HARBOR PORPOISE TAKE REDUCTION PLAN (HPTRP)

FINAL ENVIRONMENTAL ASSESSMENT

and

FINAL REGULATORY FLEXIBILITY ANALYSIS

Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
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1.0 Introduction

1.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) is our basic national charter for protection of the environment. NEPA procedures ensure that environmental information is available to the public and decision makers before decisions are made and before actions are taken. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences and take actions that protect, restore, and enhance the environment.

As part of the NEPA process, an environmental analysis must be undertaken to determine whether the action in question will have a significant impact on the human environment and whether an Environmental Impact Statement (EIS) will be required. The purpose of this Environmental Assessment (EA) is to briefly provide sufficient evidence and analysis to determine whether to prepare an EIS or a Finding of No Significant Impact (FONSI) as well as to assist the agency in planning and decision making regarding a rule to implement the HPTRP.

1.2 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) is the principal Federal legislation that guides marine mammal species protection and conservation policy. The major objectives of the MMPA are to further measures which will prevent species and stocks of marine mammals from diminishing beyond the point at which they cease to be a significant functioning element in the ecosystem and prevent them from diminishing below their optimum sustainable population level[1] (OSP) (16 U.S.C. 1361). The MMPA vests responsibility for the management and conservation of the order Cetacea (whales and dolphins) and species of the suborder Pinnipedia (seals and sea lions) in the Department of Commerce and the National Oceanic and Atmospheric Administration, and that responsibility has been delegated to the National Marine Fisheries Service (NMFS).

Since its enactment in 1972, the MMPA has contained provisions for authorizing the taking[2] of marine mammals incidental to commercial fishing operations. In 1994, the MMPA was reauthorized and amended. Significant amendments include section 117, which requires the development of stock assessment reports and section 118, which establishes a new regime to govern the taking of marine mammals incidental to commercial fishing operations.

1.2.1 MMPA, Section 117 Requirements

Section 117 requires the preparation of marine mammal stock assessments which provide a scientific basis for the new incidental-take regime. The assessments, among other things, are

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[1]As defined in the MMPA, optimum sustainable population means, with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element.

[2]As defined in the MMPA, this term means to "harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal"

intended to identify strategic stocks[3]. Based on the advice of the regional groups and public comment a final stock assessment report (SAR) is prepared for each stock. Each SAR must:

- describe the geographic range of the stock;
- provide a minimum population estimate, current and maximum net productivity rates, and current population trend;
- estimate the annual human-caused mortality and serious injury, by source;
- describe other factors that may be causing a decline for stocks determined to be "strategic stocks";
- describe the commercial fisheries that interact with the stock, including estimates of fishery-specific mortality and serious injury levels and rates, and an analysis of incidental-take levels;
- assess whether the level of human-caused mortality and serious injury would cause the stock to be reduced below its optimum sustainable population level or, alternatively, whether the stock should be categorized as a strategic stock; and
- estimate the potential biological removal (PBR)[4] level for the stock.

1.2.2 MMPA, Section 118 Requirements

In the 1994 amendments to the MMPA, section 118 established the long-term goal to reduce the incidental mortality or serious injury of marine mammals incidentally taken in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate (the Zero Mortality Rate Goal or ZMRG) by April 30, 2001. The 1994 amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations to achieve ZMRG. These include the preparation of SARs, a registration and marine mammal mortality monitoring program for certain commercial fisheries identified as Category I or II[5] fisheries, and the preparation and implementation of Take Reduction Plans (TRPs) for strategic marine mammal stocks that interact with Category I or II fisheries. This proposed action addresses the third part of the strategy.

The immediate goal of a TRP is to reduce, within six months of its implementation, the mortality and serious injury of strategic stock(s) incidentally taken in the course of commercial fishing operations to less than the PBR levels established for those stock(s). The long-term goal of a TRP is to reduce, within five years of its implementation, the incidental mortality and serious injury of marine mammals incidentally taken in commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate, taking into account the economics of the fishery, the available existing technology, and existing state or regional

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[3]The term strategic stock means a marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level; which is declining and is likely to be listed as a threatened species under the ESA; or which is listed as a threatened or endangered species under the ESA.

[4]The PBR level is the maximum number of animals, not including natural mortalities, that may be annually removed from a marine mammal stock while allowing that stock to reach or maintain its OSP level.

[5]The MMPA requires all commercial fisheries to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in each fishery. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

management plans (Section 118(f)(2)).

Take Reduction Teams As required by the MMPA, NMFS established take reduction teams (TRTs) to prepare draft TRPs. Team members must have expertise regarding the conservation or biology of the marine mammal species which the TRP addresses, or the fishing practices which result in the incidental mortality or serious injury of those species. Members include representatives of Federal agencies, each coastal State which has fisheries which interact with the species or stock(s), appropriate regional Fishery Management Councils (FMCs), interstate fishery commissions, academic and scientific organizations, environmental groups, all commercial and recreational fisheries groups and gear types which incidentally take the species or stock(s), Alaska Native organizations or Indian tribal organizations, or others as the Secretary of Commerce deems appropriate. TRTs are not subject to the Federal Advisory Committee Act and meetings of the teams are open to the public with prior notice of the meetings made public in a timely fashion (section 118(f)(6)(C and D)).

If the mortality and serious injury of a stock is equal to or greater than the PBR level for that stock, then the TRT must submit a consensus draft TRP to NMFS not later than six months after the team has been established. Draft TRPs must be developed by consensus. In the event consensus cannot be reached, the TRT must advise NMFS in writing on the range of actions considered by the TRT, and the views of both the minority and majority. Not later than 60 days after the submission of the draft plan, NMFS must publish in the Federal Register the draft plan submitted by the TRT, any changes proposed by NMFS with an explanation of the reasons, and NMFS' proposed regulations (i.e., the Proposed Rule) to implement the plan, for public review and comment for a period not to exceed 90 days. Not later than 60 days after the close of the public comment period, NMFS is required to issue a final plan and implementing regulations (i.e., the Final Rule).

Take Reduction Plans TRPs must include a review of information in the final SARs and any substantial new information that may have become available since the publication of the SARs. NMFS and the TRTs will meet every six months, or at other intervals as NMFS determines are necessary, to monitor the implementation of the final TRP until such time as NMFS determines that the objectives of the TRP have been met. NMFS will amend the final TRP and implementing regulations if necessary.

2.0 Purpose and Need For Action

The purpose of the proposed action is to implement a harbor porpoise TRP (HPTRP), pursuant to section 118 of the MMPA, to reduce the incidental mortality and serious injury of harbor porpoise in the Gulf of Maine (GOM) and Mid-Atlantic gillnet fisheries to below the PBR level for that stock. Because this is a strategic stock that interacts with both a Category I fishery (the Northeast (NE) multispecies sink gillnet fishery) and a Category II fishery (Mid-Atlantic coastal gillnet fishery), a TRP is required.

Interactions between fisheries and marine wildlife are a continuing problem in waters of the U.S. Marine mammals, sea birds, and sea turtles are accidentally injured or killed during the course of certain fishing operations. The injury and mortality of marine mammals incidental to fishing operations is an issue of concern particularly in those cases where the marine mammal stocks are decreasing, threatened, or endangered or where little is known about the status of the affected stocks or the level of mortality. In addition to the impacts on marine mammal stocks, interactions between marine mammals and fisheries result in damage and loss of fishing gear and reduced value of catch.

There are generally three types of "interactions" between marine mammals and gill nets. The first, entanglement in fishing gear, occurs when marine mammals are in the same area as gill nets, do not detect the presence of the nets, and fail to avoid them. Marine mammals then become entangled in the gear, and are generally unable to disentangle themselves before the nets are hauled in. In some cases, though, gillnet fishermen are able to remove entangled marine mammals and release the animals alive. Entanglement may also occur when fishing gear is discarded illegally. The second type of interaction occurs when marine mammals are preying on the same fish species targeted by gillnet fishermen, and are attracted to the nets as easy sources of food. When marine mammals try to eat entangled fish they can damage the net and the catch. The third type of interaction, deterrence, is the intentional use of firearms or other devices to scare marine mammals away from fishing gear.

The incidental take of harbor porpoise in commercial fishing has increased over the last ten years. In 1993, NMFS published a proposed rule (58 FR 3108, January 7, 1993) to list the GOM harbor porpoise as threatened under the Endangered Species Act (ESA). NMFS concluded that the New England, Mid-Atlantic, and Canadian gillnet fisheries incidentally take harbor porpoise at levels that are above the PBR level for this stock. The best available information at the time of the proposed ESA listing indicated that the bycatch of harbor porpoise had to be reduced by more than 50 percent if the harbor porpoise population was to be sustainable (Resolve, 1996). Despite fishery management measures enacted through the New England Fishery Management Council (NEFMC) since 1994 to reduce interactions and incidental mortality (section 3.2), harbor porpoise bycatch rates have increased.

In 1996, NMFS convened the GOM Take Reduction Team (GOMTRT) to develop a plan to reduce the incidental take of harbor porpoise in sink gillnets. The GOMTRT convened with the understanding that a separate take reduction team would be convened to address the harbor porpoise bycatch problem in the Mid-Atlantic. The GOMTRT met five times between February and July 1996 and submitted a consensus draft TRP (hereafter referred to as the draft GOMTRP) to NMFS in August of 1996. The proposed rule to implement the GOMTRP was published on August 13, 1997 (62 FR 43302). The rule proposed a schedule of time/area closures and periods during which acoustic deterrents or "pingers" would be required for each of the established management areas.

NMFS convened the Mid-Atlantic Take Reduction Team (MATRT) on February 25, 1997 to address the interactions between strategic marine mammal stocks and the Mid-Atlantic coastal gillnet fisheries. The MATRT met five times between January 1997 and August 1997 and delivered a draft report to NMFS on August 23, 1997. The MATRT report consists of the take reduction measures, both regulatory and non-regulatory, which the MATRT agreed to by consensus, and a discussion of several non-consensus issues. Because the MATRT did not reach consensus on the use of a pinger experiment in the Mid-Atlantic, it was not able to deliver a consensus TRP to NMFS.

The two predominant strategic marine mammal stocks that are caught in coastal gillnet fisheries throughout the Mid-Atlantic region are the harbor porpoise and the coastal bottlenose dolphin. A plan to reduce fishery interactions with harbor porpoise was given highest priority because this stock of marine mammals is considered particularly vulnerable.

This HPTRP, and the accompanying rule, replaces the GOMTRP. The GOMTRP is being replaced because of three developments. First, new bycatch information became available which indicates that significant changes are needed to the August 13 GOMTRP to achieve the PBR level for harbor porpoise. Secondly, Framework 25 to the NE Multispecies Fisheries Management Plan (FMP) (63 FR 15326, March 31, 1998), was implemented on May 1, 1998. Framework 25 implements gillnet fishing closures throughout the GOM to conserve cod (Gadus morhua). Some of the cod closures may indirectly provide harbor porpoise conservation. Thirdly, the MATRT submitted its report to NMFS which presented new information on the level of harbor porpoise bycatch in the Mid-Atlantic region. The combination of these actions led NMFS to integrate the initially separate plans into one comprehensive TRP and to replace the GOMTRP proposed rule.

2.1 The Need to Reduce Bycatch of Harbor Porpoise

Harbor porpoise are especially vulnerable to capture in commercial fisheries because of their small size, and because they feed in the same areas as the fleet fishes. Harbor porpoise have limited reproductive capability. They conceive only once a year and give birth to only one calf at a time. They live to a maximum age of 13 years. Over a normal life time, female harbor porpoise will give birth to no more than nine or ten calves. Given the current high rate of human-induced mortality, a female may only give birth to one or two calves in her limited life time (Gaskin, 1984, 1992). There is concern among scientists, managers, and the public about whether the species can maintain sustainable populations in the presence of current high levels of mortality in commercial fisheries.

There is no single, known cause which accounts for harbor porpoise bycatch in fishing nets except that they inhabit the same ocean areas as fixed gear fishermen (Whale Research Group, 1996). For some reason the animals fail to detect the presence of nets. Researchers suggest that the animals may be inattentive to or inexperienced with the presence of the nets. They may be attracted to the nets by food and then unable to avoid entanglement or they may simply not be able to detour around such a barrier (Nelson and Lien, 1995; Perrin et al., 1994).

Status of the Stock The 1996 stock assessment for harbor porpoise (Waring et al., 1997) estimated the size of the population to be 54,300 animals with a minimum population estimate of 48,289 animals. The PBR level for harbor porpoise, which encompasses the entire range from the Bay of Fundy, Canada to the South Atlantic, is estimated to be 483 animals. The estimated total annual average mortality and serious injury to this stock attributable to the NE sink gillnet fishery is 1,833 harbor porpoise per year (Waring et al., 1997). Mortality by the Mid-Atlantic gillnet fisheries is estimated to be 207 animals per year (Palka, 1997).

Given the estimated total take of approximately 2,140 animals per year in all fisheries, a total reduction of approximately 1,657 is needed to achieve the PBR goal between the New England and the Mid-Atlantic regions.

Timeframe for Achieving the Objectives of the HPTRP and ZMRG Section 118 of the MMPA established the long-term goal of reducing the incidental mortality or serious injury of marine mammals incidentally taken in the course of commercial fishing operations to a level approaching a zero mortality rate. The preparation and implementation of this HPTRP are key steps to meeting this long-term goal. While it is expected that the HPTRP will meet the six month goal of reducing bycatch to below the PBR level, it is difficult at this time to determine whether the measures of the HPTRP will be successful in achieving ZMRG for harbor porpoise. Over the next year, the results and feedback from the various mechanisms implemented to conserve harbor porpoise, including the measures implemented under this TRP, will be analyzed by the GOMTRT and the MATRT to determine whether further reductions, if any, may be necessary to reach the long-term goal.

2.2 Scope of Analysis

The 1996 SAR (Waring et al., 1997) states that harbor porpoise bycatch has been observed by the NMFS Sea Sampling program in the following fisheries: (1) the Northeast (NE) multispecies sink gillnet, (2) the Mid-Atlantic coastal gillnet, (3) the Atlantic drift gillnet, (4) the North Atlantic bottom trawl fisheries, and 5) the Canadian Bay of Fundy sink gillnet fishery. The fisheries of greatest concern, and the subject of this proposed action, are the NE multispecies sink gillnet fishery and the Mid-Atlantic coastal gillnet fishery.

The Atlantic drift gillnet fishery, a Category I fishery, is being addressed by the Atlantic Offshore Cetacean Take Reduction Team (AOCTRT). The North Atlantic bottom trawl fishery is a Category III fishery and is not the subject of take reduction efforts at this time. Canada has developed a Harbor Porpoise Conservation Plan and has implemented an observer program which has documented a continuous reduction in bycatch to currently less than 50 harbor porpoise per year.

The NE multispecies sink gillnet fishery comprises the majority of the overall multispecies gillnet activity in New England. Harbor porpoise may, however, interact with other gillnet fisheries capable of capturing multispecies. Additionally, new non-sink gillnet fisheries could be introduced into harbor porpoise conservation areas. Therefore, this proposed action pertains to all gillnets in New England capable of catching NE multispecies.

<u>GOMTRT</u> The objective of the GOMTRT was to develop a consensus draft plan for reducing incidental mortality and serious injury of harbor porpoise in the NE multispecies sink gillnet fishery. This fishery targets a range of bottom fish species. Geographically, the GOMTRT was defined by the NE multispecies sink gillnet fishery and limited to the New England states (Maine to Rhode Island). NMFS determined that the 72°30' W. longitude line was a reasonable boundary between New England and the Mid-Atlantic fisheries because it is used in regulations in the summer flounder FMP (certain mesh exemptions are allowed east of this line) and in the NE multispecies FMP (exemptions to the 5% bycatch of multispecies are allowed west of this line). The NE multispecies sink gillnet fishery comprises the majority of the overall gillnet activity in New England.

<u>MATRT</u> The objectives of the MATRT were to determine when and where gill nets entangle harbor porpoise along the Mid-Atlantic coast and to develop recommendations for reducing bycatch of harbor porpoise below the PBR level in conjunction with the GOMTRT. Geographically, the Mid-Atlantic is defined as all coastal areas, seaward to the 72°30' W. longitude line, from the southern border of the GOMTRT to the southern border of North Carolina. The fisheries under consideration primarily target bluefish, monkfish, weakfish,

dogfish, American shad, black drum, spot, striped bass, and menhaden.

2.3 Scoping

GOMTRT The GOMTRT met five times between February 1996 and July 1996 before submitting their consensus draft GOMTRP to NMFS in August, 1996 (RESOLVE, 1996). The GOMTRT includes representatives of the NE multispecies sink gillnet fishery, NMFS, state marine resource management agencies, the NEFMC, environmental organizations, and academic and scientific organizations.

