

Gray Whale (*Eschrichtius robustus*)

Gray whales (Fig. 6) are divided into two discrete populations, one on either side of the North Pacific Ocean. The eastern population migrates along the West Coast of North America between winter calving grounds along Baja California, Mexico, and summer feeding grounds in the Bering and Chukchi Seas between Alaska and Russia. The annual migration of some gray whales back and forth between calving and breeding grounds can exceed 10,000 miles, making it the longest annual migration of any mammal. The western population occurs along the Asian coast, where it migrates between summer feeding grounds off Sakhalin Island, Russia (about 500 miles north of the Japanese island of Hokkaido), and winter calving grounds at an unknown location suspected to be in the South China Sea.

Commercial whaling severely depleted both populations between the mid-1800s and early 1900s. As a result, gray whales were protected under a ban on commercial hunting adopted by the League of Nations in the mid-1930s. This ban, which also covered right whales, was the first international agreement to protect a whale species from commercial whaling. The ban on commercial gray whale catches has been carried forward since the late 1940s by the International Whaling Commission. Gray whales also were listed as endangered under the Endangered Species Conservation Act of 1969, the predecessor to the U.S. Endangered Species Act of 1973.

Under this protection, eastern gray whales made one of the most complete recoveries of any large whale population that had been depleted by commercial whaling. By the early 1990s eastern gray whales had recovered to levels thought to be at or near the preexploitation population size, and in 1994 the Service removed the population from the U.S. list of endangered and threatened species, making it the first marine mammal population (and the only one to date) to be delisted. Recently, however, concern arose about its status after the number of gray whales found dead along the U.S., Canadian, and Mexican coasts increased sixfold and calf production dropped to record lows.

Unlike the eastern population, the western population has shown no signs of recovery. It is



Figure 6. Western gray whale breaching off the coast of Sakhalin Island, Russia. (Photo by David Weller, courtesy of the National Marine Fisheries Service.)

one of the world's most critically endangered populations of whales and remains listed as endangered on the U.S. list of endangered and threatened species.

During the Marine Mammal Commission's 2002 annual meeting on 8–10 October in San Diego, California, information on the status and conservation of both gray whale populations was presented by researchers with the Service and reviewed by the Commission and its Committee of Scientific Advisors on Marine Mammals. Results of that review are discussed below.

The Eastern North Pacific Gray Whale Population

The eastern population of gray whales was reduced to perhaps 1,000 to 2,000 whales by the early 1900s by commercial whaling. It had recovered to an estimated level of more than 20,000 whales by 1994 when it was removed from the U.S. endangered and threatened species list. Upon removal of a species from that list, the Endangered Species Act requires that a five-year monitoring program be undertaken to ensure that the Act's protection is no longer needed. The National Marine Fisheries Service implemented such a program, and in March 1999 it convened a workshop to review the results and consider further actions.

Participants at that workshop concluded that eastern gray whales were at or near carrying capacity (i.e., the maximum number of individuals supportable by the ecosystem) and were neither endangered nor threatened as defined by the Act. They noted, however, that continued monitoring of the population offered important opportunities to gain insight into a number of significant biological and management issues. Among these are how to estimate the carrying capacity of large whale populations; how abundance levels change as populations reach carrying capacity levels; and what factors are likely to regulate the abundance of large whale populations once they reach carrying capacity. Accordingly, workshop participants recommended that monitoring efforts be continued for an additional five years. As discussed below, shortly after that workshop the population began to show signs of a decline, further underscoring the need for continued monitoring.

