

## Gulf of Maine Harbor Porpoise (*Phocoena phocoena*)

Harbor porpoises occur in relatively discrete regional populations throughout temperate coastal waters of the Northern Hemisphere (Fig. 16). One such population (referred to here as the Gulf of Maine population or stock) is confined to the southern Bay of Fundy and northern Gulf of Maine in summer, but occurs from Maine to New Jersey in the spring and fall and as far south as North Carolina in winter. In the 1980s information suggested that several thousand porpoises per year were being incidentally entangled and drowned in gillnet fisheries in the Bay of Fundy, Canada, and in waters off New England. Although the size of the porpoise population was unknown at that time, it was thought that the catch level was not sustainable.

The situation prompted the Sierra Club Legal Defense Fund in September 1991 to petition the National Marine Fisheries Service to list the Gulf of Maine harbor porpoise stock as threatened under the Endangered Species Act. The Service found merit in the petitioned action and published a proposed rule to list the stock as threatened early in 1993; however, final action was deferred. In 2001 the Service withdrew its proposal (see the



Figure 16. Harbor porpoises, growing to only about 2 m in length, are among the smallest of all cetaceans and are frequently caught incidentally in gillnets. (Photo by Ari Friedlaender.)

previous annual report) in light of new information on stock size and actions being taken to reduce porpoise bycatch under a take reduction plan.

The National Marine Fisheries Service conducted harbor porpoise population surveys in 1991, 1992, 1995, and 1999. Although the first survey yielded a population estimate of 37,500 porpoises (95 percent confidence interval 26,700–86,400), the most recent survey estimate was 89,700 porpoises (95 percent confidence interval 53,400–150,900). The difference between these two estimates likely is due primarily to better spatial coverage in the 1999 survey and improved statistical methods; however, an actual increase in numbers is also possible, if not likely, given evidence of declining bycatch levels over the past decade.

From the 1960s, when regional gillnet fishing began, until the mid-1980s, almost all of the region's porpoise bycatch was in U.S. and Canadian gillnet fisheries for groundfish (i.e., cod, haddock, and flounder). As gillnetters began targeting other species (e.g., dogfish and monkfish), harbor porpoises were caught in those fisheries as well.

In the late 1980s the Service began placing observers aboard a sample (about 5–10 percent) of New England groundfish gillnet vessels to estimate bycatch levels. By comparing the number of porpoises taken and amount of fish caught on observed trips with total fish landings for the fishery, bycatch estimates were generated for the entire New England groundfish fishery. In 1993 the Canada Department of Fisheries and Oceans began a similar program in the Bay of Fundy. In the early 1990s observers began covering the New England dogfish and monkfish fisheries, and in the mid-1990s observers also began covering gillnet fisheries south of New England targeting dogfish, monkfish, and coastal finfish (i.e., shad, weakfish, bluefish, and rockfish).

Bycatch estimates from these observer efforts through 2001 (the latest year for which complete annual analyses are available) are shown in Table 4. Because some fisheries known to catch harbor porpoises have gone unmonitored, particularly in the early 1990s, these estimates are incomplete to various degrees. For example, between 1990 and

**Table 4. Estimates of harbor porpoise bycatch in sink gillnet fisheries in the Bay of Fundy (Canada), New England (United States), and off the U.S. mid-Atlantic States, 1990–2001<sup>1</sup>**

Year	New England <sup>2</sup>	Bay of Fundy <sup>3</sup>	U.S. Mid-Atlantic <sup>4</sup>	Other <sup>5</sup>	Total
1990	2,900 (1,500–5,000)	—	—	—	—
1991	2,000 (1,000–3,800)	—	—	—	—
1992	1,200 (800–1,700)	—	—	—	—
1993	1,400 (1,000–2,000)	424 (200–648)	—	—	—
1994	2,100 (1,400–2,900)	101 (80–122)	—	—	—
1995	1,400 (900–2,500)	87	103 (11–254)	—	1,590
1996	1,200 (800–1,800)	20	311 (162–567)	—	1,530
1997	782 (501–1,208)	43	572 (296–1,071)	—	1,397
1998	332 (170–728)	38	446 (294–894)	—	816
1999	270 (78–364)	32	53 (3–98)	19	374
2000	507 (169–924)	28	21 (1–53)	1	537
2001	51 (2–166)	73	26 (1–83)	3	153

<sup>1</sup> Numbers in parentheses are ranges of the 95 percent confidence interval where available.