The proposed rule to implement the GOMTRP (62 FR 43302, August 13, 1997) was available for a 60 day public comment period. NMFS re-convened the GOMTRT in December 1997 to evaluate new data that became available after the GOMTRP was proposed by NMFS. NMFS reopened the public comment period on the proposed rule for one month during the deliberations of the GOMTRT. At the December meeting the GOMTRT developed new recommendations, and agreed on a number of additional measures for bycatch reduction, that were presented to NMFS in the form of a report on January 14, 1998 (RESOLVE, 1998).

MATRT The MATRT met five times between January 1997 and August 1997 prior to submitting their draft report to NMFS on August 25, 1997 (RESOLVE, 1997). The MATRT includes a wide range of stakeholders and interested parties, including the Mid-Atlantic and NE gillnet fisheries representatives, NMFS, state agencies, environmental organizations and academic researchers.

During the MATRT process, a number of concerns and issues were raised regarding the data and analysis that were used as a basis to develop bycatch recommendations. Although the MATRT proceeded with their deliberations despite these outstanding issues, they recognized the concerns in their report (RESOLVE, 1997). A summary of their concerns is presented later in this document.

3.0 Background

3.1 Harbor porpoise conservation measures prior to the 1994 amendments to the MMPA

The incidental take and population status of harbor porpoise has been a concern for many years. In 1989, fishermen, environmentalists, and scientists formed the Harbor Porpoise Working Group, whose purpose was to define the extent of the problem and identify solutions to reduce the incidental take of harbor porpoise in gill nets while minimizing impacts on the fishery.

In 1991, NMFS announced its intent to review the status of harbor porpoise populations in U.S. waters for possible listing as threatened or endangered under the ESA. At the time that NMFS was reviewing harbor porpoise status, the Sierra Club Legal Defense Fund, on behalf of the International Wildlife Coalition and 12 other organizations, submitted a petition to NMFS on September 18, 1991 asking that harbor porpoise be listed as threatened. In response to the petition and after considering results of its research, NMFS published a proposed rule (58 FR 3108) on January 7, 1993 to list harbor porpoise as threatened under the ESA. NMFS has not issued a final rule on this matter.

NMFS asked the NEFMC in October 1992 to develop a plan for reducing harbor porpoise bycatch in the NE multispecies sink gillnet fishery through the Magnuson-Stevens Fishery

Conservation and Management Act (MSFCMA). As part of Amendment 5 to the NE Multispecies FMP, the NEFMC proposed a four-year program to reduce harbor porpoise bycatch off New England to two percent of the estimated harbor porpoise population size per year. To achieve this goal, the NEFMC recommended phasing in time and area closures to sink gillnet gear, such that take levels would be reduced by 20 percent each year over the four-year period. NMFS implemented the first-year closure recommendations on May 25, 1994 (59 FR 26972).

In the fall of 1994, NMFS authorized and provided support for a cooperative experiment by New England gillnet fishermen and scientists. Building on work in previous years, the experiment sought to evaluate the effectiveness of acoustic deterrent devices or "pingers" attached to gillnets to prevent entanglement of harbor porpoise. The experiment was conducted in the Mid-Coast Closed Area (closed under Amendment 5 to the NE Multispecies FMP) off the New Hampshire-Massachusetts border. The result of that experiment showed that pingers can substantially reduce the bycatch of harbor porpoise during the fall in this area (Kraus, et al., 1995).

3.2 Harbor porpoise conservation measures after the 1994 amendments to the MMPA

Harbor porpoise bycatch rates had increased in 1994 despite the new time/area gillnet fishing closures enacted under the MSFCMA. The increased rate occurred before the area closure in the fall and occurred in waters adjacent to the closure area, in an area known as Jeffreys ledge. Based on this information, the NEFMC recommended expanding both the time and area of the fall closure around Jeffreys ledge. NMFS adopted a rule to do so on October 30, 1995 (60 FR 57207-57211).

Amendment 7 to the NE Multispecies FMP, implemented in July 1996, included a revised objective to address new provisions in the MMPA, which had been re-authorized the previous spring. Through Amendment 7, marine mammal gillnet closures were adopted in addition to groundfish conservation closures for all types of gear other than gillnets, capable of catching multispecies, as part of an overall groundfish effort reduction program. In addition, the NEFMC recommended the use of pingers in several experimental fisheries to evaluate their use as marine mammal bycatch reduction tools.

New England gillnet fishermen have responded to the loss of fishing opportunities in the GOM by shifting effort to other species and other areas including gillnet fishing for dogfish and monkfish in New England and in the Mid-Atlantic regions.

3.3 Canadian Interactions and Management

The harbor porpoise stock is a transboundary stock, and consequently, harbor porpoise become entangled in Canadian fishing gear. In the mid-1980s, takes of harbor porpoise by entanglement in Canadian waters were estimated to be in excess of 900 animals (Resolve, 1996). In the 1990s, several Canadian initiatives resulted in a significant reduction in harbor porpoise bycatch. Effort reduction, required pinger use, expanded observer coverage, and fisher education programs have helped reduce the bycatch to less than 50 harbor porpoise per year (Trippel, personal communication).

Long term management of fisheries to reduce harbor porpoise entanglements is addressed in Canada's "Harbor Porpoise Conservation Strategy for the Bay of Fundy." The strategy established the goal of keeping total mortality below a rate equivalent to two percent of the stock. The goal for the Bay of Fundy was set at 110 animals per year. NMFS has met with representatives of the Canadian government to discuss the HPTRP in U.S. waters and encourage the Canadians to continue to reduce overall fishing mortality on this stock. Canada's Harbor Porpoise Conservation Plan and observer program have documented a continuous reduction in bycatch to currently less than 50 harbor porpoise per year..

3.4 Description of the Fisheries

3.4.1 Summary of GOM fishing practices

The New England gillnet fleet is comprised of vessels which use gillnet gear to harvest a variety of shellfish and finfish species. Sink gillnets are set on the bottom, where they are fixed by anchors. These sink gillnets are primarily used to catch groundfish (including cod, pollock, haddock, flounder), monkfish, and dogfish. Partly as a result of restrictions to conserve groundfish, many vessels have switched from targeting groundfish to targeting monkfish and dogfish in New England and the Mid-Atlantic.

The New England fishery consists of approximately 300 to 400 part-time and full-time vessels. The fishery consists mainly of small vessels (30 to 50 feet in length) that operate from numerous New England ports. Many vessels leave their nets in the water around the clock and some vessels attempt to haul them on a daily basis. Most vessels fish close to shore, but a few fish farther out from shore, making trips of 2 to 8 days. Nets are 50 fathoms long and tied together in strings or floatlines that connect from 1 to 30 nets. A string or floatline refers to the total length of the nets that are fished. The inshore fishery is conducted in water depths of 10 to 50 fathoms and the offshore fishery in depths of 100 to 150 fathoms.

When fishing in the Mid-Atlantic, anecdotal evidence suggests that New England fishermen targeting monkfish employ on average about 10 floatlines, equaling a total of 170 nets. They also leave the nets in the water longer, on average 2 days. For dogfish, New England fishermen in the Mid-Atlantic set nets averaging about 4000 feet and use lighter twine than the local fishermen. Anecdotal evidence suggest that New England fishermen fishing for monkfish and dogfish in the Mid-Atlantic deploy more nets than they normally would in New England because they need more nets to make the longer trips profitable.

3.4.2 Summary of Mid-Atlantic Coastal Gillnet Fishing Practices (based on a summary of state fishery information provided to the MATRT)

The gillnet fisheries of the Mid-Atlantic states opportunistically target a wide variety of species at all levels of the water column. These fisheries operate in the estuaries, bays and along the coast from Montuck Point in New York to Cape Hatteras, North Carolina, mainly in vessels ranging between 20 to 50 feet long. Mesh sizes range from 2.5 to 12 inches, with the smallest mesh sizes used to capture small fish like spot and shad. Medium mesh sizes of 5 to 6 inches are used to capture weakfish, striped bass and bluefish, while the largest mesh sizes are used for Atlantic sturgeon and monkfish. The nets are rigged to sink to the bottom, float on the surface, or are staked to poles.

These fisheries are particularly difficult to monitor because the fishers operate from local small wharfs, and in many cases market their catch directly to restaurants or major fish exchanges. The small gillnetters operate seasonally, catching migrating fish stocks as they pass through local waters. Larger boats operate year-round following migratory stocks along the entire Mid-Atlantic coast. In recent years, New England gillnetters shifted effort to the southern states, particularly New Jersey and Maryland, in the winter time to target dogfish and in spring to target monkfish.

In the Mid-Atlantic, two fisheries appear to take the majority of harbor porpoise. Those fisheries are the monkfish and dogfish fisheries. In the monkfish fishery, Mid-Atlantic fishermen normally set floatlines of 10 to 12 nets, each net being 300 feet long. On average, they set 4 to 6 floatlines. During the spring, the Mid-Atlantic vessels fish every other day, however during the winter they tend to fish every two to three days. Normal soak times can range from 6 hours to 5 days, but average slightly more than 24 hours. Mid-Atlantic fishermen tend to use fairly heavy twine (.62 to .90 mm) and they use mesh sizes of 10 - 14 inches.

In the dogfish fishery, Mid-Atlantic fishermen deploy nets ranging from 1000 to 7000 feet total length, with average floatlines of less than 2,000 feet. On average, they set 7 - 8 floatlines. They generally keep their nets in the water from 18 to 48 hours, but soak times can range from 12 hours to 5 days. As a comparison, fishermen from New England set longer nets. Mid-Atlantic fishermen use heavy twine for this fishery (.62 -.66 mm), but not as heavy as is used in the monkfish fishery. Mesh size is generally 6 to 7 inches.

Landings for monkfish in the Mid-Atlantic are highest in the months of November, December, May, and June with less in January through April. A significant portion of monkfish effort occurs off New Jersey and to a lesser extent off Maryland. Fishing for monkfish tends to occur further offshore than for dogfish. For dogfish, highest landings are in December through March, with less landings in November, April, and May. Dogfish effort tends to be less focused in any one area, being less spatially concentrated among the Mid-Atlantic states than the monkfish effort.

3.5 Harbor Porpoise Bycatch in the NE Multispecies Gillnet Fishery

As previously discussed, the objective of the GOMTRT was to draft a TRP to reduce the incidental mortality and serious injury of harbor porpoise below PBR. The draft GOMTRP included a request that NMFS reconvene the GOMTRT within a year of implementation of the GOMTRP to review the effectiveness of the recommended actions and to revise the GOMTRP, if necessary. Although the GOMTRP was not implemented, the measures recommended by the GOMTRT to reduce harbor porpoise bycatch were, for the most part, implemented through various multispecies conservation measures enacted under the Magnuson Stevens Fishery Conservation and Management Act (MSFCMA) (Table 1, Figure 1). Since the publication of the GOMTRP in August, 1997, data has became available on the overall bycatch and bycatch rates for harbor porpoise in various areas within the GOM. This information was used to evaluate the effect of existing MSFCMA gear restrictions and closed-area regulations, regulations consistent with the measures proposed by the GOMTRT, on the incidental take of harbor porpoise.

Figure 1. Closures in effect prior to the proposed GOMTRP, August,1997

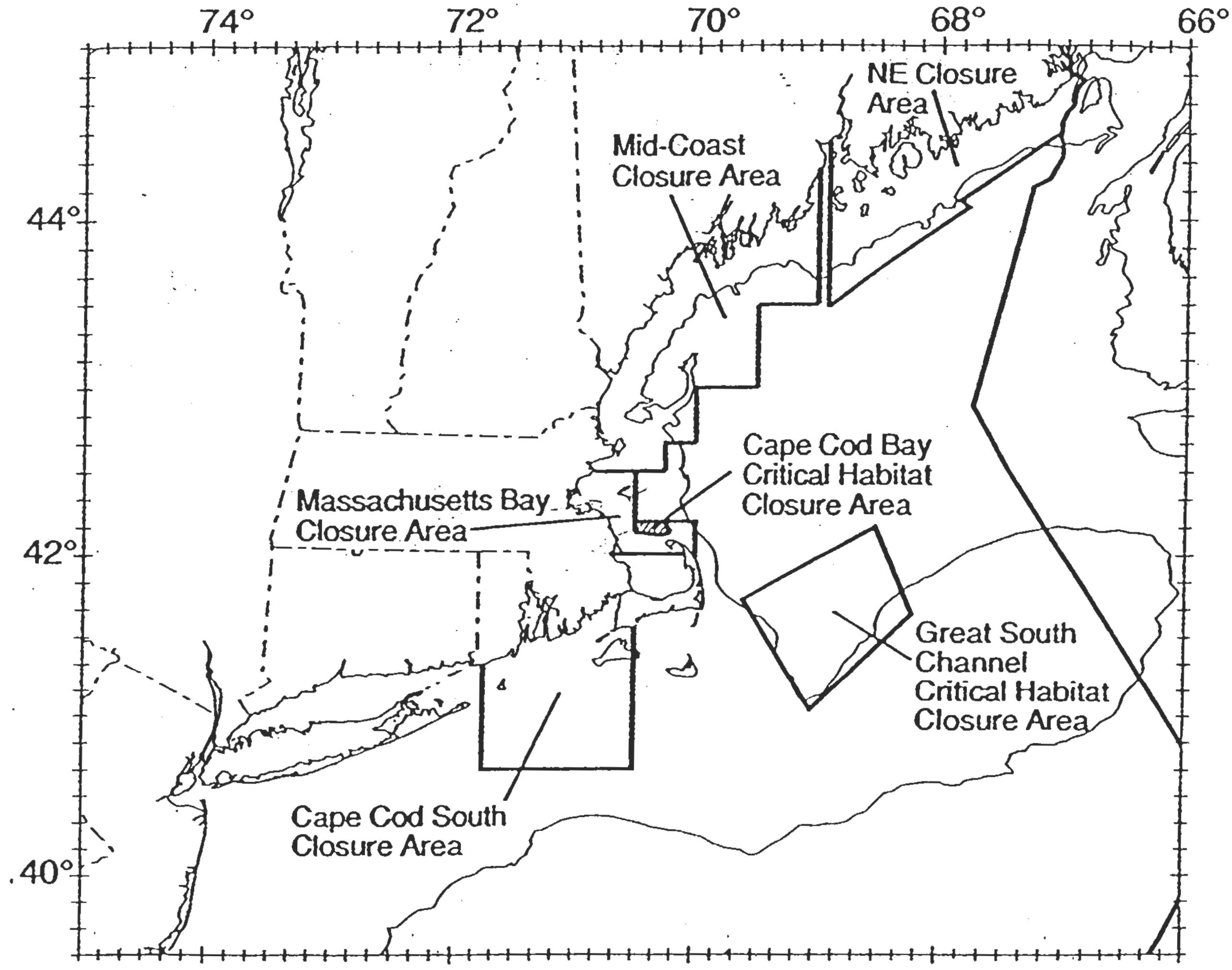


Table 1. Closures in effect prior to the proposed GOMTRP, August,1997

Northeast Closure Area	- Closed August 15 through September 15 (implemented 1994)
Mid-Coast Closure Area	- Closed March 25 through April 25 (1995) experimental fishery using pingers allowed - Closed September 15 through October 31 experimental fishery using pingers allowed in 1996 and 997 - Closed November 1 through December 31 experimental fishery using pingers allowed - Jeffreys Ledge section closed May 1 - May 31 experimental fishery using pingers allowed - Blocks 132 & 139 closed from May 1 through May 31 (1997)
Massachusetts Bay for multispecies conservation	Closed March 1 through March 31 (1997) experimental fishery using pingers allowed in 1996
Cape Cod South Area for multispecies conservation	Closed March 1 through March 31 experimental fishery using pingers allowed in 1996
Cape Cod Bay Critical Habitat Closures Area	Closed January 1 through May 15 to gillnet gear for right whale conservation
Great South Channel Critical Habitat Closures Area	Closed April 1 through June 30 to gillnet gear for right whale conservation