Recent Strandings and Calf Production—

In 1999 and 2000 unprecedented numbers of gray whales were found dead or dying along the coast-

line between Alaska and Mexico. Before 1999 gray whale strandings had averaged about 40 a year, with a record one-year total of 87 carcasses. In 1999 and 2000 stranding totals leaped to 284 and 377. Most of the whales were adults and subadults in unusually thin condition, suggesting that limited prey availability had been a factor in their deaths. Aerial photogrammetric studies of migrating whales undertaken by the Service beginning in 1997 to assess the condition of live whales also supported this conclusion. By measuring the ratio of whale lengths to widths in photos of animals migrating southward from their feeding grounds, Service researchers developed an index to assess the fatness and general condition of the whales. The results of studies in 1999 and 2000 revealed a marked increase in the number of unusually thin whales.

Also in 1999 and 2000 calf counts of gray whales migrating north from their calving grounds past Point Piedras Blancas, California, declined sharply to the lowest levels on record. Between 1994, when the Service began annual counts, and 1998, an average of nearly 375 calves was counted annually, with a maximum of 501 calves in 1997 and a low of 194 calves in 1995. In 1999 and 2000 the counts dropped to 141 and 96.

As this information became available, the Commission wrote to the Service on 7 August 2001 and again on 15 January 2002, recommending that the Service develop a second five-year research plan, complete a stranding response plan to better coordinate gray whale stranding investigations, assess effects of the 1999–2000 die-off on the population's status, and review planned research to ensure that information is adequate to assess the population's status and conservation needs.

On 5 March 2002 the Service responded to the Commission's letters. Based on information gathered since 1994, the Service continued to believe that the eastern gray whale population was neither endangered nor threatened and did not warrant protection under the Endangered Species Act. A second five-year monitoring program under the Act's post-delisting provisions, therefore, was not required. However, recognizing the importance of further monitoring, the Service noted that it planned to continue annual calf counts on northbound migrations through at least 2004 and that it had conducted additional population counts on southbound migrations in the winters of 2000–2001 and 2001–2002. It also noted that steps had

been taken to improve the stranding response program and that it was analyzing effects of the 1999–2000 die-off on the population’s status.

At the Commission’s October 2002 annual meeting, Service representatives noted that limited prey could have affected both mortality and calf production in 1999 and 2000. They noted that increased attention had been focused on examining conditions in the population’s main feeding grounds in the Bering and Chukchi Seas. Gray whales feed mostly on small benthic organisms, particularly small shrimp-like animals called amphipods, by filtering mouthfuls of soft muddy sediment through their baleen. In the 1980s benthic ecologists reported a decline in the abundance and size of amphipods in a key gray whale feeding area south of Bering Strait and north of St. Lawrence Island in the north-central Bering Sea. They suggested that the increase in gray whale abundance may have been the cause. There is evidence that amphipod abundance in the area has remained low since then. Although the cause of the amphipod decline remains uncertain, climate change, as well as increased gray whale foraging, are possible factors. Nevertheless, the gray whale population continued to increase through the 1990s.

To help assess gray whale feeding activity, the National Marine Fisheries Service conducted an

aerial survey in 2001 over parts of the eastern population’s feeding grounds. Surveys in the 1980s revealed that most feeding activity occurred in a shallow basin located in the northernmost Bering Sea. Survey flights in 2001, however, found few whales in that area. Instead, a dense concentration of feeding whales was found north of the Bering Strait in the southern Chukchi Sea where few whales had been seen in the 1980s. Although only a small proportion of the population was seen during the 2001 flight and although whale distribution may change from year to year, results of the 2001 survey suggested that the species’ principal feeding grounds may have shifted in the past 15 years to areas north of Bering Strait.

Service scientists have attempted to correlate trends in calf production with changes in seasonal ice cover at the time whales arrive at their feeding grounds in spring. In some years when ice is slow to retreat through the Bering Strait, gray whale access to the most productive feeding grounds, now possibly located north of the strait, might be delayed or shortened, leaving females in poor condition and less able to either become pregnant or successfully carry a calf to term. Results of the investigation found a strong correlation. Years of heavy spring ice cover in the northern Bering Sea were followed by low calf counts the following spring, but years of light spring ice cover were followed by higher calf counts the following spring.

