a group of marine mammal experts that helps the Service review and update Alaska marine mammal stock assessment reports) recommended in December 2000 that the Service develop separate population estimates and potential biological removal levels for each identified summer feeding area.

The Marine Mammal Commission concluded that this recommendation had merit. Therefore, by letter of 27 December 2001, the Commission expressed the view that, when there is strong evidence that the loss of a regional group of marine mammals is unlikely to be replaced within a few generations by members of the same species from surrounding areas, the Service should treat that group as a separate management unit for purposes of preparing marine mammal stock assessment reports. It also noted, however, that subdivisions into such units be approached cautiously. It noted that such decisions seem warranted only when there is strong evidence to indicate that members of a group exhibit a high degree of site fidelity and discreteness from other population components, that they represent an ecologically significant part of the regional ecosystem, that immigration from other areas is not likely to occur for at least several generations, and that their geographic extent comprises a significant part of the population's overall range. Noting that groups using at least some Alaska feeding grounds appear to meet these criteria, the Commission recommended that the Service develop separate stock assessments for the humpback whales using southeastern Alaska, Prince William Sound, and, if information warrants, other Alaska feeding areas.

In its 30 April 2002 response, the Service noted that, although southeastern Alaska appears to support a discrete group of whales, some information suggests that whales using more westerly feeding areas, including Prince William Sound, may move between feeding areas. Given the Scientific Review Group's recommendation, it advised that the Service's National Marine Mammal Laboratory would likely be receiving funds in 2002 to update abundance estimates for the total central North Pacific population and for that portion that forages annually in southeastern Alaska. The Service

also noted that it hoped to provide that information to the review group in the fall of 2002 to help draft the 2003 stock assessment reports.

The Alaska Scientific Review Group met on 4–5 November 2002 and, among other things, reviewed information on the central North Pacific humpback whale population. In preparation for the meeting, the Service provided funds to the University of Alaska to develop an estimate of the portion of the North Pacific stock that feeds in southeastern Alaska. Although final results of the work were not available in time for the meeting, the group recommended an approach for revising the population's stock assessment report such that the feeding group of humpback whales in southeastern Alaska would continue to be recognized as part of the central North Pacific stock, but that a separate potential biological removal (PBR) level would be calculated for the whales feeding in southeastern Alaska. The PBR level is an estimate of the number of whales that can be removed from a stock annually (other than by natural causes) while still maintaining a high degree of assurance that it will increase toward or remain at its optimum sustainable population level. New abundance and growth rate estimates for the southeastern Alaska feeding group, which are needed to calculate the PBR level, are expected to be incorporated into the draft stock assessment reports that will be made available in 2003.

As a related matter, Service scientists and collaborators met in December 2002 to begin planning a North Pacific-wide research project on the structure of populations, levels of abundance and status of humpback whales in the Pacific. If funding can be secured, the project will be initiated in 2003. If successfully completed, the project could provide much information for revising and improving the North Pacific Ocean humpback whale stock assessments.