<sup>2</sup> Palka, D. 1997. Gulf of Maine Harbor Porpoise By-catch. Prepared for the Gulf of Maine Harbor Porpoise Take Reduction Team Meeting, 16–17 December 1997. National Marine Fisheries Service, Woods Hole, Massachusetts. Estimates since 1997 are from unpublished National Marine Fisheries Service data.

<sup>3</sup> Trippel, E. A. 1998. Harbour Porpoise By-catch in the Lower Bay of Fundy Gillnet Fishery. DFO Maritime Regional Fisheries Status Report 98/7E. Canadian Department of Fisheries and Oceans, Dartmouth, Nova Scotia. Estimates since 1997 are from unpublished data provided by E. A. Trippel.

<sup>4</sup> Palka, D. 1997. Mid-Atlantic Harbor Porpoise By-catch and Gear Characteristics. Prepared for the Gulf of Maine Harbor Porpoise Take Reduction Team Meeting, 16–17 December 1997. National Marine Fisheries Service, Woods Hole, Massachusetts. Estimates since 1997 are from unpublished National Marine Fisheries Service data.

<sup>5</sup> Harbor porpoise strandings with signs of gillnet fishery-related interactions in areas of the U.S. mid-Atlantic region not monitored by fishery observers.

1992 no estimates were available for fisheries in Canada where harbor porpoises are known to have been taken. Even in recent years, some components of coastal gillnet fisheries that appear to be catching harbor porpoises in the mid-Atlantic (based on stranded porpoises with net marks found in unsampled areas) have not been covered by the observer program or factored into bycatch estimates. In addition, a few harbor porpoises are caught and killed annually in herring weirs in the Bay of Fundy, Canada.

Nevertheless, estimates show a substantial decline in porpoise bycatch over the past decade. The estimate of 80 harbor porpoise takes within U.S. waters in 2001 represents a decrease of 85 percent from the 2000 estimate of 529. The 2001 bycatch estimate is being reviewed by the Service and its Atlantic Scientific Review Group for incorporation in the draft 2003 Gulf of Maine harbor porpoise stock assessment report, which is expected to be available for public review in 2003. Final bycatch estimates for U.S. fisheries in 2002 were not available at the end of the year, but preliminary analyses suggest that they remained low during 2002.

Although porpoise bycatch in U.S. waters has continued to decline in recent years, new data from the Canada Department of Fisheries and Oceans revealed an increase in bycatch during 2001 in the Bay of Fundy. Because fishing effort in Canadian waters did not increase in 2001, the increased bycatch appears to be related to unusually large numbers of porpoises in the Bay of Fundy in 2001. In 2002 the Department suspended its Bay of Fundy monitoring program due to financial constraints. Without a monitoring program, it will be difficult to estimate overall 2002 bycatch. However, assuming that the 2002 bycatch for the Bay of Fundy did not exceed the level reported for 2001, it seems likely that the total take for the year remained below the stock's currently estimated potential biological removal level of 747 porpoises per year (see below).

There appear to be two reasons for the overall decrease in porpoise bycatch during the past decade. First, the National Marine Fisheries Service adopted time-area fishing restrictions for the purpose of reducing harbor porpoise bycatch. Those restrictions, which the Service incorporated into a harbor porpoise take reduction plan (see below), include seasonal fishing closures, areas in

which gillnets must meet certain specifications (e.g., twine diameter and net lengths) that have a relatively low bycatch risk, and seasonal management areas where gillnets must be equipped with acoustic deterrents, or "pingers." Pingers are soda-can-sized devices that emit periodic sound pulses at specified frequencies to alert porpoises to the presence of nets. Based on a scientific study, pingers can reduce bycatch as much as 90 percent when they are attached to bridles between each net panel in a gillnet string and are properly maintained.