Although calf counts remained low in 2001, ice cover over the northern Bering Sea in the spring of 2001 was relatively light. Service scientists therefore predicted that calf production would increase in 2002. Although a final spring calf count for 2002 was not provided at the Commission’s October meeting, Service scientists reported that it had apparently increased as predicted. Also in 2001 gray whale strandings declined to 21 animals and remained at more normal levels in 2002. Based on ice cover in the spring of 2002, Service scientists predict that calf counts in 2003 will again be high.

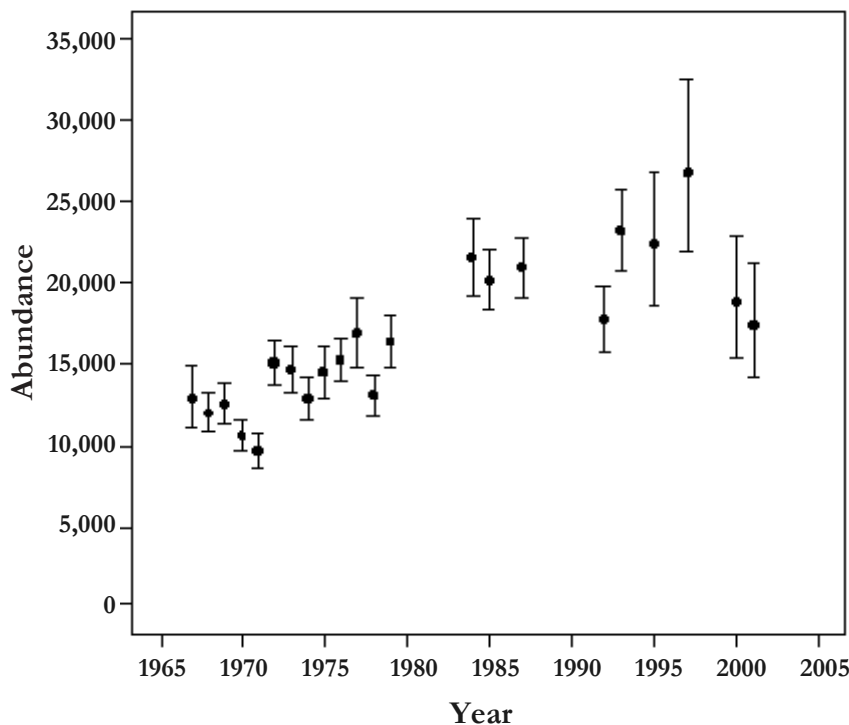


Figure 7. Gray whale population abundance.

Population Status and Trends—Abundance estimates for eastern gray whales are based on winter counts made as gray whales migrate south along the coast of California to their calving grounds. National Marine Fisheries Service researchers have made 22 such counts since 1967. Recent counts leave little doubt that the eastern gray whale population declined as a result of the 1999–2000 die-off. Population estimates for the winters of 1997–1998, 2000–2001, and 2001–2002 declined from 26,635 (95 percent confidence interval 21,877 to 32,428) to 18,761 (95 percent confidence interval 15,429 to 22,812) to 17,414 (95 percent confidence interval 14,322 to 21,174), respectively.

The magnitude of the recent decline, however, may be far less than the 12,313 suggested by these point estimates. During the Commission's annual meeting, Service scientists noted that, given the imprecision of population estimation techniques, counts sometimes produce what appear to be artificially high and low numbers when counts are viewed in a longer-term context (Fig. 7). In this regard, the count during the winter of 1997–1998 produced an estimate that appears suspiciously high. In addition, when the estimates are viewed over 30 years, it appears that the population size increased between the 1970s and early 1980s and remained relatively stable within a range of about 18,000–23,000 between the mid-1980s and 1999. Thus, the decline in 1999 and 2000 may only have been a few thousand animals. Based on this information, Service scientists concluded that the decline in 1999 and 2000 had ended, and that it was caused by changes in environmental conditions that affected gray whale foraging patterns, which in turn affected the condition of adult whales. In the future, year-to-year variations in environmental conditions can be expected to produce periodic fluctuations in the population.