3.5.1 Bycatch Analysis

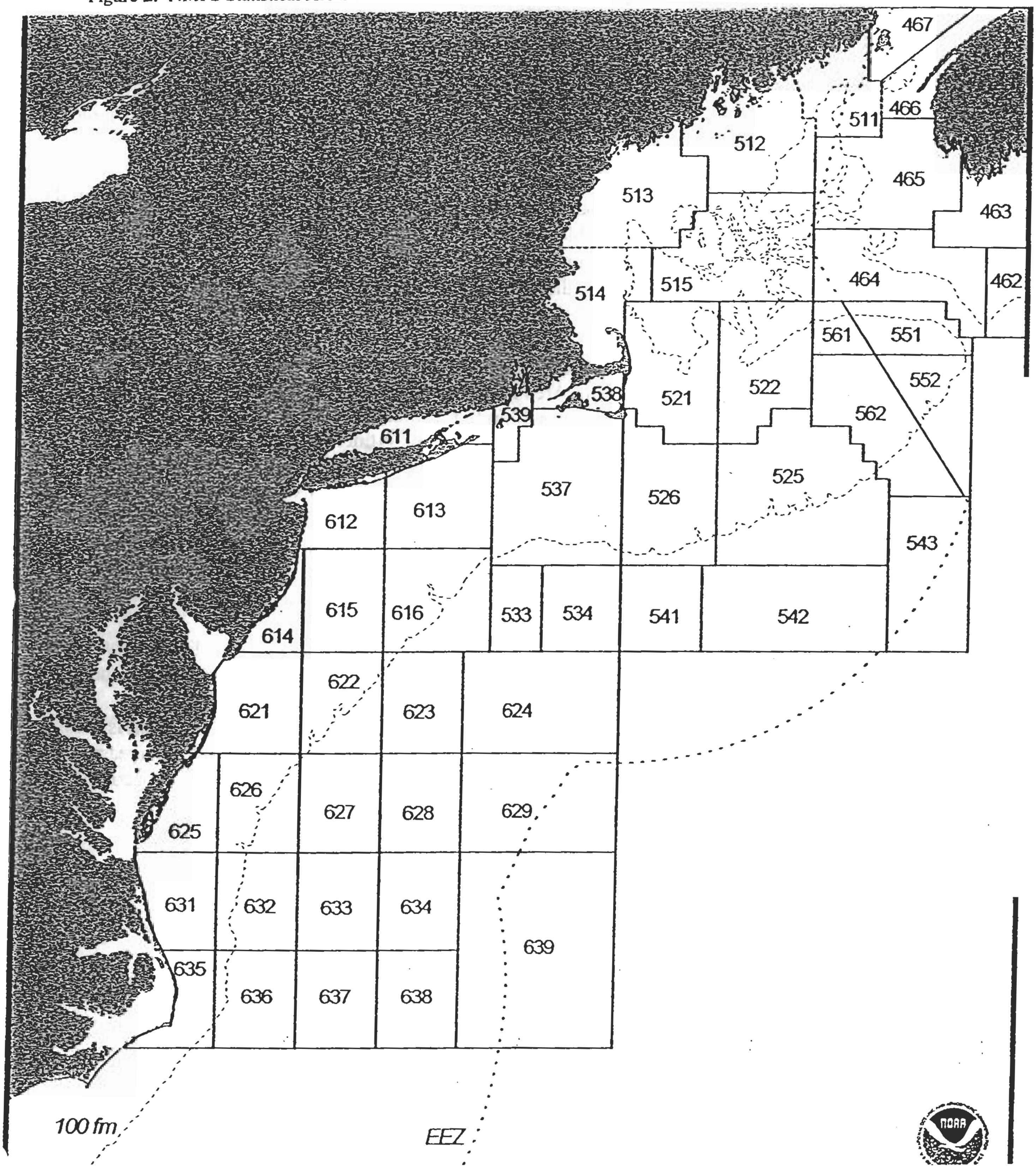
For this section, refer to Tables 2 and 3 and Figure 2 . Table 2 shows the stratification by season and area used to derive the total bycatch estimate for 1996, new information that was discussed at the GOMTRT's December 1997 meeting. 1996 was the first year that bycatch data could be extrapolated for the Offshore area. Table 3, also provided at the December meeting, shows summaries of bycatch estimates over three years (1994 - 1996) by month for statistical areas that correspond to existing harbor porpoise management areas (Figure 2).

It is important to note that the bycatch data in Table 3 and the data used in the discussion below, were analyzed based on these statistical areas. The GOMTRT did consider the spatial location of observed takes within the statistical areas in making their management recommendations.

Northeast area Between 1990 and 1994, an estimated 300 harbor porpoise per year were entangled in sink gillnets in this region. Of these, approximately 240 were caught in August and September. Entanglements in June and July accounted for 50 of the remaining takes. In 1995 and 1996, 21 and 41 animals, respectively, were estimated caught in the months of June through August.

Mid-Coast Area The largest portion of the bycatch problem has occurred in this area. The following bycatch estimates correspond to Statistical Area 513 (see Figure 2), which is larger

Figure 2. NMFS Statistical Areas in the Gulf of Maine



than the Mid-Coast Closure Area. From 1990 to 1994, approximately 1600 harbor porpoise per year were entangled in sink gillnets in Statistical Area 513. The key periods for high bycatch were January through May and then again from September through January. This bycatch estimate was 578 harbor porpoise in 1995 and 113 in 1996 (Table 3). Closures in the Mid-Coast area during 1995 and 1996 did reduce bycatch in the closure area itself, but fishing effort appeared to shift elsewhere, therefore there was no improvement in bycatch reduction observed in the GOM overall.

Massachusetts Bay Statistical Area 514, which includes Massachusetts Bay, has accounted for an estimated 373 harbor porpoise entanglements per year from 1990 to 1994, in the months of October through May (Table 3). In 1995 and 1996, 58 and 48 takes occurred, respectively, in the month of March in this Statistical Area, mostly outside the existing closure area (Table 1). In the period January through May the total bycatch was 116 in 1995 and 202 in 1996 (Table 3). During the fall of 1995 and 1996, the takes were 85 and 44, respectively (Table 3).

Cape Cod South Area Statistical Areas 537 & 539 were used for bycatch estimates prior to 1996; the Cape Cod South Closure Area is contained within these two areas. The boundaries of the closure area were based on where within those statistical areas takes occurred. The possibility that harbor porpoise may be entangled in sink gillnets operating just south of Cape Cod has only recently been documented. Observer coverage of sink gillnet trips in this area began in 1992. From 1992 to 1994, an estimated 132 entanglements occurred each year. The large majority of these occurred in March, with the rest occurring in April and May. As observer coverage expanded in 1995, an annual total of 643 entanglements were estimated. In January, February, and December of 1996, significant numbers of takes (77, 140, and 75), respectively, occurred in these statistical areas. The Cape Cod South Closure Area is closed to fishing with sink gillnets during the month of March.

Offshore Area Observer coverage in the Offshore Statistical Area was limited until 1996. In 1996 harbor porpoise takes were estimated at 218 in the winter (mostly in February) and 29 in the fall (November) (See Table 4 - offshore data prior to 1996 was not available).

In summary, the results of the bycatch estimates suggest that bycatch reduction is being achieved in the Mid-Coast and Northern Maine closure areas, but that bycatch has increased in other areas (South Cape Cod and Offshore areas). Therefore bycatch reduction has occurred in specific areas and times but the PBR level overall is not being achieved in the GOM.

Table 2. Observed takes, estimated total by-catch, and associated % Coefficient of Variation (CV) in the Gulf of Maine for 1996 (Palka, 1997). This information was presented to the GOMTRT at their December, 1997, meeting.

Seasons are WINT (January - May), SUMM (June - August), and FALL (September - December).
- = no observer coverage and/or fishing effort
0 = was observer coverage and fishing effort but no observed takes
N/A = not applicable; SGOM includes the Mid-coast and Massachusetts Bay areas

Area		Observed Takes			Estimated Takes				%CV of Est. Takes		
		Wint	Summ	Fall	Wint	Summ	Fall	Total	Wint	Summ	Fall
NGOM	N. ME	-	2	0	-	41	0	41	-	66	0
SGOM	S. ME	1	0	0	62	0	0	62	108	0	0
	NH	3	0	0	37	0	0	37	108	0	0
	N. Boston	4	0	2	92	0	139	231	49	0	85
	S. Boston	0	0	2	0	0	36	36	0	0	116
S. Cape	S. Cape	9	0	2	323	0	108	431	51	0	119
Offshore	Offshore	8	0	1	229	0	48	277	20	0	107
Closed Areas											
closed areas	Mid-coast	7	N/A	3	62	N/A	22	84	45	N/A	64
	Mass Bay	1	N/A	N/A	2	N/A	N/A	2	30	N/A	N/A
	S. Cape	0	N/A	N/A	0	N/A	N/A	0	0	N/A	N/A
TOTAL		33	2	10	807	41	353	1201	24	66	55

Table 3. Harbor Porpoise Bycatch Estimates by Year and Month (Palka, 1997). HPTRP illustrated by shaded areas; lighter shading is where pinger use is required, darker shading represents complete closure. Offshore data is only available for 1996, see Table 4. This information was provided to the GOMTRT at their December, 1997, meeting.

	Massachusetts Bay			Mid-Coast			Cape Cod South		
Month	1994	1995	1996	1994	1995	1996	1994	1995	1996
Jan	0	38	0	0	-	-+	0	18	77
Feb	120	0	0	-	-	-	-	185	140
Mar	0	58*	48*	157	0	0	207	151	0
Apr	47	0	112	339	198	63*	0	289	0
May	34	20	42	82	126	14	105	0	0
June	0	-	o	60	0	0	0	-	0
July	0	0	0	0	0	0	-	0	-
Aug	0	0	0	38	0	0	-	-	-
Sept	0	0	0	478	0	0	-	0	-
Oct	138	29	0	95*	254	36*	-	0	0
Nov	11	56	0	87*	0	0	-	0	0
Dec	30	0	44	2*	0	0	-	0	75
Total	380	201	246	1338	578	113	312	643	292

\+ monthly estimate not representative due to low observer coverage and very high bycatch rate
* some takes were within closure, some outside (see text for further description)
\- = no observer coverage due to no observers and/or no landings
0 = bycatch estimated to be zero, and there was observer effort

Note: Closures occurred for at least part of the month for the following cells: March, 1995 and 1996 in Massachusetts Bay; April, and September through December 1996, Nov - Dec 1995, and November, 1994 in the Mid-Coast area, and March 1996 in the Cape Cod South area. For the Mid-Coast area, some of the takes occurred in nets with pingers in closure areas: April and October 1996--all takes occurred in closed area , October 1994: 13 takes in closed areas, 82 in open areas (rest of Stat Area 513); November 1994: 29 takes in closed areas, 58 in open areas; December 1994: 2 takes in closed areas, 0 in open areas.

The Massachusetts Bay data includes all of statistical area 514, which is larger than Massachusetts Bay. This means that some of the takes occurred outside the closure area. These areas follow: March 1995: 0 takes in closure area and 58 takes outside closure area; in March 1996: 2 takes in closure area and 46 takes outside closure area.

3.5.2 1997 GOMTRT Recommendations

At their December , 1997 meeting, the GOMTRT recommended additional closures and expanded requirements for pinger use to achieve the necessary bycatch reduction for harbor porpoise. The GOMTRT took into account the significant changes in groundfish conservation measures under Framework 25 of the NE Multispecies FMP. Framework 25 was under consideration by the NEFMC during the GOMTRT meeting in December, 1997 and was not implemented until May, 1998. Framework 25 established rolling one-month closures from Cape Cod Bay to Penobscot Bay from March 1 through June 30 (April 1 through June 30 in the Mid-Coast area), and a one-month closure in the Offshore area during June. These periods partially overlap with existing marine mammal closures (see Figure 3). Additionally, Framework 25 allowed continued use of pingers in the Mid-coast area from March 25 through April 25 and closed the Jeffreys Ledge portion of the Mid-Coast area year-round.

The GOMTRT recommended the following closures to achieve PBR: 1) maintain the existing Northeast Closure from August 15 through September 13; 2) close Cape Cod South from March 1 through March 31; 3) close Massachusetts Bay from March 1 through March 31; and 4) close the Mid-Coast area from March 24 through April 26. The GOMTRT also recommend the following expanded pinger requirements: 1) September 15 through March 24 and April 26 through May 31 in the Mid-Coast area; 2) the months of September through May in the Cape Cod South area; 3) the months of February and April in the Massachusetts Bay area; and 4) September 1 through May 31 in the Offshore area.

3.5.3 Bycatch Reduction in the GOM

This section refers to Table 4 which shows the 1996 bycatch data stratified to enable direct comparison of existing closure areas, HPTRP bycatch reduction measures, and Framework 25 measures. The bycatch estimates in Table 4 are slightly different than the bycatch estimates in the draft EA. The differences are due to two reasons: First the spatial and temporal stratification is presented differently. In particular, the Southern GOM and Offshore areas in the draft EA are sub-divided in Table 4 into the closed and open management areas with and without pingers to provide a clearer picture. Secondly, the new spatial strata shown in the new Table 4 results in a more accurate allocation of the total fishery effort data and produces a more robust bycatch estimate (i.e., lower variability) than was shown in the draft EA. The analytical process is basically the same as that used to produce the 1996 total bycatch estimates reviewed by the GOMTRT in December 1997, shown in Table 2. The total number of 1996 takes now shown in Table 4 is therefore essentially the same as the estimate reviewed by the GOMTRT.

Table 4. Harbor porpoise bycatch estimates for the New England Multispecies Sink Gillnet Fishery. Entire table reflects all harbor porpoise expected to be caught in these areas if no closures were in place. Shaded blocks are areas that would be completely closed to gillnets by Framework 25 to the NE Multispecies Sink Gillnet FMP and/or the HPTRP (Bisack, 1998).

<table>
<tr><th rowspan="2"></th><th rowspan="2">N.Maine</th><th rowspan="2">Open 513-14</th><th colspan="7">Closures</th><th rowspan="2">Season Total</th></tr>
<tr><th>Monthly Rolling</th><th>Jeffrey's Ledge</th><th>Mid-Coast</th><th>Mass Bay</th><th>Cashes Ledge</th><th>Offshore</th><th>South Cape</th></tr>
<tr><td>January</td><td rowspan="5">0</td><td rowspan="5">0</td><td rowspan="2">NA</td><td rowspan="2">269</td><td rowspan="2">0</td><td rowspan="2">0</td><td>0</td><td>0</td><td>96[1]</td><td rowspan="5">879</td></tr>
<tr><td>February</td><td>122[1]</td><td>96[1]</td><td>72[1]</td></tr>
<tr><td>March</td><td colspan="2">85[3]</td><td>2[1]</td><td>1[2]</td><td colspan="3" rowspan="3">0</td></tr>
<tr><td>April</td><td colspan="2">67[2]</td><td rowspan="2">0</td><td>19[1]</td></tr>
<tr><td>May</td><td>27[1]</td><td></td><td>23[1]</td></tr>
<tr><td>June</td><td rowspan="3">41</td><td colspan="8" rowspan="3">0</td><td rowspan="3">41</td></tr>
<tr><td>July</td></tr>
<tr><td>August</td></tr>
<tr><td>September</td><td rowspan="4">0</td><td rowspan="4">28[1]</td><td rowspan="4">NA</td><td rowspan="4">91[2]</td><td rowspan="4">3[1]</td><td rowspan="3">0</td><td colspan="2" rowspan="2">0</td><td rowspan="3">0</td><td rowspan="4">252</td></tr>
<tr><td>October</td></tr>
<tr><td>November</td><td colspan="2" rowspan="2">29[1]</td></tr>
<tr><td>December</td><td>15[1]</td><td>86[1]</td></tr>
<tr><td></td><td>41</td><td>28</td><td colspan="2">539</td><td>5</td><td>58</td><td colspan="2">247</td><td>254</td><td>1172</td></tr>
</table>

[1] Harbor porpoise caught with no active pingers
[2] Harbor porpoise caught with active pingers
[3] Harbor porpoise caught with active and non-active pingers

Table 4 reflects the expected bycatch without the HPTRP in place. In other words, it reflects the expected bycatch given the closures in place prior to and including those in 1996. The "closures" column represents a stratification that accounts for the boundaries of the HPTRP closures and the Framework 25 closures. The additional bycatch reduction realized from the Framework 25 closures, including the year-round Jeffreys Ledge closure, is expected to be 539 harbor porpoise or a 46% reduction. Adding in the additional areas closed under the HPTRP (Massachusetts Bay, Cashes Ledge, and Cape Cod South = 123) and the areas where pingers will be used, assuming 80% effectiveness (353), projects a total bycatch reduction of 1015 animals. This results in a remaining bycatch estimate of 157 animals. This achieves plan goals of reducing take to 79% of historic levels, taking into consideration expected bycatch from outside the GOM.

For several reasons, the final regulations differ slightly from the recommendations of the GOMTRT that resulted from the December 16-17, 1997 meeting. The problem with the GOMTRT recommendation in the Mid-Coast area is that, in combination with the measures of Framework 25, it results in a consecutive two-month closure period in the Mid-Coast area. This would significantly impact the small boat coastal fishery in Maine and New Hampshire. NMFS investigated whether other options for bycatch reduction were available that would not create a two month consecutive closure. Since the Mid-Coast area is an area of high bycatch some level of bycatch reduction would be needed in that area. NMFS proposes a pinger requirement in the Mid-Coast area during those times when the Framework 25 closures are not in effect.