Second, and perhaps more important, bycatch has declined because of increasingly stringent fishery management measures, such as time-area fishing closures and limits on both landings and days at sea, enacted to protect overfished stocks of groundfish and monkfish. Some of these closures occur in areas of historically high porpoise bycatch that are not included in the harbor porpoise take reduction plan. In addition, fishery management measures have compelled many participants to leave these fisheries, thereby reducing the number of gillnets. Although it is unclear precisely how much of the bycatch reduction is due to either one of these two sets of measures, it seems likely that harbor porpoise bycatch is currently at a sustainable level. (Canadian fishery managers have not imposed requirements for the use of pingers or other gear restrictions in the Bay of Fundy, and past declines in bycatch levels for that area have been achieved largely as a result of reductions in fishing effort to protect depleted fish stocks.)

### **Harbor Porpoise Take Reduction Plan**

To manage the incidental take of marine mammals by commercial fisheries in U.S. waters, the Marine Mammal Protection Act was amended in 1994 to require that the National Marine Fisheries Service prepare stock assessment reports for all cetacean and pinniped stocks in U.S. waters. In part, each assessment is to calculate a potential biological removal (PBR) level that estimates the number of animals that can be removed from the stock annually (not including natural mortality), while maintaining a high degree of assurance that the stock will continue to increase toward or remain at its optimum sustainable population level. The formula for calculating PBR relies, in part, on the lower limit of a population's estimated range

of abundance (i.e., minimum population size) and its estimated maximum productivity rate. Based on data available when the first harbor porpoise stock assessment was completed in 1995, the Service estimated bycatch levels to be several times higher than the stock's PBR level, which was then calculated to be 403 porpoises per year.

If incidental taking exceeds a stock's calculated PBR level, the Service is required to convene a take reduction team to develop a take reduction plan. The Marine Mammal Protection Act requires that take reduction plans reduce the bycatch to below the PBR level within six months of implementation and subsequently reduce those takes to levels approaching a zero mortality rate. With regard to harbor porpoises, the latter goal was to be met by April 2001.

In response to these requirements, the Service established two harbor porpoise take reduction teams. In February 1996 it established a Gulf of Maine team to address gillnet fisheries off New England, and in February 1997 it formed a mid-Atlantic team for gillnet fisheries between New York and North Carolina. Each team includes representatives of regional fisheries, environmental groups, the scientific community, and involved federal and state agencies. A representative of the Commission has participated on both teams.

Each team developed a different regulatory approach to reduce porpoise bycatch in its region. The Gulf of Maine team recommended seasonal fishing closures in high bycatch areas and management zones in which gillnets had to be equipped with pingers. The mid-Atlantic team also recommended seasonal fishing closures, but instead of relying on pingers, it chose to recommend requirements for using certain fishing practices (e.g., limited soak times—that is the length of time a net is allowed to remain in the water after being set) and gear characteristics (e.g., twine diameter for mesh, mesh size, tie-downs to limit the vertical height of nets, and the number and length of nets). This choice was based on observer data that suggested that nets meeting those specifications caught far fewer porpoises.

As discussed in previous annual reports, the Service was slow to act on the teams' recommended plans, thus prompting a lawsuit by environmental organizations. In December 1998 the Service adopted a Gulf of Maine Harbor Porpoise Take Reduction Plan that combined recommenda-

tions by both teams. Regulatory measures for New England included six seasonal management zones in which fishing was either prohibited or permitted only if gillnets were equipped with pingers (see Fig. 17). Measures for mid-Atlantic gillnet fisheries included seasonal fishery closures and seasonal restrictions on the fishing practices and gear characteristics mentioned above. The regulatory measures were implemented under authority of the Marine Mammal Protection Act, rather than the Magnuson-Stevens Fishery Conservation and Management Act, to prevent changes during the process used by regional fishery management councils to annually adjust fishery management measures. The take reduction plan also included nonregulatory tasks to address research, enforcement, bycatch monitoring, and education needs.