Future Research and Monitoring Plans—During its October 2002 meeting, the Commission was advised by the Service that it planned to continue annual calf counts for the foreseeable future and to continue aerial photogrammetric studies through 2003, at which time it would reevaluate the results. The Service does not plan to conduct a new population count during the winter of 2002 to 2003, but expects to carry out another survey in two or three years if funding is available.

In response to this information, the Commission wrote to the Service on 27 November 2002 concurring with the Service's view that the eastern gray whale population appears to be fluctuating within the range of carrying capacity in response to year-to-year variations in environmental conditions. It commended the Service for its recent efforts to assess and monitor the status of eastern gray whales and recommended that funding and support be continued at the levels provided in recent years to carry those studies forward.

Subsistence Whaling—Native residents in Russia and the United States take gray whales for subsistence and cultural purposes under quotas set by the International Whaling Commission (IWC). The quotas are based on requests by Russian and U.S. delegations to the IWC on behalf of their respective Native communities. At its 1998 meeting, the IWC adopted a five-year quota of 620 whales, with no more than 140 whales to be taken in any one year, for 1998 to 2002. Historically, the vast majority of gray whales have been taken in Russia, with just a few taken by Alaska Eskimo whalers. For example, during the previous five-year quota period (1994 to 1998), annual catches ranged between 42 and 122, with only two gray whales reported taken by Alaska Natives during that entire period.

In the past, a small share of the gray whale quota was requested for Alaska Natives; however, given their preference for bowhead whales and their limited interest in hunting gray whales, no request was made on their behalf to take gray whales when the 1998–2002 quota was considered. To meet the needs of Makah whalers of Washington State, however, the U.S. delegation requested and was granted a share of five whales per year, with the remaining 135 allocated to Russian hunters.

Since 1998 the Makah Tribe and the Department of Commerce have taken steps to reestablish a traditional gray whale hunt that has not been practiced since early in the 1900s. As a result of court action in 2001 on a suit challenging the adequacy of the Department's environmental assessment on the Makah Tribe's whaling program, the Department was directed to complete and circulate a new environmental assessment in 2002. The Service completed a revised assessment, which again was challenged for its adequacy in a new lawsuit filed in January 2002 (*Anderson v. Evans*). The

plaintiffs also contended that whaling by the tribe must be authorized under the Marine Mammal Protection Act, not merely under the quota issued by the International Whaling Commission. On 20 December 2002 the U.S. Court of Appeals for the Ninth Circuit reversed the district court ruling and ruled for the plaintiff on both courses of action. In light of the uncertainty and controversy over the impacts of Makah whaling, the court ordered the Service to prepare an environmental impact statement. In particular, the ruling concluded that the environmental assessment had not adequately considered the potential impact of whaling on the small local group of gray whales that use the Strait of Juan de Fuca between Washington and British Columbia, Canada, as a feeding grounds or the precedent the tribe's resumption of whaling could set for other areas.

More important, the court determined that whaling by the Makah Tribe remains subject to the Marine Mammal Protection Act. In so ruling, the court found that the provision of the Act that allows taking authorized by preexisting treaties and agreements with the Makah Tribe was inapplicable in this case. Further, the court ruled that applying the Marine Mammal Protection Act taking prohibition to the Makah whaling rights recognized in the 1855 Treaty of Neah Bay is necessary to achieve the Act's conservation purpose. Because the court found the Marine Mammal Protection Act applicable to whaling by the Makah Tribe, it did not need to consider the merits of the plaintiffs' alternative argument that the whaling rights contained in the treaty had been abrogated by enactment of the statute.

As of the end of 2002 the federal agencies and the tribe were considering their options, which include seeking rehearing by the court of appeals or seeking review of the case by the U.S. Supreme Court.