Requiring pingers would not result in the same bycatch reduction as a total one-month closure, therefore, NMFS considered whether a one month closure in another high bycatch area would be effective. A logical choice was the Cashes Ledge area during the month of February. Cashes Ledge is part of the Offshore Closure area. This appears to be a good choice because: 1) both 1996 data and 1997 data indicate that the Cashes Ledge area has very high bycatch in winter (January and February); 2) no complete closure was proposed for this area for groundfish conservation; and 3) a different segment of the fishery (larger, more mobile vessels) fish in this area compared with the inshore areas of the Mid-Coast, thereby distributing the economic impacts of the conservation measures more equitably among segments of the gillnet fishery. It is apparent from Table 4 that the MSFCMA measures (monthly rolling closures, Jeffrey's Ledge year-round closure) will result in bycatch reduction in the Mid-Coast area.

Even though 1996 is probably most representative of the current status of the fishery given the changes that have occurred within the fishery, the GOMTRT expressed interest in continuing to use other years of data to get another perspective on take reduction strategies. NMFS has been monitoring this issue for many years. It is useful to analyze that information without the Framework 25 measures under the MSFCMA, but caution must be used in directly comparing this analysis to Table 4, where the effect of these overlapping closure and time periods is detailed. Based on the data presented in Table 3, and assuming an 80% pinger effectiveness rate, but without including the effects of the Framework 25 measures to protect cod, the expected bycatch reduction from the HPTRP based on 1994 and 1995 data is:

Table 5. Expected bycatch reduction from final HPTRP measures

(1) Bycatch reduction from final HPTRP based on 1994 data

	Mass Bay	Mid-Coast	Cape Cod South	Offshore
closure	0	0	207	N/A
pingers	185	957*	0	N/A

Total Bycatch reduction from table = 1349 animals
Total Bycatch estimate for 1994 was 2100
Therefore, bycatch estimate under final plan using 1994 data is 2100 - 1349 = **751** animals
(*This total does not include the 44 takes in pingered nets in Nov -Dec)

(2) Bycatch reduction from final HPTRP based on 1995 data

	Mass Bay	Mid-Coast	Cape Cod South	Offshore
closure	58	0	151	N/A
pingers	30	462	394	N/A

Total Bycatch reduction from table = 1096 animals
Total Bycatch estimate for 1995 was 1400
Therefore bycatch estimate under final plan using 1994 data is 1400 - 1096 = **304** animals

Using data provided to the GOMTRT at the December 1997 meeting (Table 3) and as summarized above, the HPTRP results in a remaining bycatch of approximately 751 animals using 1994 data and approximately 304 animals using 1995 data, without consideration of the additional bycatch reduction benefits that may occur from closures in the Mid-Coast area under the MSFCMA. The analysis in Table 4 reflects the additional 46% reduction from the closures to protect Gulf of Maine cod, including the year-round Jeffreys Ledge closure while opening the Mid-Coast area to pingers. While the distribution of takes may not have been identical to those takes in 1996 (i.e. may not result in the same 46% reduction), the cod protection closures are expected to have some effect since it is in the same area of high bycatch in all years.

3.6 Harbor Porpoise Bycatch in the Mid-Atlantic Gillnet Fisheries

Efforts to reduce the bycatch of harbor porpoise throughout its range have been hampered by the lack of data on the extent of harbor porpoise bycatch in the Mid-Atlantic coastal gillnet fisheries. To document the incidental interactions with harbor porpoise in the Mid-Atlantic, NMFS began placing Sea Sampling Program observers aboard Mid-Atlantic coastal gillnet vessels in 1993. Since that time, observer coverage has revealed information on the temporal and spatial nature of the fisheries interaction and has provided information on gear types, fishing practices, and vessels most likely to interact with harbor porpoise.

3.6.1 Bycatch Data Analysis (Bisack, 1997; Palka, 1997)

The basis for determining how to reduce the bycatch of harbor porpoise in the Mid-Atlantic was to determine an overall bycatch estimate based on observed harbor porpoise takes. The observer program cannot cover all vessels in the Mid-Atlantic fishery at this time, therefore the total bycatch is estimated by multiplying the total fishing effort and the average bycatch rate per unit effort (tons of fish). The data to estimate total bycatch comes from NMFS' Sea Sampling observer data and the weigh-out program. The weighout program collects data on total landings for all vessels fishing in federal waters (Bisack, 1997). Harbor porpoise per ton of fish was calculated using the sea sampling data; total fish landed was calculated from the weighout information.

The Mid-Atlantic coastal gillnet fishery consists of several sub-fisheries each targeting different fish species. Overall for 1995 and 1996, there were 25 observed takes of harbor porpoise; 12 in the dogfish fishery, 12 in the monkfish fishery and 1 in the shad fishery. From January - April, 1997, there were 31 harbor porpoise takes in 25 hauls; 4 from the dogfish fishery, 3 from the menhaden fishery and 24 from the monkfish fishery. This observation suggested to the MATRT that there may be a relationship between the bycatch of harbor porpoise with specific sub-fisheries. To determine if there was a relationship between harbor porpoise bycatch and the type of fishery, bycatch was estimated for each subfishery.

There are significant drawbacks associated with analyzing bycatch data by subfishery (discussed below). Because the sample sizes for each subfishery are so small, these estimates can only be used as a tool to develop a take reduction plan and not to determine subfishery bycatch estimates. Even using the data as such a tool for development of take reduction strategies would have to be done with caution. The 1995-1996 Sea Sampling data collected from the Mid-Atlantic coastal gillnet fishery was used to determine which gear characteristics are associated with a low bycatch of harbor porpoise, assuming there is a cause and effect relationship between the gear characteristic and harbor porpoise bycatch.

3.6.2 Analysis of Observer Data in the Mid-Atlantic

There were 20 observed trips of the Mid-Atlantic coastal gillnet fishery in 1993. The number of observed trips[6] increased to 221 trips in 1994, 368 in 1995, and 342 in 1996. In 1997, there were 281 observed trips. No harbor porpoise were taken in the observed trips during 1993 and 1994. This is most likely because the observer coverage was low during these years, and there is little evidence that harbor porpoise are in the Mid-Atlantic during July to December, which is the only time observed during 1993. Harbor porpoise were observed taken in more recent years: 6 in 1995, 19 in 1996 and 31 from January through May, 1997.

Other species have also been taken in observed trips. In 1994, 1 bottlenose dolphin and 1 turtle were taken. In 1995 two common dolphins (a strategic stock) and 1 turtle were taken. In 1996 two common dolphins, 1 seal, and 3 turtles were taken.

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[6]Trips are defined as when the boat leaves port until it returns to port. A haul is the retrieval of one piece of gear. There may be many hauls per day or per trip, all or some of which may be observed if there is an observer on board. An observer is usually out for a complete trip.

Harbor porpoise takes were observed between January and April off the Mid-Atlantic coast from New Jersey to North Carolina in both 1995 and 1996. Takes in January have only been observed off New Jersey, though 95% of the observed hauls in January were from hauls south of New Jersey (total observed hauls in January was 413). No harbor porpoise were observed taken south of Cape Hatteras (south of 35°19'), though 10 % (n=125) of the observed hauls in the Mid-Atlantic during January to April in 1995-96 occurred south of Cape Hatteras. There was no observer coverage January through April off New York and only one trip was observed off Delaware during the same time period.

The average estimated takes for 1995 and 1996 were 103 and 310 harbor porpoise respectively. The average is therefore 207 animals per year. The average estimated takes for 1995 and 1996 by month were 28 taken in January, 55 in February, 89 in March and 34 in April. The average estimated takes by state is 46 landed from New Jersey, 71 landed from Maryland and 89 landed from North Carolina.

The one harbor porpoise take in the shad fishery was unique because of the type of net in which the harbor porpoise was taken. A shad net normally has a fine mesh. In the case of the observed take, the shad net included a section of net with a 12 inch mesh, much larger than a normal shad net. It was unclear from the observer report what section of the net, the fine mesh or the large mesh, actually entangled the harbor porpoise. The location of the entanglement has a direct bearing on whether this observed take truly reflects harbor porpoise bycatch in the shad fishery as it is normally conducted. Because of the unique character of the net and the low observed take (one harbor porpoise), bycatch was not estimated for the shad fishery. More information and observer coverage is needed in the shad and other fine mesh subfisheries to analyze their level of bycatch. However, it is likely that harbor porpoise can become entangled in any gill net, regardless of mesh size.

3.6.3 Assumptions inherent in the Mid-Atlantic bycatch and observer data analysis.

A drawback of analyzing bycatch data by subfishery is that because of small sample sizes and assumptions necessary to develop statistical models, subfishery bycatch estimates are not as accurate or precise as when using all subfishery data pooled together, especially when the data are already stratified by port and month. Pooling or combining subfishery data results in a statistically better bycatch estimate. However, to design management measures the pooled estimates are not as useful as subfishery bycatch statistics. This is because pooling mixes subfisheries that experience different bycatch rates, and does not explicitly account for different gear types, different fishing practices, and different fishing locations. Therefore, unique aspects of each sub-fishery are lost, and it is not possible to target those subfisheries that are causing the largest problems. To account for all of these issues, the best estimate of bycatch in the Mid-Atlantic coastal gillnet fishery was calculated by pooling subfishery data, and management bycatch reduction measures were discussed in terms of subfisheries.

Assumptions are often necessary to develop and evaluate results of statistical modeling. Two major assumptions were taken into consideration in analyzing and developing alternatives to reduce bycatch in the Mid-Atlantic coastal gillnet fisheries. First, it was assumed that the Sea Sampling data collected in 1995 and 1996 were representative of the sub-fisheries during those years and would be representative of the future sub-fisheries. The number of observed takes in these fisheries was not large, therefore it is possible that single hauls could be influential. In addition, fishing is a dynamic industry and may not be consistent from year to year.

The second important assumption was that there was a cause and effect relationship between a particular gear characteristic and the bycatch rate and that one gear characteristic is not related to some other gear characteristic. Other assumptions made during the evaluation of alternative reduction schemes includes: 1) the only subfisheries that catch harbor porpoise must be the dogfish and monkfish subfisheries; 2) the models used in this analysis correctly modeled the relationships; 3) no harbor porpoise were caught in waters off Virginia and Delaware; and 4) in areas and time periods not explicitly stated in a reduction option the fishing effort and fishing habits remained the same as those in 1995 and 1996.

3.6.4 Characteristics of the sea sampling trips (Palka, 1997)

Gill nets are vertical walls of netting normally set out in a straight line. A gill net is constructed of a single wall of webbing held vertically in the water by weights and floats. The manner in which the webbing is hung, the "hanging ratio" determines the shape of the mesh (Neilson and Johnson, 1983) Some of the characteristics that observers record for each observed haul include: target species, homeport, twine size, twine color, float line length, mesh size, soak duration, net segment length, number of tie downs, hang ratio, water depth, and water temperature. Descriptions of these characteristics within the dogfish and monkfish sub-fisheries and correlations with harbor porpoise bycatch are discussed below.

In the Mid-Atlantic region, gillnet fishing for monkfish and dogfish tends to exhibit regionally-specific fishing characteristics. In particular, Mid-Atlantic dogfish and monkfish fishing characteristics are generally distinguishable from New England monkfish and dogfish fishing practices. The within-region commonalities are termed locally prevailing fishing practices and are discussed above.

<u>Target species</u> The target fish species are those fish which, before the haul started, the captain said he/she was trying to catch. Harbor porpoise were taken in hauls where the target species were dogfish (916 observed hauls), monkfish (240 observed hauls) and shad (62 observed hauls). In 1995 and 1996, 12 harbor porpoise were taken in 11 hauls of the dogfish sub-fishery, 12 harbor porpoise were in 9 observed hauls of the monkfish sub-fishery, and 1 harbor porpoise was observed taken in the shad sub-fishery. There was no obvious spatial pattern of where harbor porpoise were taken within any of these sub-fisheries.

<u>Homeport</u> Homeport refers to the state in which the vessel is registered. Vessels registered in states outside of the Mid-Atlantic may land their catch in Mid-Atlantic states. Homeport information was used to determine how many sea sampled trips and hauls are from local boats and how many are from out-of-state boats. In 1995, all sea sampled trips which landed fish in New Jersey, Delaware, and Virginia were on boats registered in their respective state (referred to as a local boat); about a quarter of Maryland sea sample trips were on local boats, and about half of North Carolina sea sampled trips were on local boats. In 1996, all sea sampled trips from Virginia were on local boats. Five percent of Maryland sea sampled trips were on local boats; About half of the New Jersey and North Carolina trips were on local boats.

Approximately 80 to 85 % of the observed harbor porpoise were taken by the non-local vessels in 1995 and 1996 (Table 6). The harbor porpoise caught in the shad sub-fishery was caught by a boat registered in New Jersey. Sixty-three non-local vessels (i.e., those vessels not registered in a Mid-Atlantic state) were observed fishing for monkfish and dogfish in 1995 and

1996 compared to 70 observed local vessels during that same time period. The non-local boats made 215 observed trips, while the local boats made 141 observed trips.

Table 6. Home state, number of observed vessels, number of observed trips and number of harbor porpoise observed taken in 1995 and 1996 (in italics).

State Landed	Home State	# Vessels Obs.	# Trips Obs.	# Harbor porpoise Obs
NY		0 *0*	0 *0*	0 *0*
NJ	NJ MA NH	6 *2* *1*	8 *3* *1*	1 *0* *7*
DE	DE	1 *0*	1 *0*	0 *0*
MD	ME	1 *1*	4 *9*	0 *0*
"	NH	4 *3*	13 *11*	1 *0*
"	MA	17 *12*	47 *33*	3 *3*
"	RI	1 *2*	2 *7*	0 *1*
"	NY	*1*	*1*	*0*
"	NJ	*1*	*2*	*1*
"	MD	8 *1*	17 *3*	0 *0*
"	DE	1	7	0
VA	VA	10 *5*	15 *11*	0 *0*
NC	NH	2 *4*	9 *21*	1 *1*
"	MA	8 *3*	17 *5*	0 *0*
"	RI	1 *1*	2 *2*	0 *0*
"	VA	*4*	*6*	*0*
"	NC	13 *16*	34 *41*	0 *0*

Twine size Twine size refers to the thickness of the thread used to make the fishing net. Most dogfish observed hauls used either .62 mm (48 %) or .66 mm (15 %) twine size. Hauls targeting monkfish used .62 mm (26 %), .66 mm (27 %), .57 mm (11 %) and .90 mm (28 %). For both of these sub-fisheries, there appears to be a relationship between twine size and harbor porpoise bycatch. Most harbor porpoise are taken in twine size of .62 mm and .66 mm. However, because most of the takes are in the twine sizes that were most often observed, when the effect of effort is removed, there is not enough data to determine if a particular twine size is associated with low bycatch rates.

Twine color Commonly used twine colors in the dogfish sub-fishery were green (34 %), blue (21 %), and clear (11 %). Commonly used twine colors in the monkfish sub-fishery were green (28 %), blue (17 %), and pink (13 %). There was no relationship between twine color and bycatch rate.

Float line length Floatline length refers to the total length of the net that is fished. A net segment is typically 300 feet long. These nets are connected by a floatline to other nets, usually including up to 10 to 13 individual segments. In the dogfish sub-fishery, most observed floatlines were between 2000 feet and 4000 feet (62 %), 12 % were less than 1000 feet, and 11 % were greater than 4000 feet. In the monkfish sub-fishery, most observed floatlines were between 3000 feet and 5000 feet (59 %), 22 % were shorter than 3000 feet and 19 % were greater than 5000 feet. There is a significant relationship between float line length and bycatch, even when accounting for the distribution of effort. The bycatch is greater when float line length is greater than 4000 feet. This relationship is strongest in the monkfish sub-fishery.

Mesh size Mesh size is usually specified by the length of one bar side of the diamond-shaped mesh opening or by the length of the mesh stretched to bring the side knots together. Nearly all (93 %) of the nets observed in the dogfish sub-fishery were between 6 and 7 inches, where 19 % were 6 inches, 36 % were 6.5 inches, and 38 % were 7 inches. The most commonly used mesh size in the monkfish sub-fishery was 12 inches (86 %) and an additional 11 % used either 10 inch or 11 inch mesh.

Soak duration Soak duration refers to the amount of time the net is left in the water. Soak durations varied widely. In the dogfish sub-fishery, soak durations range from a few minutes to over 100 hours; most were between 18 and 24 hours (55 %), 17 % were between 24 and 48 hours, while 14 % were less than 6 hours. In the monkfish sub-fishery, 38 % were between 18 and 24 hours, 28 % were between 24 and 48 hours, and 7 % were greater than 72 hours. For both sub-fisheries, there was a relationship between soak duration and harbor porpoise bycatch. All harbor porpoise caught in the dogfish and monkfish sub-fisheries were caught in nets that soaked for more than 18 hours. As the soak duration increased so did the bycatch rate. This trend was strongest in the monkfish fishery.