Late in 2000 the Service reconvened the two teams to review progress and to develop further recommendations for reducing bycatch. At those meetings, the teams were advised that, based on the 1999 population survey, the PBR level had been recalculated to be 747 porpoises per year. Although bycatch appeared to have dropped below that level (final estimates for 1999 bycatch levels were not available at the time of those meetings), Service representatives reminded members of the teams that the Marine Mammal Protection Act requires that incidental take levels be reduced to "insignificant levels approaching a zero mortality and serious injury rate." Although the Service has not yet defined this standard, it advised the teams that, for planning purposes, a bycatch of no more than 10 percent of PBR (i.e., 75 porpoises per year) likely would satisfy that goal. Recognizing that such a reduction by the statutory deadline of April 2001 was unlikely, the Service proposed a new date of 2 December 2003 as the target for reaching the zero mortality rate goal.

At its meeting, the Gulf of Maine team was advised that some boats had been fishing illegally without pingers in management zones requiring their use. The team therefore recommended that at-sea boardings be undertaken by enforcement officers to check for illegal fishing and that an annual certification program on using pingers be established for anyone fishing in a management area requiring pingers. The team also recommended that fishery observers be provided with devices to (1) test whether pingers were working properly on nets that catch porpoises and (2) estimate the overall



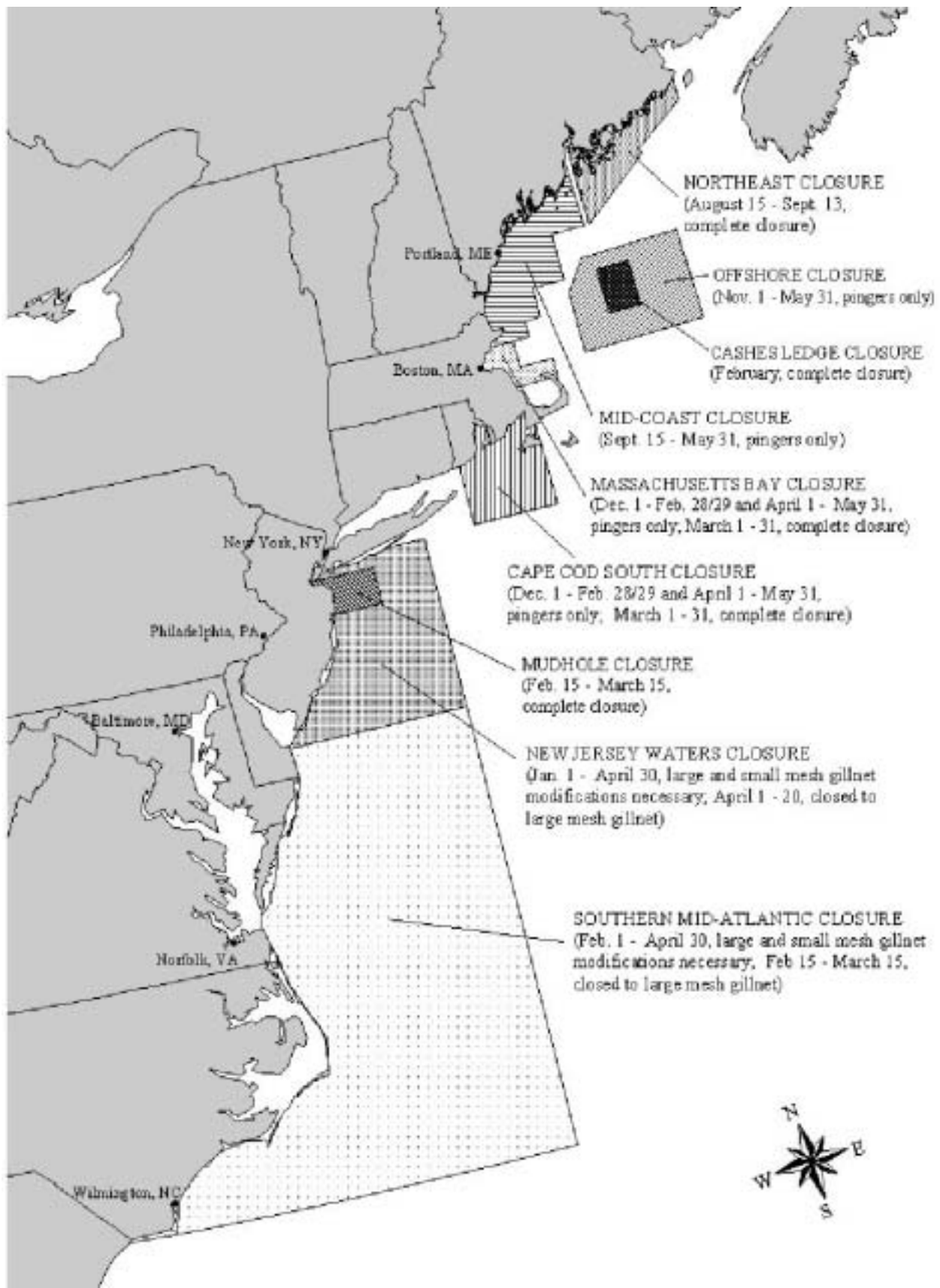


Figure 17. Time-area management zones under the Gulf of Maine Harbor Porpoise Take Reduction Plan. (Figure by Caroline Good, courtesy of the National Marine Fisheries Service.)

proportion of deployed pingers that may not be functioning properly in the operational fishery. For waters south of New England, the mid-Atlantic team expressed concern that observer coverage had declined from 5 to 2 percent in the observed fisheries, that it was not covering all segments of the gillnet fleet, and that the observer coverage was not large enough to accurately determine if or when the zero mortality rate goal was achieved. It therefore recommended that the Service increase observer sampling to at least 6 percent of the overall mid-Atlantic gillnet fishing fleet—the level of observer coverage calculated as being necessary to obtain a statistically reliable estimate of bycatch levels approaching the zero mortality rate goal of 75 porpoises or less.