Against this backdrop of legal challenges, Makah whalers killed and landed one whale in 1999 but have taken no other whales since then. In 2002, as in 2001, they refrained from engaging in any whaling activity. However, one gray whale was struck, but not landed, in June 2002 by Alaska Natives from the village of Little Diomedé in the Bering Strait. Apparently because of a very poor bowhead whale hunting season in the spring of 2002, village whalers attempted to take a gray whale instead. During the course of the hunt, one of the

whalers was killed. As noted above, the gray whale quota no longer includes provisions for Alaska Natives to take gray whales. As a result, an infractions report may need to be filed with the IWC when it meets next year (see also the IWC section in Chapter V).

With the expiration of the gray whale quota in 2002, the U.S. and Russian delegations to the May 2002 IWC meeting requested an extension of the gray quota at the same level for another five-year period (i.e., 620 whales with no more than 140 whales taken in any one year). The request was granted for the period 2002 to 2007 with five whales per year to be available to Makah whalers.

The Western North Pacific Gray Whale Population

As recently as the 1970s, the western gray whale was thought to be extinct. However, a small remnant population is now known to have survived and is recognized as one of the world's most critically endangered large whale populations. Its only known feeding grounds, off Sakhalin Island, Russia, occurs in an area where several major oil and gas fields are currently undergoing intensive exploration and development. One offshore drilling platform has already been constructed within 20 km of the population's principal feeding area and others are planned. Noise, oil spills, routine discharges, ship traffic, and other perturbations associated with offshore oil and gas exploration and development pose risks both to the remaining whales and their habitat.

In view of the population's critical status, the IWC adopted a resolution concerning western gray whales at its 23–27 July 2001 annual meeting. The resolution called on the population's range states (i.e., those nations with jurisdiction over waters in which the population occurs) and other interested parties to expand research and monitoring efforts on the population, eliminate any sources of human-caused mortality, and reduce all sources of disturbance to the western gray whale population.

Also concerned about the critical status of this population, the Marine Mammal Commission wrote to the National Marine Fisheries Service on 15 January 2002 recommending that Service scientists work cooperatively with their Russian counterparts to design, fund, and implement research and recovery measures necessary to ensure the long-term conservation of this population. The Ser-

vice responded to the Commission's letter on 15 March 2002 noting that, although its scientists were continuing to work closely with their Russian colleagues, the Service was unable to increase its support for work on western gray whales due to critical needs for other marine mammal species in U.S. waters. Recognizing the importance of ongoing research and monitoring to identify impacts and mitigation needs, the Commission provided partial funding to help support the joint U.S.-Russia monitoring studies during the summer of 2002 (see also Chapter VIII). Involved scientists with Texas A&M University and the National Marine Fisheries Service presented results of the 2002 field season and previous research seasons during the Commission's 8–10 October annual meeting.

Oil and Gas Exploration and Development—To evaluate possible effects on gray whales and mitigation needs resulting from planned development of oil reserves off Sakhalin Island (see Fig. 8), Sakhalin Energy Investment Company Limited (the oil consortium led by Royal Dutch/Shell, which is developing one of the major offshore oil

and gas fields nearest to the gray whale feeding grounds) circulated and requested comments on a document early in 2002 entitled “Western Gray Whale Protection Plan: A Framework of Monitoring and Mitigation Measures Related to Sakhalin Energy Oil and Gas Operations on the Northeast Coast of Sakhalin Island, Russia.” The Commission responded to the request on 30 August 2002.

The company's plan concluded that the activities of the Sakhalin Energy Investment Company have not had any long-term negative effects on the gray whale feeding habitat. The document, however, did not describe the spatial and temporal overlap between gray whale feeding activity and oil and gas operations or the cumulative effects of all ongoing and planned activities in the region. In addition, baseline information was not collected on gray whale foraging distribution before exploration activities began. The Commission therefore questioned whether such a conclusion could be justified. The Commission noted that detection and mitigation of possible adverse effects on gray whales would depend to a considerable extent on the quality and objectivity of scientific research and monitoring programs. It encouraged the company to provide adequate support to continue gray whale monitoring studies. It also recommended that mechanisms be provided for the independent review and oversight of gray whale research and monitoring activities, and that the results of those studies be made freely available to the public and outside reviewers.