Net length. Ninety-eight percent of dogfish nets and 98 % of monkfish nets were 300 feet long. Due to the lack of variability in the net segment length, it is not possible to determine if the bycatch rate would be lower under some configuration of net segment length.

Tie downs Tie downs are unique to the monkfish fishery as a way to trap fish alive in pockets or bags of netting created at the bottom of net when the net is "tied down". Very few (1 %) dogfish nets had tie downs. Observed monkfish nets had one or more tie downs (74 %) or no tie downs (26 %). Due to the lack of variability in the number of tie downs, it was not possible to determine if the bycatch rate is lower under some configuration of tie downs.

Hang ratio The hanging ratio is the ratio between the length of the float line and the length of the stretched mesh hanging from the float line. For nearly all the dogfish nets, the hang ratio is either 0.5 (68 %) or 0.33 (29 %). For all the monkfish nets, the hang ratio was either 0.5 (69 %) or 0.33 (31 %). Due to the lack of variability in the hang ratios, it was not possible to determine if the bycatch rate is lower under some configuration of hang ratio.

Water depth Water depths where observed nets from both the dogfish and monkfish sub-fisheries were set ranged from 2 to 36 fathoms. For the dogfish sub-fishery, 23 % of the hauls were set in water less than 10 fathoms, 34 % were in 10 to 15 fathoms, 27 % in 15 to 20 fathoms, and 16 % in greater than 20 fathoms. For the monkfish sub-fishery, 22 % of the hauls were in water 5 to 15 fathoms, 44 % in 15 to 20 fathoms, 28 % in 20 to 25 fathoms, and 6 % in greater than 25 fathoms. For the dogfish sub-fishery, there was a trend of increased harbor porpoise bycatch with increased depth. For the monkfish sub-fishery the trend was in the opposite direction; bycatch increased as the depths become shallower. After taking into account the effort distribution, the trend became very weak for the dogfish fishery; only at depth less than 10 fathoms was the bycatch lower. After taking into account the monkfish effort distribution, there was still a trend toward decreased bycatch in deeper waters. In the monkfish sub-fishery, bycatch rates were highest in nets that were set at 10 to 15 fathoms.

Water temperature Water temperatures at the location of the set ranged from 39°F to 68°F. Sixty-seven % of the dogfish nets and 67 % of the monkfish nets were set in waters ranging from 41° F to 47°F,. In the dogfish sub-fishery, there was possibly a trend toward increased harbor porpoise takes in cold water, 38° to 41° F; however, because only 5 % of the observations were in this temperature range, the trend was not significant. There was no relationship between water temperature and bycatch in the monkfish sub-fishery.

3.6.5 Subfishery bycatch analysis

Various bycatch reduction scenarios, based on those gear characteristics and fishing practices that are common to the Mid-Atlantic monkfish and dogfish fisheries, were analyzed. The analysis used 1995 and 1996 NMFS' Sea Sampling data to mathematically model the relationships between gear characteristics and fishing practices with the presence or absence of harbor porpoise caught. The model was then used to predict future bycatch rates for hauls that exhibited the suite of gear characteristics under review. The percent bycatch reduction was estimated by comparing the predicted future bycatch rates to the bycatch rates observed in the 1995-1996 Sea Sampling data.

Dogfish results In general, the models indicated that bycatch rates decrease when float line length decreases, twine sizes were either smaller or larger than .62 and .66, mesh size was either smaller or larger than 6.5 or 7 inches, and when soak duration was decreased. Months with the highest bycatch rate were February and March. The states with the highest bycatch were North Carolina and Maryland. Dogfish effort and bycatch were more spatially dispersed than effort and bycatch in the monkfish fishery (see below). In the analysis of various month-state combinations, the median observed soak durations were 18 or 24 hours. In these cases, when soak duration changed to 6 or 12 hours the bycatch reduction was 60 or 30%, respectively. However, when soak duration was set to 18 or 19.5 hours, very little or no bycatch reduction was achieved.

For the dogfish fishery off New Jersey between January and April, if twine size decreased to .81 mm or .70 mm, float line lengths increased to 3000 or 4000 feet, and mesh sizes stayed at about 6.5 or 6.8 inches, then the bycatch rate increased by 85%. The only reduction option that had a greater than 75% reduction was when the float line length was equal to 3000 feet, the twine size was equal to .90 mm, and the mesh size was equal to 6.0 inches.

For the dogfish sub-fishery off Maryland over all months, bycatch rates decreased by more than 75% when twine size increased to .70 mm or more, mesh size decreased to 6 or 6.5 inches, and float line length was 3000 feet or less. The suite of characteristics that had the maximum reduction of 95% was float line length equal to 2118 feet, twine size equal to .70 mm or .90 mm, and mesh size equal to 6.0 or 6.5 inches.

For the dogfish sub-fishery off North Carolina, during February or March, the bycatch rate was reduced by 50% when float line length decreased below 4000 feet, twine size increased to .70 mm or .90 mm, and mesh size decreased to 6.0 inches. The largest reduction of greater than 50% was obtained when float line length was equal to 2118 feet, twine size was equal to .90 mm and mesh size was equal to 6.0 inches.

Monkfish Results In general the model indicated that bycatch rate decreased when float line length decreased, twine size was either smaller or larger than .62 and .66 mm, and mesh size was either smaller or larger than 11 inches. Months with the highest bycatch were March, followed by January. Areas with the highest bycatch were in Maryland and North Carolina in March, and New Jersey in January and April, particularly in an area off New Jersey called the "Mudhole". The Mudhole is defined as an area south of $40^030'$, north of $40^005'$, east of the coastline, and west of $73^020'$. The definition of the Mudhole is based on topographic features that support concentrations of target fish species at certain times of the year.

The characteristics that had the greatest influence were twine size and float line length. In all of the monkfish options, the mesh size and tie down presence were nearly the same as that observed during 1995-1996. In addition, the float line lengths were similar to the float line lengths observed in Maryland and North Carolina, but less than that observed in New Jersey and the Mudhole. The suggested twine size of .90 mm was larger than most of the median values observed during 1995-1996. When twine size was increased to .90 mm and the float line length decreased to below 4000 feet, there were reductions in the bycatch rate from most areas and months. The amount of reduction from month-states that had a bycatch in 1995-1996 was nearly 100%. The amount of reduction over the entire area for all months ranged from 88 - 99%, depending on the float line length. If fishing effort and fishing practices remain similar to that observed in 1995-1996, then larger reductions could occur.

4.0 Alternatives, Including the Proposed Action, and Environmental Consequences

This section describes the proposed action (the HPTRP) and the range of reasonable alternatives to the proposed action. This section contains a discussion of the environmental consequences of both the proposed action and the alternatives.

The alternatives outlined below include the range of reasonable options to reduce the bycatch of harbor porpoise in the GOM and the Mid-Atlantic. All alternatives apply to the area from the Bay of Fundy to the North Carolina/South Carolina border and extend from the seaward edge of the coast[7] to the 72°30' W. longitude boundary. For all alternatives, except the no action alternative, the goal is to achieve a reduction in harbor porpoise bycatch below the PBR level. Each alternative approaches the take reduction goal in a different way.

Alternative 1, the proposed action, is divided into two parts. The HPTRP combines the GOM and Mid-Atlantic geographic areas to achieve the bycatch reduction goal for harbor porpoise. This stock is distributed both in New England and the Mid-Atlantic regions. Part A (GOM) of the HPTRP is composed of a series of time/area closures where fishing would be prohibited, and time/area closures where gillnet fishing would be allowed if fishing nets are equipped with pingers. Part B (Mid-Atlantic) of the HPTRP is composed of a series of time/area closures where fishing would be prohibited and time/area closures where fishing gear can be used if the gear is modified. This alternative is based on GOMTRT and MATRT recommendations for bycatch reduction methods that are most appropriate to each area. For certain reasons these two areas are being treated with different approaches, which is described in detail in section 4.1.

Alternative 2, the No Action alternative, is a discussion of the affect on the human environment if no action to address harbor porpoise bycatch in the GOM and the Mid-Atlantic is taken at this time. This discussion is required under NEPA.

Alternative 3 focuses solely on the use of pingers as the mechanism with which to achieve the necessary reduction in bycatch. This alternative is based on the assumption that the success of the 1994 and 1997 scientific pinger experiments in the GOM can be repeated with the same success throughout the GOM and in the Mid-Atlantic fisheries.

Alternative 4 focuses on the use of time and area closures to reduce bycatch below the PBR level. This alternative is based on the concern that gear modifications and limited time/area closures and pinger requirements are too complicated and too difficult to implement and enforce. Therefore, one broad time/area closure that encompasses all fisheries during the time of highest bycatch will be easier to implement and therefore more successful in achieving the PBR goal.

4.1 Alternative 1, Proposed Action - The Harbor Porpoise Take Reduction Plan

4.1.1 Part A, GOM Component

This component of the proposed action is based on the recommendations of the GOMTRT in their report to NMFS on January 14, 1998. The goal of this component of the HPTRP is to reduce takes in the GOM from 1833 to less than 385 animals per year. The proposed action attempts to achieve the bycatch reduction goals of the MMPA while minimizing the economic impact to any one segment of the NE multispecies sink gillnet fishery. The proposed action would regulate sink gillnet fishing in all state and federal waters.

The GOM component of the HPTRP consists of a series of complete time/area closures and time/area closures that allow fishing with the use of pingers (Table 7, Figure 3).

[7] The waters included for this action are defined as the waters seaward of the first bridge over any barrier island, embayment, harbor or inlet and excludes bays, river mouths, and other inshore areas.

Figure 3. Chart of closures under the Gulf of Maine component of the HPTRP and closures under the NE Multispecies FMP.

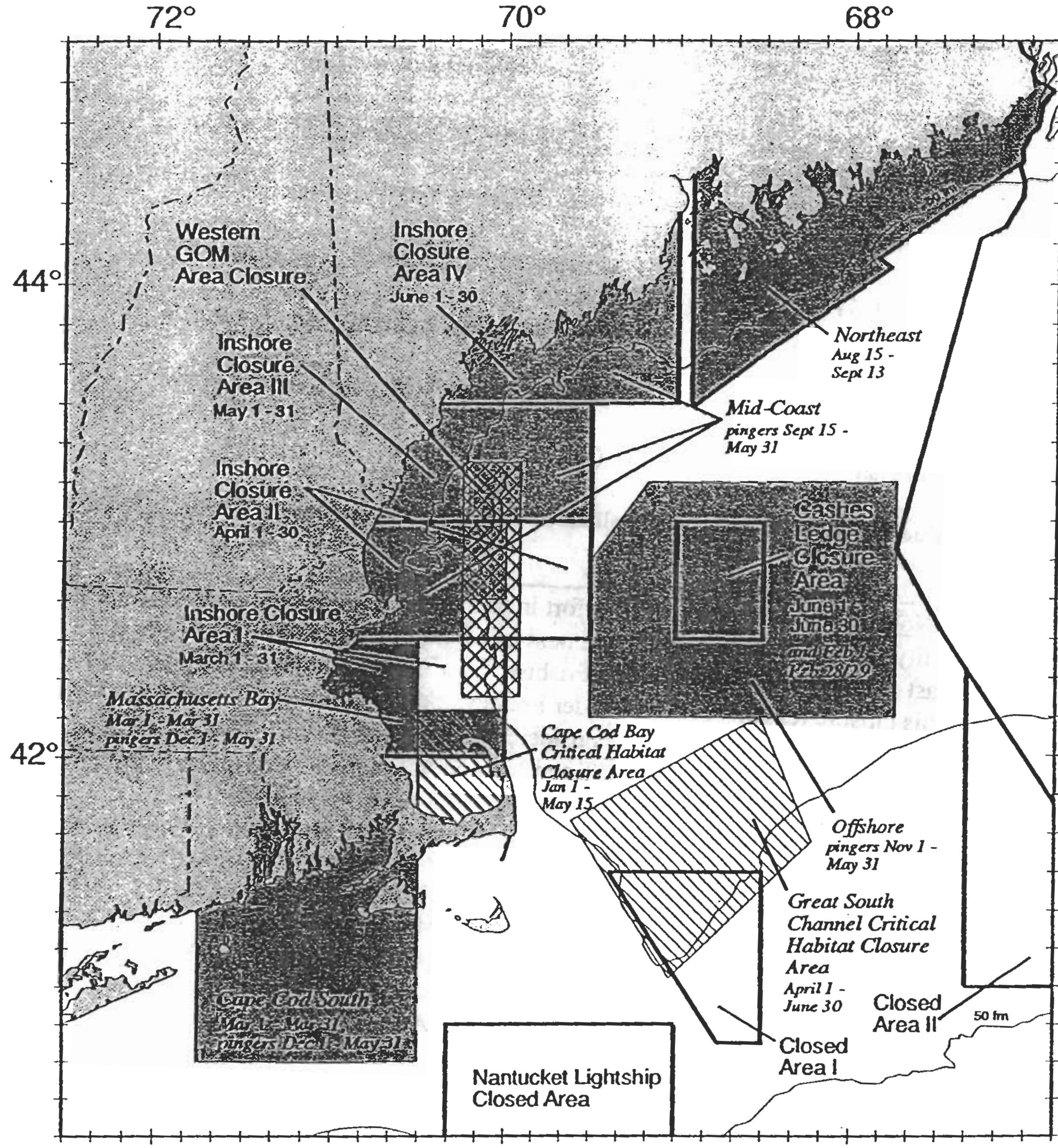


Chart of closures under the Gulf of Maine component of the Harbor Porpoise Take Reduction Plan and closures under the Northeast Multispecies Fishery Management Plan (FMP). Areas on the chart delineated by bold, linear outline with labels in regular type correspond to NE Multispecies FMP; labels in italic type identify shaded areas of harbor porpoise measures.

Table 7. Time/area closures and periods during which pinger use would be required for the GOM component of the HPTRP.

Downeast Area:	
Aug.15 to Sep.13	Closed
Mid-Coast Area:	
Sep 15 - May 31	Closed, sink gillnet with pingers allowed
Massachusetts Bay Area:	
Dec. 1-Feb. 28/29	Closed, sink gillnet with pingers allowed
Mar. 1-31	Closed
Apr. 1 - May 31	Closed, sink gillnet with pingers allowed
Cape Cod South Area:	
Dec. 1 - Feb. 28/29	Closed, sink gillnet with pingers allowed
Mar. 1-31	Closed
Apr. 1- May 31	Closed, sink gillnet with pingers allowed
Offshore Area:	
Nov 1 - May 31	Closed, sink gillnet with pingers allowed
Cashes Ledge Area:	
February 1 - 28/29	Closed

In closed areas where pingers are allowed, all fishers using pingers are required to obtain certification and training in pinger use

Northeast Area - Sink gillnet effort in this region has decreased since 1990, and the probability of harbor porpoise entanglement has therefore also decreased. Currently the Northeast Area is closed to sink gillnet fishing from August 15 through September 13 of each year. This closure remains in effect under Framework 25 to the NE Multispecies FMP. No further management measures were considered for this area at this time. This measure was considered sufficient by the GOMTRT and NMFS, and represents no change from the GOMTRP proposed rule (August, 1996) or the September 1998 HPTRP proposed rule.

Mid-Coast Area - While the HPTRP does not include a complete closure in the Mid-Coast area, Framework 25 to the NE Multispecies FMP implements three, month-long closures in different parts of the Mid-Coast area (previously described). The months of April and May were months of high harbor porpoise bycatch in 1994, 1995 and 1996 and therefore, the Framework 25 closure is expected to reduce harbor porpoise bycatch to some extent. The HPTRP pinger requirement in March will reduce the likelihood that effort shifts from the closed periods would result in increased takes. The Western GOM Area Closure (includes portions of Jeffreys Ledge and Stellwagen Bank) is a year round closure under Framework 25 to the NE Multispecies FMP as well. This overlaps the eastern edge of the current HPTRP Mid-Coast closure.

The bycatch estimate for the Mid-Coast area in 1995 was 324 animals in spring and 254 animals in fall (a limited pinger experiment was conducted in the fall); in 1996 those estimates were 77 animals in spring and 36 animals in fall (pinger experimental fisheries operated during portions of both spring and fall) (Table 3).

To determine the level of bycatch reduction realized from pingers, an assumption must be made on the effectiveness of pingers. The results of a controlled experiment in the Mid-Coast area in the fall of 1996 resulted in a bycatch reduction of 90%. This result led the GOMTRT to agree to an assumption that pingers are 90% effective in the Mid-Coast area during that time period. However, the results of an experimental fishery in the Mid-Coast area in the spring of 1996 resulted in a pinger effectiveness rate considerably less than the 90% experiment result. As a result of this outcome, the GOMTRT recommended that a 50% effectiveness rate be applied to pingers during the spring in the Mid-Coast area.