Both teams also strongly recommended that the Service conduct a scientific experiment to assess the effectiveness of acoustically reflective netting, which is made of hollow-core strands filled with barium sulfate that theoretically reflects sound more readily than conventional nylon nets so that echo-locating porpoises can more easily detect and avoid the nets. The teams recommended that field tests be undertaken to compare bycatch rates in the new nets with those of gillnets equipped with pingers.

Finally, both teams expressed concern about relying on take reduction measures outside the harbor porpoise take reduction plan (i.e., closures under fishery management plans) to reduce harbor porpoise bycatch. They noted that measures under fishery management plans could be relaxed or altered at the recommendation of fishery management councils to meet fish management objectives and thereby incidentally increase porpoise bycatch. The Gulf of Maine team therefore recommended that the Service prepare a proposal to integrate key fishery management plan closures for groundfish into the harbor porpoise take reduction plan so that regional fishery council actions would not incidentally increase porpoise bycatch. As noted in previous annual reports, the Marine Mammal Commission made a similar recommendation to the Service by letter of 17 November 2000. The mid-Atlantic team, however, concluded that it was premature to integrate fishery management closures into the harbor porpoise take reduction plan. Instead, it recommended that the Service develop a process for calculating the effect of proposed changes to fishery management plans on harbor

porpoise bycatch, and that it consult with the fishery management councils and the two take reduction teams to identify any measures that may be needed to protect harbor porpoises, given those effects.

On 2 February 2001 the Service responded to the Commission's 17 November letter noting that it would consider effects of proposed changes to fishery management plans on harbor porpoises when it reviewed required environmental assessments or environmental impact statements on fishery management plan amendments. Where proposed changes would increase harbor porpoise bycatch, the Service noted that it would discuss those changes with the council and ask the harbor porpoise take reduction teams to recommend changes to the harbor porpoise take reduction plan to compensate for those increases. It also noted that it would consider the Gulf of Maine team's recommendation to integrate all measures necessary to protect harbor porpoises under that plan.