As of the end of 2002 the Commission had not received a response from the company or a revised document.

Western Gray Whale Research and Monitoring—Since 1997 Russian and U.S. scientists have surveyed gray whales off Sakhalin Island (Fig. 8) for two to four months each summer between June and October. Other than information from Russian aerial surveys between the 1960s and 1980s and a few days of dedicated photo-identification surveys in 1994 and 1995, virtually nothing is known about the use of this area by gray whales before 1997.

Between 1994 and the end of the 2002 field season, 118 individual whales have been photo-identified, including five new animals (other than calves) seen for the first time in 2002. The studies document a high degree of site fidelity among the individual whales to this feeding area, and a vast



Figure 8. The location of Sakhalin Island, Russia, and the western gray whale study site.

majority of the population is now thought to be included in the photo-identification catalogue. Since 1995 researchers have counted a total of 31 calves (between 2 and 8 per year), including 7 in 2002. Many of these calves have not been resighted after the year of their birth, suggesting that calf survival is low. Biopsy samples from 93 individuals also have been collected. Analyses of these samples reveal a strong bias toward males among both calves and older animals. Fewer than 20 reproductively active females have been identified.

The population's principal feeding area appears to be a narrow band of coastal waters about 5 km wide and 70 km long off the northeastern shore of Sakhalin Island. A second feeding area used by fewer whales also has been identified farther offshore. An existing oil and gas platform has been constructed 20 km offshore, southeast of the coastal feeding area, and, as indicated above, other platforms are to be placed in the area. In 2001 high-intensity seismic surveys were conducted over a six-week period near the feeding grounds. During that period, the whales moved south, away from the area being surveyed. After the surveys ended, the whales returned to the area, suggesting that the sound generated by the seismic activity may

have temporarily displaced them from preferred feeding areas.

Like the thin whales seen in the eastern gray whale population in 1999 and 2000, researchers off Sakhalin Island also have reported relatively high numbers of "skinny" whales apparently in poor health (Fig 9). Between 1999 and 2001 the numbers of whales seen in this condition were 17, 31, and 19, respectively. Although most of these whales were observed to be underweight in only one year, nine whales appeared thin in two of those years, and five were seen in this condition all three years. In 2002, 15 skinny whales were observed. The cause of this condition is uncertain, but seems likely to be related to some nutritional problem (e.g., limited prey availability or limited access to key feeding areas).

Because of the potential for human-related impacts along migratory corridors and calving grounds off the southeastern coast of Asia, as well as on the feeding grounds, project scientists expressed serious concern for the future survival of the population. They noted that the proximity of whales to seismic surveys, drilling, ship traffic, and other activities associated with offshore development could displace gray whales from essential feeding areas, and that oil spills, dredging, and other