The controlled experiments in the GOM, and elsewhere, indicate a pinger effectiveness rate greater than 50%. A spring experiment in the Mid-coast area in 1997 was 100% effective therefore, it is unclear whether the results of the spring, 1996 experimental fishery are indicative of the ineffectiveness of pingers or the result of improper operation of pingers by fishers. NMFS considers an assumption of effectiveness that is not based on a controlled experiment as unwise. However, to allow for uncertainty in effectiveness, particularly in the spring, a pinger education and certification program for fishers wanting to use pingers is required. If the spring, 1996 results are an indication of errors in operation, a pinger certification requirement is expected to raise the overall effectiveness of pingers in reducing bycatch. NMFS assumes that pingers will have an overall effectiveness rate of 80%.

Massachusetts Bay - Currently Massachusetts Bay is closed to fishing with sink gillnets during the month of March. This is the time of year during which most known takes in the region were recorded. The GOMTRT and NMFS consider a March closure (closed under Framework 25) sufficient when combined with the pinger measure described below, therefore no additional management measures are considered necessary at this time.

In March 1996, NMFS authorized fishers to operate in Massachusetts Bay as part of an experimental fishery, provided the fishers used pingers in accordance with instructions. The GOMTRT concluded that it could not be sure that pingers would significantly reduce the take of harbor porpoise during the spring in Massachusetts Bay. The GOMTRT agreed, however, to assume that pingers might reduce the take of harbor porpoise by 50% during the spring, and it recommended that pingers be required during February and April. Again, NMFS is reluctant to assume percentages contradictory to the results of controlled scientific experiments and is proposing to assume 80% for the first year of plan implementation. (Refer to the section on acoustic deterrent devices for further explanation).

Complete closures during the months of February and April would cause significant losses of fishing opportunity, with relatively little additional reduction in bycatch of harbor porpoise. Because March is the month with the highest risk of entanglement, the GOMTRT recommended that March be closed to sink gillnet fishing. Bycatch has occurred in this area from October through May. April bycatch in 1996 was high for this area, possibly a result of shifted effort from March to April, or differences in harbor porpoise abundance and distribution. The bycatch that might occur prior to or after the closure due to effort shifts is expected to be mitigated because of the requirement to use pingers during those months.

Cape Cod South - The Cape Cod South Closure Area is closed to fishing with sink gillnets during the month of March. This is the time of year during which most known takes in the region were recorded until 1996. The March closure is considered sufficient by the GOMTRT and NMFS, and no change in the complete one-month closure for this area is warranted. However, increased takes from September through December, which may be the result of the changing nature of the fisheries or changes in harbor porpoise distribution and abundance, led the GOMTRT to recommend that pingers be required during the fall.

In March 1996, NMFS authorized fishers to operate in Cape Cod South Closure Area as part of an experimental fishery, provided the fishers used pingers in accordance with NMFS's instructions. No marine mammals were observed caught during that experimental fishery, but only 16 trips were reported during that time period. The GOMTRT assumed that pingers would reduce harbor porpoise entanglements by 50% during the spring. However, as with the Mid-Coast area, without controlled experiments the significance of this result is uncertain. Given the relatively low level of bycatch during February and April, the GOMTRT believed that the use of pingers to minimize bycatch would be sufficient during that time period. A closure during these periods would represent significant losses of fishing opportunity, with relatively little additional reduction in bycatch of harbor porpoise.

Offshore Closure Area - Since 56% of the bycatch in the Offshore Area occurred in the Cashes Ledge area boundaries during February, 1996, complete closure of this area was a logical choice to offset the change in the Mid-Coast area from a complete closure in March to a closure with pingers. Pinger use is required in the broader Offshore area from November through May.

Outreach and Training The GOMTRT recommended that, in order to insure that pinger effectiveness was not compromised by inappropriate use or faulty equipment, NMFS conduct a training program and certify fishers that would be fishing in closed areas with pingers. NMFS is requiring a fisher certification program as a component of the HPTRP. This aspect of the HPTRP is directly aimed at removing questions concerning proper use of pingers by fishermen under commercial situations should the bycatch rate not be reduced as expected.

In addition to the pinger use certification program, the HPTRP will include a general outreach effort. This will provide the public with information concerning the problem of harbor porpoise bycatch in gill nets, the MMPA in general, and the various options that are expected to reduce bycatch.

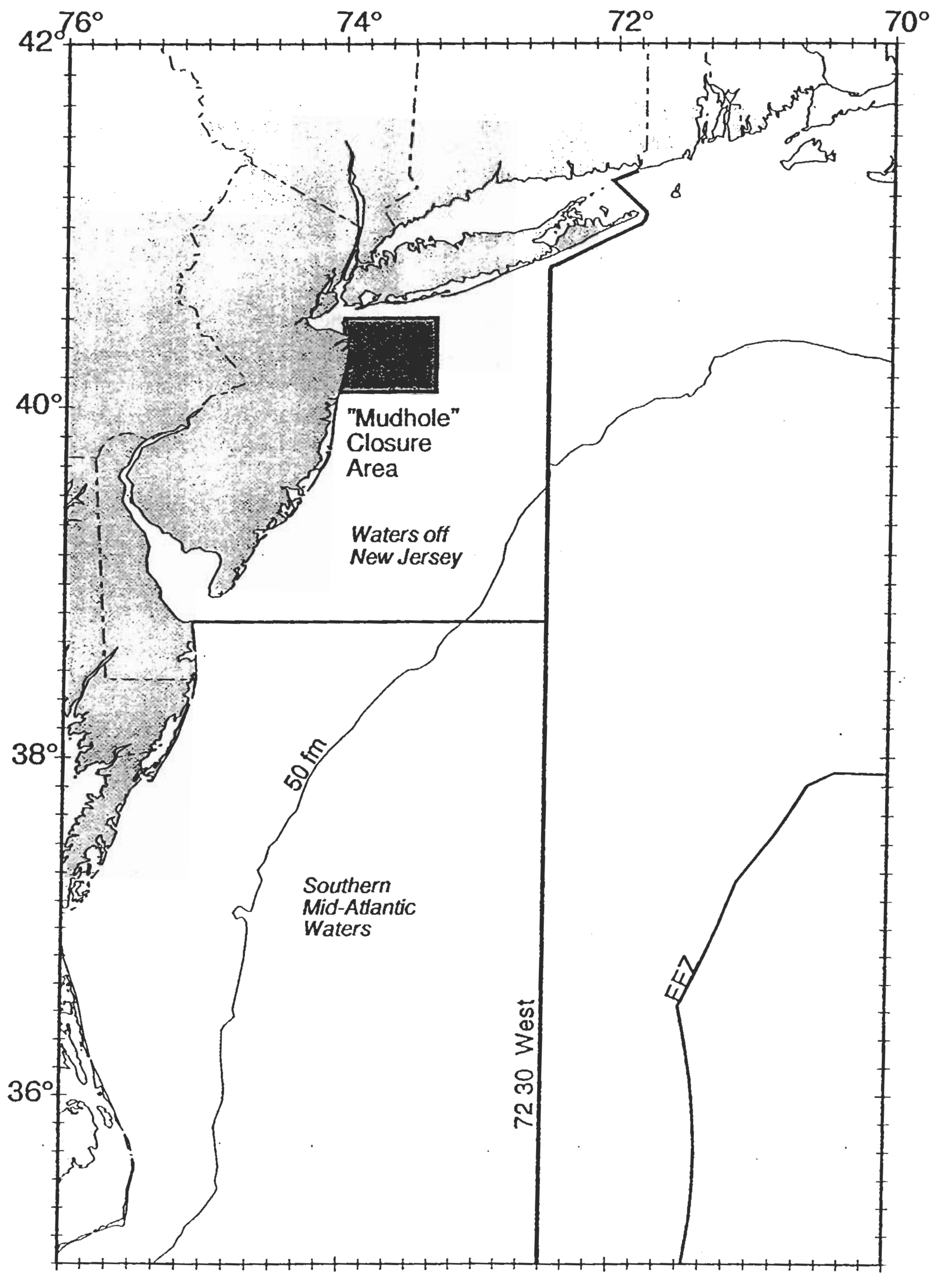
4.1.2 Part B, Mid-Atlantic Component

This component of the proposed action is based on the recommendations of the MATRT in their report to NMFS on August 25, 1997. The goal of this component of the HPTRP is to reduce takes in the Mid-Atlantic from 207 to less than 50 animals per year. This goal was chosen because it meets the requirements of the MMPA to reduce bycatch below the PBR level and because it is consistent with the harbor porpoise bycatch reduction goal of the GOM component, thereby spreading the burden of reduction equitably between the New England and the Mid-Atlantic gillnet fisheries.

The proposed action modifies those gear characteristics and fishing activities that appear to be most closely linked with higher harbor porpoise bycatch (Tables 8 and 9, Figure 4). The MATRT based its recommendation on the observer data provided by NMFS, which showed patterns or trends where reduced bycatch might be achieved if certain combinations of gear characteristics were used. The proposed action also establishes a schedule of fishery closures in areas and at times most closely linked with high harbor porpoise bycatch based on the observer data.

The MATRT recommended management measures specific to the two predominant coastal gillnet fisheries, i.e., the monkfish and dogfish fisheries. NMFS has modified that

Figure 4. Boundaries of management measures within the Mid-Atlantic component of the HPTRP.



recommendation by proposing management measures specific to large and small mesh size fisheries. This change, from a fishery-specific to a gear-specific approach, should not change the effectiveness of the management measures in achieving a 70% reduction in bycatch because the mesh size categories are consistent with the mesh size categories of the dogfish (small mesh) and monkfish (large mesh) fisheries. The major benefits of this modification is to make the provisions of this action more enforceable.

Given the considerable assumptions inherent in the subfishery bycatch analysis, NMFS determined that regulatory measures should not be based on subfisheries, as the MATRT intended. Rather, the regulatory measures should be based on the characteristic(s) that appear most related to harbor porpoise bycatch, regardless of which subfishery employs such gear characteristics. It is the nature of the gear and how that gear is employed, rather than the target species, that determines whether or not harbor porpoise are entangled. In addition, basing regulatory measures on the dogfish and monkfish subfisheries would be very difficult to enforce, since the definition and prosecution of those fisheries differs greatly among fishermen and no FMP or permit system is currently in place under the MSFCMA for either fishery. Enforcement through bycatch restrictions on fish species is not an option because such a system is based on landings and could not be enforced at sea, an important element of timely enforcement.

Table 8. NMFS management measures for the large mesh gillnet fishery[1] in the Mid-Atlantic area

Measures are effective from January 1 through April 30 in waters off New Jersey to 72°30' W. longitude; measures are effective from February 1 to April 30 for the Mid-Atlantic south of New Jersey (referred to as the southern Mid-Atlantic), which includes waters off Delaware, Maryland, Virginia and North Carolina waters to 72°30' W. longitude.

Floatline Length:	
New Jersey Mudhole	Less than or equal to 3,900 ft (1188.7 m)
New Jersey Waters (excluding Mudhole)	Less than or equal to 4,800 ft (1463.0 m)
Southern Mid-Atlantic Waters	Less than or equal to 3,900 feet(1188.7 m)
Twine Size:	
All Mid-Atlantic Waters	Greater than or equal to .90 mm (.035 inches)
Tie Downs:	
All Mid-Atlantic Waters	Required
Net Cap:	
All Mid-Atlantic Waters	80 nets[2] (nets are 300 ft (91.4 m) long)
Time/Area Closures:	
New Jersey Waters, including the Mudhole	Closed from April 1 -April 20
New Jersey Mudhole	Closed from February 15 - March 15
Southern Mid-Atlantic Waters	Closed from February 15 - March 15

[1]Includes gillnet with mesh size of 7 inches (17.78cm) to 18 inches (45.72cm)
[2]Requires all nets to be tagged by January 01, 2000

Table 9. Management measures for the small mesh gillnet fishery[3] in the Mid-Atlantic area.

Measures are effective from January 1 through April 30 in waters off New Jersey to 72°30' W. longitude; measures are effective from February 1 to April 30 for the Mid-Atlantic south of New Jersey (referred to as the southern Mid-Atlantic), which includes waters off Delaware, Maryland, Virginia and North Carolina waters 72°30' W. longitude.

Floatline Length:	
New Jersey Waters	Less than or equal to 3,000 feet (914.4 m)
Southern Mid-Atlantic Waters	Less than or equal to 2,118 feet (645.6 m)
Twine Size	
All Mid-Atlantic Waters	Greater than or equal to .81 mm (.091 inches)
Net Cap	
All Mid-Atlantic Waters	45 nets (nets are 300 feet (91.4 m) long)
Time/Area Closures	
New Jersey Mudhole	Closed from February 15 - March 15

[3]Includes gillnet with mesh size of greater than 5 inches (12.7 cm) to less than 7 inches (17.78cm)
[4]Requires all nets to be tagged by January 01, 2000

The time frame for the effectiveness of the management measures is based on when and where harbor porpoise takes are observed to occur. Harbor porpoise takes were observed between January and April from New Jersey to North Carolina, though January takes were only observed in New Jersey. The months with the highest bycatch were March, followed by January in the monkfish fishery and February and March in the dogfish fishery.. Areas with highest bycatch for monkfish were in New Jersey waters, particularly the Mudhole, and were in North Carolina and Maryland for dogfish. However, dogfish effort and bycatch is less concentrated temporally and spatially than monkfish effort.

The gear characteristics that demonstrated the most potential for bycatch reduction in both fisheries are floatline length, twine size, and soak time. The presence of tie downs was an important factor in the monkfish fishery. Given that none of the gear characteristics alone are strongly correlated with reduced bycatch, a number of management measures are combined to achieve the bycatch reduction goal. In general, the models indicate that bycatch rates decrease when float line length decreases, and twine size is either smaller than .62 or larger than .68 mm. When twine size was increased to .90 mm and the float line length decreased to less than 4000 feet, there were reductions in the bycatch rate from most areas and months for the monkfish fishery. For dogfish, when twine size was greater than .81 mm, floatlines were less than 3,000 feet, there were reductions in the bycatch rater from most areas and months. Since these measures would be ineffective if effort increases, a net cap or net limit of 80 nets in the monkfish fishery and 45 nets in the dogfish fishery (the prevailing averages for each fishery) was considered necessary to keep effort at current levels. These measures are consistent with the recommendations of the MATRT.

The MATRT recommended time/area closures for the monkfish fishery in New Jersey waters from February 15 to march 15, and recommended a 20 day floating closure for the monkfish fishery in southern Mid-Atlantic waters. The MATRT did not recommend any time/area closures for the dogfish fishery.

The proposed action calls for closures in the Mudhole from February 15 through March 15 for small mesh and large mesh gear, and April 1 through April 20 for large mesh gear. NMFS added a closure to New Jersey for large mesh gear in April because, given the considerable assumptions inherent in the subfishery bycatch analysis, NMFS determined that additional regulatory measures would be prudent to realistically achieve the bycatch reduction goals of the HPTRP. For New Jersey, January and April are the months of highest bycatch. Since a closure in January would be very costly for the fishermen, as discussed by the MATRT, NMFS chose to limit fishing opportunity in April instead of January. A closure in April would still afford significant harbor porpoise conservation benefits, still be consistent with the proposed Monkfish FMP regulations and not cause undue impact on fishermen.

The MATRT recommended a 20 day floating closure in the southern Mid-Atlantic, sometime between February and April, for the monkfish (i.e., large mesh) fishery. The exact 20 days would be chosen by the individual fishermen. This proposal was changed by NMFS in two ways: 1) the proposal for a floating closure was rejected in favor of a fixed closure and 2) the 20 day closure was expanded by 10 days to a full one month closure.

NMFS changed the floating closure because an FMP and associated permit system will not be in place for the spring 1999 fishery, thereby making it extremely difficult to enforce and administer a call-in system for this fishery. Therefore, a set period for the closure was favored.

The 20-day closure recommended by the MATRT was expanded to 30 days as a way to more strongly address the harbor porpoise bycatch in the southern Mid-Atlantic during this time period by avoiding a 10 day window of possible fishing effort displacement.

4.1.3 HPTRP Implementation

The proposed action will be implemented under the authority of the MMPA. NMFS will request that the NEFMC consider amending the marine mammal closures currently in place under the MSFCMA so that marine mammal and fisheries regulations in the GOM are consistent.