Due to the significant reductions in porpoise bycatch levels and other high-priority issues, efforts to implement recommendations made by the two teams in 2000 have been limited and neither team was convened in 2001 or 2002. New homeland security responsibilities within the Coast Guard and resource limitations within the Service resulted in a decrease in enforcement efforts in 2002. However, several enforcement actions related to porpoises were undertaken in 2002, and several violations from previous years remained under investigation. In 2002 one case from a previous year was settled with the imposition of an \$8,000 fine and a loss of 30 days at sea.

The Service also substantially increased its registry of East Coast gillnetters by incorporating fishermen with state fishing permits that do not fish in federal waters. Many of these fishermen had not registered previously pursuant to the provisions of section 118 of the Marine Mammal Protection Act for authorization to incidentally catch marine mammals during their commercial fishing operations. No steps have yet been taken to require annual certification of gillnetters using pingers or to incorporate key time-area fishing closures adopted under the fishery management plans into the harbor porpoise take reduction plan. However, with regard to area closures, the Service continued to review changes implemented under its fishery management plans and in 2002 it deter-

mined that none of the changes would require amending the harbor porpoise take reduction plan.

With regard to nonregulatory recommendations made by the two teams, the Service contracted for a full-time fishing gear technology specialist to work with fishermen in the mid-Atlantic region on developing fishing techniques to reduce marine mammal bycatch. The position was modeled after a successful program initiated by the Service in New England.

Although the Service has not funded the recommended field experiment to assess the effectiveness of new acoustically reflective netting to reduce porpoise bycatch, it did work with a gear manufacturer to produce a few nets for use by mid-Atlantic gillnetters interested in evaluating their fishing characteristics. As a related matter, the Service also has funded research to determine whether captive bottlenose dolphins can detect the new reflective netting more easily than traditional net material (bottlenose dolphins also are caught incidentally in gillnets – see the section on that species elsewhere in this chapter).

Some encouraging field tests with the new reflective netting have been done in Canada and Denmark. In the Bay of Fundy, Canada, in 1998 and 2000 no harbor porpoises were caught in 231 sets with reflective netting compared with a catch of 12 porpoises in 467 sets of traditional nylon nets. The reflective nets caught far fewer seabirds than all nylon nets, and both types of nets caught fish at comparable rates. Trials in a Danish gillnet fishery in the North Sea in 2000 produced similar results. Researchers in those trials, however, concluded that the reason for reduced porpoise bycatch was the stiffer nature of the reflective netting rather than its increased detectability by porpoises.

To determine if deployed pingers are working properly, the Service developed a device to test whether pingers are emitting signals at required frequencies. Fishery observers monitoring the New England gillnet fishery began using the devices on

a limited basis in the fall 2002 fishing season. It also was recommended that testing be done to assess the effectiveness of pingers that emit higher frequencies that would not attract seals. In anticipation of such testing, the Service also contracted for the development and production of a device to detect a broader frequency range. A prototype was tested in 2002 and apparently worked well. With regard to testing new pingers, the Service took steps in 2002 to develop a rule to authorize experimental fishing under the harbor porpoise take reduction plan. The purpose of the proposed rule, expected to be published in 2003, is to facilitate efforts to test new porpoise bycatch reduction technologies.

With regard to its observer program, the Service has not taken steps to expand fishery observer coverage to levels necessary to accurately estimate low levels of bycatch that would approach the zero mortality rate goal. However, the expanded database of registered gillnetters should provide an improved basis for planning observer efforts to monitor harbor porpoise bycatch by providing a more complete and accurate description of the fishery. Additional funding recently made available to the Service for monitoring landings of target species in the New England groundfish fishery also may improve porpoise bycatch data for that area in the short term.

Notwithstanding the limited efforts to implement the recommendations made by the two harbor porpoise take reduction teams since 2000, it appears that bycatch levels remained well below the stock's PBR level through 2001 and remained low in U.S. waters in 2002. The overall bycatch for 2002 likely will remain uncertain because bycatch monitoring efforts in the Bay of Fundy were suspended by the Canada Department of Fisheries and Oceans. At the end of 2002 the Department apparently had no plans to reinstate a monitoring program in 2003.