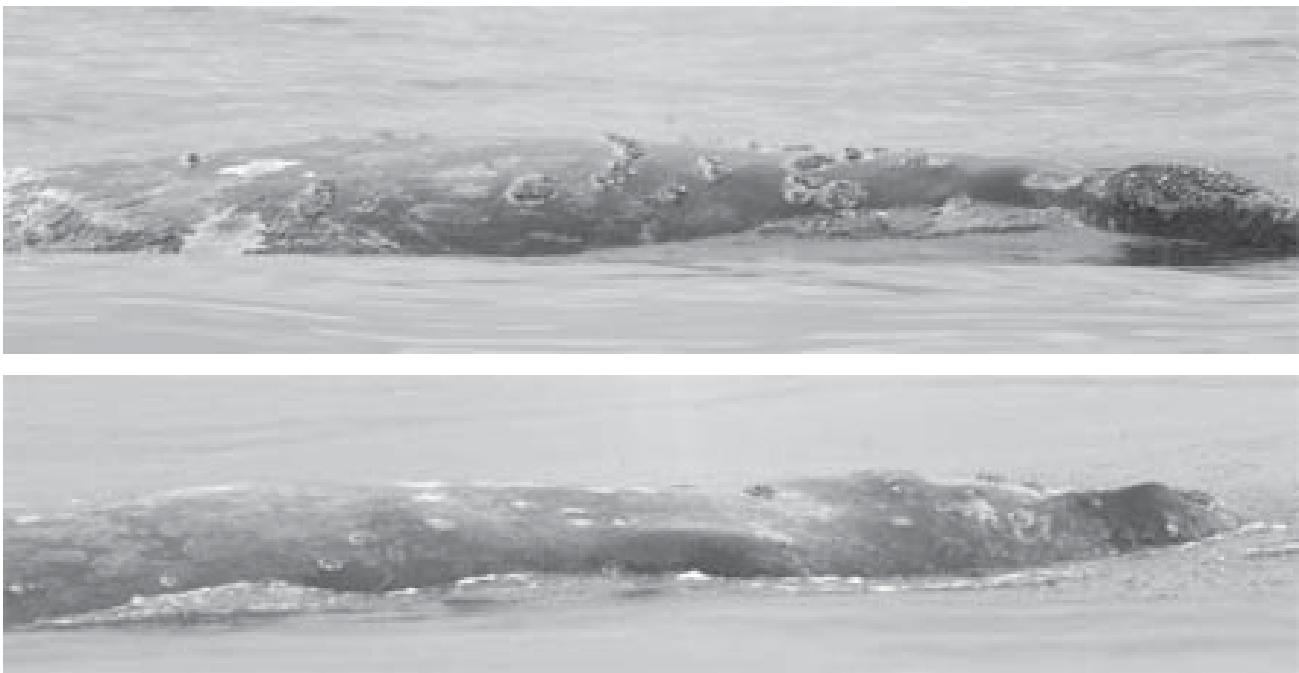


Figure 9. Comparison of a well-nourished (*top*) and a skinny (*bottom*) western gray whale. The dip along the back of the skinny whale behind the blowhole and skull (right side of photos) and the bulge of the scapula (shoulder bone) in the concavity near the water line indicate a thin blubber layer and an undernourished condition. (Photos by David Weller, courtesy of the National Marine Fisheries Service.)

forms of pollution and construction could impact gray whale prey resources.

Project scientists noted that ongoing work was under way to back-calculate population size, conduct survival and mark-recapture abundance estimates, determine patterns of paternity and social relatedness, and synthesize research findings from the past seven years. In addition, they provided details on a special meeting on western gray whales scheduled by the IWC Scientific Committee for 22–25 October 2002 in Korea. The purpose of that meeting was to review information on the status of the population and identify future research and monitoring needs throughout its range. The meeting, which included scientists familiar with data on the population, including those from most of the population's range states (Russia, China, Japan, and the Republic of Korea) was subsequently held as scheduled. A meeting report will be submitted to the IWC at its 2003 annual meeting.

Based on information provided at its October 2002 annual meeting, the Commission wrote to the Service on 27 November 2002. It observed that the photo-identification catalogue and biopsy database offer a valuable opportunity to monitor the health and status of individual whales and determine overall trends in the population. It also noted that further research and monitoring on western gray whales could be very helpful in advancing our understanding of the effects of human activities and environmental variables on whale populations in general. For example, comparisons of trends in the occurrence of skinny whales in both the eastern and western populations could help clarify whether and how broadscale climatic events affect whale populations. The Commission therefore commended the Service for facilitating collaborative research with Russian gray whale scientists and recommended that support be increased as much as possible to carry this work forward for the foreseeable future.