One of the points of agreement at the December 1997 GOMTRT meeting was that support of widespread pinger requirements in combination with complete closures was contingent on diligent monitoring of bycatch information in the first year of plan implementation. Specifically, the GOMTRT requested that the HPTRP only be implemented for one year and that the GOMTRT be reconvened one year after plan implementation; if bycatch has not been reduced to acceptable levels, additional bycatch reduction measures would have to be considered. Reconvening the team within one year, when data analysis is available, is part of the implementation component of this plan.

4.1.4 Discussion of the proposed action and differences between the proposed action and the recommendations of the TRTs

GOM Component The only significant changes in the HPTRP from the recommendations of the GOMTRT are (1) NMFS changed the Mid-Coast closure from a complete closure to a closure where pingers are allowed in every month of the closed period, and (2) NMFS implemented a complete one-month closure in the Cashes Ledge portion of the Offshore Closure Area whereas the GOMTRT had not recommended additional complete closures.

The reasons for NMFS' changes are discussed in detail in Section 3.5.3. In summary, NMFS changed the proposed Mid-Coast one month closure to a closure allowing pingers, to avoid imposing a consecutive two month closure on one segment of the fishery. Other options were available to offset the difference in bycatch reduction between a total closure and a closure with pingers. The best option, for a number of reasons, was a complete one-month closure in the Cashes Ledge area of the Offshore closure area.

The complete closures proposed by NMFS are aimed at those areas where fishing effort is expected to result in the highest harbor porpoise bycatch. Based on some uncertainty surrounding the effectiveness of the widespread use of pingers under commercial conditions and uncertain ecosystem effects, total closures are considered necessary by both NMFS and the GOMTRT to supplement pinger use in order for the plan to be reasonably expected to reach the goal of reducing bycatch to below the PBR level. The periods proposed for pinger use are based on high bycatch months and months that surround complete closures to mitigate effort shifts. Additionally, proposed pinger requirements are based on equitable impacts on segments of the fishery. Past year's data suggests a trend of decreasing bycatch within closures with increased bycatch in areas and during months adjacent to the closures. The GOM component of the HPTRP is designed to meet the spirit and expressed goals of the GOMTRT, but was not agreed upon by all members of the GOMTRT.

Mid-Atlantic Component This component of the proposed action attempts to achieve the bycatch reduction goals of the MMPA, while minimizing the economic impact on the Mid-Atlantic gillnet fisheries. The gear modifications reinforce locally prevailing practices because those practices, in general, appear to be correlated with less bycatch. As a result, NMFS does not expect that Mid-Atlantic fishermen will need to reduce their level of fishing substantially. Gear modifications would have the greatest impact on the vessels from New England that fish in the Mid-Atlantic using practices common to New England. Although the MATRT was uncertain how many vessels would be affected, anecdotal evidence combined with the observer and landing data suggest approximately 100 vessels from New England might be involved. The proposed action is considered effective and fair because it concentrates management measures on those fishing practices and gear characteristics that appear to have the greatest harbor porpoise bycatch, while allowing those practices that do not have a significant impact on harbor porpoise bycatch, with some limitations.

For both the large mesh and small mesh fisheries, there are no proposed measures to reduce soak time, even though the gear characteristic analysis showed a high correlation between decreased soak time and decreased bycatch for the dogfish subfishery. There was weak evidence that long soak times were associated with high bycatch of monkfish. The drawback of managing reduction by soak duration is that it is very difficult to enforce. Since it is believed that the combination of gear modifications will achieve the PBR goal, and because soak duration is only correlated to one fishery and would be difficult to enforce, it is not included as a management measure.

Although takes in the monkfish fishery have been observed in January off New Jersey, the

MATRT felt that a closure during that month would be too costly to the fishery. In addition, the MATRT felt that it was unnecessary, given the expected reduction in bycatch that will occur as a result of the gear modifications and time/area closures in the proposed action. NMFS agrees with that determination and did not impose a January closure in the large mesh fishery.

The MATRT did not recommend time/area closures for the dogfish fishery at this time. NMFS does not agree with that recommendation and therefore proposes that the small mesh fishery be restricted from the Mudhole during the same timeframe as the large mesh fishery, February 15 through March 15. Because of the incidence of bycatch in this area, NMFS felt that both large mesh and small mesh gear should be prohibited if bycatch is to be reduced.

This component of the proposed action would establish an upper limit for the number of nets to be fished in the Mid-Atlantic. The reason for a net limit is that if the number of fishermen increases, the total number of nets will increase, thereby nullifying the positive effects of the gear modification regulations. This will result in reduced harbor porpoise take because the New England vessels, which normally employ twice the number of nets that Mid-Atlantic fishermen do, will have almost half their normal number of nets in the waters. Unlike a complete closure, this measure minimizes the economic impact on the fishery, because it allows fishing to occur, albeit at a reduced level. Since the prevailing practice in the Mid-Atlantic is to fish for monkfish with approximately 80 nets, and to fish with dogfish with approximately 45 nets, those numbers have been determined as a fair limit. This measure is unlikely to significantly impact local fishermen.

The effect of time/area closures on bycatch reduction for monkfish and dogfish was not fully explored by the MATRT in the bycatch data analysis, therefore it is unclear what effect time/area closures alone would have on bycatch reduction. Because observer coverage does not cover 100% of the fishery and is focused in certain areas, it is unclear whether the relationship between bycatch and geographic area is truly a reflection of high bycatch in these areas or an artifact of the less than complete observer coverage. The time/area closures that would be implemented under the large mesh management measures would reduce large mesh gillnet fishing opportunities in the areas where harbor porpoise are known to occur during periods of peak abundance. The proposed action has the benefit of targeting a particular geographic area and fishery. This will minimally affect fishing where the bycatch is low, while, at the same time, targeting reduction in areas of high bycatch.

The proposed action will be promulgated under the MMPA, thereby regulating large mesh and small mesh gillnet fishing in all state and federal waters in the affected areas. There are no FMPs for the predominant large mesh and small mesh fisheries at this time, however, the Monkfish FMP has been drafted and will likely be published as proposed regulation before the end of 1999. A dogfish FMP is currently under development and is expected in 2000. The interaction of MMPA and MSFCMA regulations are being considered during plan development. NMFS will ask the FMC's to take into consideration how components of the HPTRP interact with these FMP's to determine whether or not complementary regulations are necessary.

4.1.5 Environmental Consequences of the Proposed Action

Impacts of the Proposed Action on Harbor Porpoise

Overall, the impacts of the proposed action on harbor porpoise are expected to be beneficial because it will reduce the incidental mortality and serious injury from approximately 2040 animals per year to less than 483 animals per year.

GOM component The impacts of the proposed action on bycatch reduction for harbor porpoise are described in detail in the bycatch analysis section 3.5. The affects of pingers on harbor porpoise are discussed in Section 4.3, within the discussion of a "pinger only" alternative. Some questions still remain on habituation of harbor porpoise to the sound of pingers that may reduce the effectiveness of pingers after prolonged periods of use, and over whether or not widespread use will displace harbor porpoise from important foraging habitat. Research will be conducted prior to and concurrent to the first year of plan implementation to address these knowledge gaps.

Mid-Atlantic component The combination of gear modifications and changes in fishing practices in the small mesh and large mesh fisheries is expected to decrease harbor porpoise take in the Mid-Atlantic gillnet fisheries from an average of 207 animals per year to less than 50 animals per year. The impacts are described in detail in the bycatch analysis section (section 3.6).

The proposed action has the drawback of focusing management measures on specific areas such as the Mudhole. This may make it easier for fishing effort to be redistributed just outside the identified area, possibly reducing the intended benefits of bycatch reduction by increasing the probability of harbor porpoise bycatch in other areas. Monitoring through observer coverage both inside and outside the closed areas is essential in order for NMFS to fully evaluate the effectiveness of the management measures.

Continued observer coverage may identify whether bycatch reduction is occurring, but it will not be possible to determine if bycatch is approaching zero mortality within six months. Six months is not long enough to quantify the overall magnitude of the reduction. More time will be needed for monitoring and analysis, in coordination with the ongoing analysis of the measures in the GOM, to determine if the proposed action has achieved its goal.

Impacts of the Proposed Action on Threatened and Endangered Species

Overall, the proposed action is expected to have no adverse impact on threatened and endangered species. In some cases, the proposed action will have positive benefits on threatened and endangered species because it will reduce effort and thereby reduce the probability of interactions during certain times of the year in certain areas._An ESA consultation was completed November 12, 1998 which concluded that the action is not likely to adversely affect endangered whales or threatened or endangered sea turtles under NMFS jurisdiction or adversely modify their critical habitat.

GOM component This plan is not expected to result in any changes in fishing patterns in addition to those brought about by harbor porpoise closures implemented under the MSFCMA.. Therefore, the only potential for impact on endangered species is from widespread pinger use. This is discussed in detail in Section 4.3, the pinger-only alternative. The HPTRP includes a research component to monitor shifts in distribution of large whales after plan implementation that may indicate whether or not whales are disturbed by widespread pinger use. As part of an overall monitoring of environmental effects of pingers, NMFS will begin investigating the effects of pingers on right whales, humpback, and fin whales by evaluating whether any shifts in distribution of baleen whales occurs as a result of widespread pinger use that may indicate that pingers are having an effect.

Mid-Atlantic component A Section 7 consultation under the ESA has not previously been conducted on operation of the monkfish and dogfish fisheries because no FMPs are in place for these fisheries. No fishery management mechanism has therefore existed that regulated fishing for these species in Federal waters. However, formal consultation on the monkfish fishery as a result of draft FMP development is in progress at this time. As the dogfish FMP becomes further developed in the FMC process, consultation will also occur for that FMP.

Most of the historic effort for dogfish prior to 1990 has occurred from June through September, mostly in Massachusetts Bay. Effort has increased dramatically since 1989, particularly in the Mid-Atlantic in response to diminishing opportunities for groundfish fishing and the development of a viable European market for the species. Fishing in the Mid-Atlantic has resulted in increased opportunities for New England fishermen fishing in the fall and winter months. Likewise, fishing for monkfish as an alternative to traditional groundfish species has dramatically increased in recent years and is generally a fall, winter, and spring fishery in the Mid-Atlantic. Both of these fisheries are comprised of both local fishermen and fishermen coming from the New England Area. After reviewing data on observed harbor porpoise takes in this fishery from the NE Fisheries Science Center (NEFSC), it appears that local Mid-Atlantic fishers have a generally lower bycatch rate than New England fishers. Therefore, gear modifications modeled after those fishing practices and gear used by local fishermen that were experiencing less bycatch are considered a viable option for reducing harbor porpoise takes.

The take of large whales in gillnet fisheries in the Mid-Atlantic were considered during deliberations of the Atlantic Large Whale Take Reduction Team (ALWTRT). The Atlantic Large Whale Take Reduction Plan (ALWTRP) regulations (62 FR 39185, July 22, 1997) apply to all anchored gillnets, regardless of the target species, and include dogfish and monkfish nets. Vessels in the Mid-Atlantic are required to use one modification from a list of approved gear modification options, during December through March. Most of these modifications, however, are not likely to be effective at reducing injury and mortality of small cetaceans or sea turtles in the monkfish or dogfish fisheries. They are designed for much larger whales with unique entanglement potential. Closures are beneficial to all species, but the times and areas of the closures under the ALWTRP do not impact the dogfish and monkfish fisheries in the Mid-Atlantic.

Sea turtles are known to become entangled in gillnet gear. NEFSC observer data from trips on Mid-Atlantic gillnet vessels have recorded no takes of endangered whales, but have recorded sea turtle takes (Table 10). Most of these interactions occurred in the North Carolina/Virginia area. However, sampling was targeted to provide the best information on harbor porpoise takes and therefore, is most likely not completely representative of total turtle interactions with this fishery.

Since the monkfish and dogfish fisheries occur in most of the Mid-Atlantic states north of Virginia, when sea turtles are not concentrated in cold waters, interactions would be expected to be low in that area. Overlap of sea turtle distribution and the fisheries could occur in the fall as sea turtles are migrating south for the winter, particularly in Virginia and North Carolina and possibly in late spring during years when warmer water temperatures cause turtles to move into inshore habitats. This is of particular concern as these incursions would include gravid females.

Table 10. Observed takes of sea turtles on Mid-Atlantic vessels

year	month	trip	lat	long	species	condition	target
1995	05	A75034	3707	7556	*Caretta*	dead	dog
1996	03	A53006	3531	7500	*Caretta*	dead	monkfish
1996	03	A53006	3531	7500	*Caretta*	dead	monkfish
1996	05	B08003	3704	7542	*Caretta*	alive	dog
1997	05	B14045	3810	7444	*Caretta*	alive	monkfish
1997	05	B14048	3813	7452	**Caretta*	alive	monkfish
1997	05	B14048	3812	7453	**Caretta*	alive	monkfish
1997	05	B14049	3809	7445	**Caretta*	dead	monkfish

*turtle fell from net, species not confirmed

Note: this data is preliminary and 1997 is not complete. The total observed days on gillnet vessels in the Mid-Atlantic from which the above data was derived are: 1995-394, 1996-359, 1997-278.

The time area closures in the February through April time period will benefit endangered whales by taking gillnet gear out of the water when they are migrating north in spring. Sea turtles may be negatively impacted by closures late in the spring (March-April) if the closures cause effort shifts into later months in the spring and summer. During years with warmer water temperatures, turtles may move inshore earlier in North Carolina and southern Virginia waters. They are not likely to be present in waters north of Virginia, so the closures would not be expected to have impacts in the areas being fished during that time period. Reducing the float line length and imposing a net cap will decrease the likelihood of monkfish and dogfish gillnet gear entangling both whales and sea turtles because it effectively reduces the amount of gear in the water. The change in mesh size and twine size is not expected to have any discernable effect on risk from this gear to whales and sea turtles. Stranding data indicate that turtles have been found entangled in gillnets ranging from 3 5/8 inches to 11½ inches stretch mesh sizes.

Impacts of the Proposed Action on Other Marine Organisms

Other than potential impacts from widespread pinger use in the GOM, impacts which cannot be determined until the plan is actually implemented, this HPTRP is not expected to result in adverse impacts to any other marine organisms. As described in the pinger-only alternative, none of the scientific experiments conducted on pingers in the GOM indicated any significant difference in seal or fish catch in the nets equipped with pingers. The fishery will be monitored during plan implementation to determine if any unexpected effect, such as changes in seal or fish bycatch, occurs with widespread application of pingers in the sink gillnet fishery. The total closures are very similar to those that have been in place for several years and are therefore not expected to cause any further changes in the fishery that would result in impacts to other marine organisms.

As previously stated, the gear characteristic modifications in the Mid-Atlantic essentially mimic existing fishing practices by Mid-Atlantic fishermen; therefore, it is unlikely that the proposed gear modifications will result in an overall reduction in catch of monkfish or dogfish by Mid-Atlantic fishermen. If New England fishermen decide to continue to fish for dogfish and monkfish in the Mid-Atlantic under the new gear requirements, their catch per unit effort is likely to decrease during the effective months and areas. If New England fishermen decide to forego fishing in the Mid-Atlantic because of the gear requirements, there will most likely be a slight decrease in monkfish and dogfish landings in the Mid-Atlantic to reflect the somewhat smaller fleet. In either case, monkfish and dogfish will benefit somewhat from the reduced fishing pressure but it is difficult to determine how much fishing pressure will be reduced given the range of variables.

The primary fish species, besides monkish and dogfish, that may be impacted by the proposed action are those included under the Northeast Multispecies FMP, particularly cod. The proposed HPTRP could only affect cod in the Gulf of Maine as the Mid-Atlantic portion of the HPTRP is out of the species range.

In the Gulf of Maine, the only perceivable difference between the complete closures in place under Framework 25 and the HPTRP is the closure in Cashes ledge during February. However, the effect of a closure in the Cashes ledge area was analyzed for Framework 25 and it was concluded that reductions in cod catch in that area would be achieved in the summer months and therefore June was chosen for that action. The HPTRP closure in February would not be expected to provide any additional benefit to conservation of cod. The pinger requirements in the GOM portion of the HPTRP would not be expected to add any additional benefit to cod conservation since it is anticipated that most participants in the fishery will choose to purchase pingers and continue to fish. Therefore, no effort increase or decrease due to the pinger requirement would be realized.

Amendment 9 to the Northeast Multispecies FMP has been submitted by the NEFMC to the NMFS and is currently being reviewed. Proposed measures that relate to gillnet gear include and increase in minimum size for winter flounder and a possession limit for southern New England winter flounder fisheries. Other aspect include administrative measures, measures that will affect a small fishery for halibut in Maine, and mesh adjustments to otter trawl requirements. The HPTRP would not be expected to have any additional impact on these components of the fishery beyond closures currently in place.

4.1.6 Economic Impacts of the Proposed Action

This analysis estimates net national benefits generated by the HPTRP. Net national benefits are the benefits minus the costs under the proposed action, minus those generated under the status quo or no action. The status quo scenario is defined by the current regulations under which the fishing fleet is expected to operate, including both days-at-sea regulations and area closures.

Net economic benefits are measured as the change in consumer and producer surplus brought about by new management action. This analysis is similar to that conducted for Framework Adjustments 4, 12 and 14 to the NE Multispecies FMP, actions which were implemented to reduce harbor porpoise bycatch. The analysis calculates the net national benefits for the first year of the HPTRP only. Implicit in this analysis is the assumption that taken together, all measures in the plan will be successful at achieving the bycatch reduction goal.

Consumer Surplus Changes in consumer surplus resulting from the management action are caused by changes in the price of seafood. Because the gillnet fleet is a small component of the fishing industry overall, and a large percentage of our seafood is imported, no price changes at the consumer level and therefore no change in consumer surplus are expected with the proposed action.

Producer Surplus Producer surplus is measured by the economic rents vessel owners earn. For the purposes of this analysis, total profits will be used as a proxy for economic rents. Profits will be affected through both changes in revenue and costs which occur because of the proposed action. For example, if vessels need to purchase pingers to continue fishing, their cost will reduce profits in year one.

In addition to vessel profits, wages earned by crew members are considered in the analysis. These are used in the determination of crew rents, which are wages in excess of what they could earn in their next best alternative (opportunity cost). In most industries, wages are generally considered to be part of the variable costs and a decrease in variable costs would increase a firm's profitability. However, because crews are generally compensated with a percentage of the revenue, any decrease (increase) in their earnings needs to be included in the calculation of changes in total economic rents. Any reduction (increase) in crew income from the proposed action would be counted as an economic cost (gain) to the extent that it reduces (increases) crew rents, and thereby total economic rents. Because most of the closures proposed are relatively short in duration, and in some instances vessels will be able to fish with pingers, crew members will be unable to find alternative employment, and will have a zero opportunity cost. Any reduction in crew earnings will be counted as a reduction in crew rents rather than a savings in variable costs.

In equation form, the change in total rents brought about by the proposed action would be:

Change in (Producer Surplus + Crew Rents) = Change in Vessel Revenues - Change in Variable Costs.

GOM component The proposed action closes the Cashes Ledge area in February and closes other areas to fishing unless nets are equipped with operating pingers. This complicates the analysis, because vessels will have to purchase pingers to fish during these closures, and it is unclear how many will buy pingers. One extreme assumption is that none of the vessels could afford to buy pingers, and they would be unable to shift their effort outside the closed areas. The other extreme is that all vessels would purchase pingers and continue to fish.

Based on 1996 data, the Cashes Ledge closure in February is expected to cost the fleet $83 thousand dollars in lost producer surplus and crew rents, and will impact 4 vessels. This translates into a per vessel loss of approximately $21 thousand dollars. Because this closure is relatively small and short in duration, it is likely that vessels will be able to shift their effort to other locations to compensate for the losses.

There will also be a benefit accruing to the fleet because vessels which were not able to fish in the Mid-Coast region under the status quo during the period March 25-April 25, will now be able to fish in this area at this time under the proposed action. The fleet is expected to earn $145 thousand dollars from the opening of this area to vessels with pingers during this time period. This translates into a gain of $112 thousand dollars in producer surplus and crew rents. Combining the impact of both features yields a gain in producer surplus of $29 thousand dollars.

In order to evaluate the impact of the pinger requirements, it is necessary to know the number of vessels which can afford pingers. A worst case scenario would be that none of the vessels could afford pingers, and they would not be able to shift effort to other fishing areas where pingers are not required. The best case scenario would be for all vessels to purchase pingers or shift their effort to other areas where pingers are not required.

In order to examine the losses that would occur under the worst case scenario, estimates of gross revenue for each of the times and areas when pingers are required were calculated from the 1996 dealer and vessel logbooks. Losses in producer surplus and crew share are calculated using the methods described above, by assuming that crew share and variable costs are 25% and 23% of gross revenues respectively. Table 11 shows the losses in producer surplus and crew rents for each of the area closures recommended assuming that none of the vessels can fish elsewhere or afford pingers.

Mid-Coast Under the proposed action, this area would be closed between September 15 and May 31. Under existing regulations, the area is closed between November 1 and December 31, but vessels are allowed to fish with pingers. As mentioned previously, under the status quo, the area is also closed from March 25 and April 25, and pingers are not allowed. For the impact of area closures without using pingers, the relevant months to examine are January, February, March, May, October and the last half of September. Estimated value from the areas in the Mid-Coast region which are part of Framework 25 closures are not included in the estimates of losses from this proposed action. They are considered part of the status quo. The loss in producer surplus and crew rents for these time periods is estimated to be $419 thousand dollars, and there are an estimated 58 vessels which will be impacted. This translates into a per vessel loss of slightly more than $7 thousand dollars.

Massachusetts Bay This area is closed because of groundfish regulations in March. The proposed action adds additional closures in December, January, February, April and May. Losses in producer surplus and crew rents during this time period are estimated to be $925 thousand dollars, and there were 49 vessels which would be impacted. This translates into a per vessel loss of $19 thousand dollars.

Cape Cod South This area is currently closed in March. The proposed action adds additional closures in December, January, February, April, and May. Losses in producer surplus and crew rents during this time period are estimated to be $337 thousand dollars, and there are 36 vessels which would be impacted. This translates into a per vessel loss of roughly $9 thousand dollars.

Offshore This area would be closed from November through May. Estimated losses in producer surplus and crew wages during this time period are $2.0 million dollars and there would be 41 vessels impacted. On a per vessel basis, losses would be roughly $50 thousand dollars.

Table 11. Change in Revenue, Profit and Producer Surplus from Each Area where Pingers are Required Assuming Vessels Cannot Fish Elsewhere and Cannot Afford Pingers.

Area	A Change in Gross Revenue	B Change in Variable Cost	C Change in Crew Share	D Change in Profits	A-B Change in Producer Surplus & Crew Rents
Mid-Coast	-543,988	-125,117	-135,997	-282,874	-418,871
Mass. Bay	-1,200,743	-276,171	-300,186	-624,386	-924,572
Cape Cod South	-437,067	-100,525	-109,267	-227,275	-336,542
Offshore	-2,660,652	-611,950	-665,163	-1,383,539	-2,048,702
Cashes Ledge	-108,116	-24,867	-27,029	-56,220	-83,249
Totals	-4,950,566	-1,138,630	-1,237,642	-2,574,294	-3,811,936

Change in Surplus with Pingers Vessels will be able to fish in these additional closed areas provided they use pingers, which they will have to purchase. Each vessel owner will decide whether to purchase pingers based on their own set of circumstances. Based on discussions with NMFS Sea Sampling personnel, each pinger is estimated to cost $50 dollars. Past studies have shown that on average, a New England gillnet vessel fishes with 72 nets on six strings or floatlines (Walden 1996). Vessels would have to have one pinger per net and one on each end of a string. This translates into a pinger cost of $4,200 dollars per vessel (84 pingers x $50 dollars). Table 12 shows the losses in producer surplus and crew rents based on percentages of gillnet vessels purchasing pingers. Fishing in closed areas requires pingers and losses in producer surplus and crew share are linearly related to the percent of vessels using pingers. For example, if 50 percent of the vessels use pingers, then the losses in producer surplus and crew rents will be reduced by 50 percent. Gains due to vessels being able to fish in the Mid-Coast area from March 25 to April 25 are also included. As Table 12 shows, total losses to the fleet would be between $0.49 and $3.7 million dollars. Losses of $0.49 million dollars would occur if all the vessels impacted by the plan purchase pingers and continue fishing.

Table 12. Change in Producer Surplus and Crew Rents Depending on Percentage of Fleet which use Pingers.

			Percent Using Pingers		
	0	25	50	75	100
Producer Surplus Loss	-3,728,687	-2,768,602	-1,808,518	-848,434	111,650
Pinger Cost	0	150,150	300,300	450,450	600,600
Total Losses	-3,728,687	-2,918,752	-2,108,818	-1,298,884	-488,950

Change in Surplus with Effort Shifts If some of the vessels are be able to shift operations to open areas and continue fishing without using pingers, then some losses will be offset. Although the exact number of vessels which would switch areas is unknown, the percent of losses which can be offset will range between zero and 100%. Table 13 shows the losses in producer surplus and crew rents assuming different percentages of revenue replacement. Losses range from zero to $3.8 million dollars.

Table 13. Changes in Producer Surplus and Crew Rents with Different Levels of Revenue Replacement from Other Areas.

		Percentage Effort Shift			
	0	25	50	75	100
Area					
Mid-Coast	-418,871	-314,153	-209,435	-104,718	0
Mass. Bay	-924,572	-693,429	-462,286	-231,143	0
Cape Cod South	-336,542	-252,406	-168,271	-84,135	0
Offshore	-2,048,702	-1,536,527	-1,024,351	-512,176	0
Cashes Ledge	-83,249	-62,437	-41,625	-20,812	0
Totals	-3,811,936	-2,858,952	-1,905,968	-952,984	0

Change in Surplus with Effort Displacement and Pinger Use The above results show the costs of regulations based on different percentages of the fleet either using pingers or switching to other areas to continue fishing. In reality, there will be some vessels which switch areas, some which use pingers, and some which will stay tied up at the dock until they can fish in their preferred area. Table 14 shows the losses in producer surplus and crew rents given this mixed type of strategy. Included in Table 14 are the gains realized from opening the Mid-Coast area from March 25 - April 25. Some combinations are not feasible, and are signified by an N.A. entry. For example, a 50 percent shift in effort and a 75 percent use of pingers is not feasible. It is also assumed that if 25 percent shift effort and 25 percent use pingers, then 50 percent of the vessels are not fishing.

Without a more formal model, it is not possible to predict the number of vessels which will adopt either strategy. Changes in surplus will be between zero and $3.8 million dollars, depending on the percentage of vessels which can either shift their effort, or purchase pingers. The only case where there would be zero losses would be if all vessels could shift their effort to other areas. The probability of this happening is likely to be quite low given the extensive time and area closures proposed by this plan.

Table 14. Changes in Producer Surplus and Crew Shares with both Pinger Use and Shifts in Effort

			Percent Pinger Use		
	0	25	50	75	100
Percent Effort Shift					
0	-3,811,936	-3,002,002	-2,192,068	-1,382,133	-572,199
25	-2,858,952	-2,090,642	-1,259,896	-429,149	N.A.
50	-1,905,968	-1,088,934	-286,100	N.A	
75	-952,984	-143,050	N.A.		
100	0	N.A.			

<u>Mid-Atlantic Component</u> The proposed action would require gear modifications for gillnet vessels using both large and small mesh gillnet gear between January and April, along with time and area closures for vessels using large mesh gillnet gear. Additionally, there are net cap provisions for each type of gear, but these will not restrict vessel revenue.

Mesh size was determined from landings records. Large mesh gillnet vessels generally are fishing for monkfish, while small mesh are fishing for dogfish and other species. Based on the species composition in 1996 landings data, the gillnet fleet was stratified into four sub-fleets. Vessels which caught both dogfish and monkfish were considered to be "combination" vessels, because they used both large and small mesh gillnets. There were 48 vessels in this category fishing between January and April. Those which caught monkfish and no dogfish were considered large mesh "monkfish" vessels and there were 9 of these vessels. Vessels which caught dogfish, but no monkfish were considered small mesh "dogfish" vessels and there were 10 in this category. There were also 9 vessels which caught neither monkfish or dogfish, and these were classified as "other" gillnet vessels.

Change in Surplus due to Area Closures Based on 1996 landings data, the total revenue loss from the proposed time and area closures is estimated to be $143 thousand dollars. Crew wages are assumed to be 25% of total revenue based on data used in Amendments 5 and 7 to the NE Multispecies FMP. Under the proposed regulations, crew rents would be reduced by $36 thousand dollars from these closures. It is assumed that only monkfish gillnet vessels will realize any variable cost savings from not being able to fish. Combination gillnet vessels will likely fish for other species, and there would be no revenue losses from the other two gillnet vessel types. The total loss in producer surplus is therefore estimated to be $116 thousand dollars. It is estimated that 5 vessels will be impacted by the area closures, for a per vessel loss of slightly more than $23 hundred dollars.

The estimated losses are likely to be an upper bound because combination gillnet vessels can switch to small mesh gear and target other species, and some monkfish gillnet vessels may have the ability to switch areas. Without knowing the number of vessels which could switch areas, all that can be said is that the losses will be between zero (if 100% of the vessels could switch) and $116 thousand dollars (if no vessels can switch).

Change in Surplus with Gear Changes Most of the gear modifications should be without cost because vessels can easily modify their existing gear configurations to comply. However, the twine size requirements mean vessels which are not using nets with the mandated twine size will have to purchase new nets. This could be a substantial number of vessels. For example, based on Sea Sampling data, 89% of the monkfish, 68% of the dogfish, and 89% of the combination gillnet vessels would have to purchase new nets to be in compliance. It is also assumed that combination gillnet vessels will need to replace two sets of gear in order to continue to fish for both dogfish and monkfish.

Each combination gillnet vessel which fishes during this time period is expected to spend $12,000 dollars for gear replacement (30 nets x $200 dollars per net x 2), while monkfish and dogfish gillnet vessels will spend $6,000 dollars to replace their gear (30 nets x $200 dollars per net). Net costs were based on prices from the Mariner Nylon Net Company catalog. Information on the number of nets fished per vessel showed a wide range of values. For example, data show that Maryland vessels fished an average of 44 nets, Virginia vessels fished 26 nets and New Jersey vessels fished between 8 and 20 nets. A report by DeAlteris and Lazar (1997) reported that New England vessels fishing in the Mid-Atlantic fished between 10 to 50 nets on 3 to 6 strings, while Mid-Atlantic vessels fished between 9 and 12 nets, on 4 to 6 strings. Vessels were assumed to fish on average 30 nets, on 5 strings. Based on these estimates of costs, and the percentages of each fleet which needed to replace their gear, the total cost of net replacement in year one was estimated to be $604 thousand dollars.

Fishermen would also need to mark their gear in year two depending on which type of net they are using if they wish to fish during the regulated periods. Each net would be required to have one tag per net with unique identification on each tag. Each tag is expected to cost $1.25 dollars (based on prices for livestock tags found in Modern Farm Catalog, early spring 1998 edition). Assuming an average of 30 nets per vessel, the discounted cost (7% discount rate) for the tagging requirements is estimated to be $35 dollars per vessel. Costs are discounted one year (7% discount rate) because they are not incurred until year two. Combination vessels are assumed to have twice the cost as the other vessels because they need to mark both dogfish and monkfish gillnets. When all vessels are included, gear marking will cost the fleet roughly $4.35 thousand dollars in year one dollars.

Total Economic Cost in the Mid-Atlantic Region The total economic cost for the Mid-Atlantic region is measured by the change in vessel revenue plus crew wages minus the variable cost savings, plus the total cost of the gear changes required. These are estimated to be $550 thousand dollars for the combination gillnet fleet, $38 thousand dollars for the dogfish gillnet fleet, $139 thousand dollars for the monkfish gillnet fleet and $315 dollars for the unclassified gillnet fleet. The total loss for all four segments of the gillnet fleet is estimated to be approximately $725 thousand dollars, which yields a figure of roughly $10 thousand dollars per vessel when averaged over the four sub-fleets. The majority of this cost is due to the high gear replacement cost in the combination gillnet sector.

Total Economic Cost from Both Regions Table 15 shows the total economic losses from the New England and the Mid-Atlantic sub-regions. Losses are estimated to be between $609 thousand dollars and $4.5 million dollars depending on the number of vessels which can shift their effort to open areas and the number which use pingers. Even if 100% of the vessels can shift their effort to avoid the time and area closures, there would still be losses due to the gear replacement costs and marking requirements in the Mid-Atlantic region. Losses are estimated for the first year only. If this plan stays in place for greater than the one year time horizon analyzed, vessels will incur further losses, but fishermen would also have time to adjust their fishing practices and capital stock. Labor would also adjust as some crew members leave the industry or shift to boats which are not impacted by the regulations. Adjustments in capital stock, fishing practices and labor supply will continue until vessels can no longer compensate for the management measures, and then some will start to exit the industry when the losses become too great.

Table 15. Changes in Producer Surplus and crew Rents from the New England and Mid-Atlantic Regions

			Percent Pinger Use		
	0	25	50	75	100
Percent Effort Shift					
0	-4,536,929	-3,726,994	-2,917,060	-2,107,126	-1,297,192
25	-3,554,833	-2,786,523	-1,955,777	-1,125,031	N.A.
50	-2,572,737	-1,755,703	-952,869	N.A	
75	-1,590,641	-780,707	N.A.		
100	-608,546	N.A.			

Net National Benefits In all management plans, the potential costs of a plan need to be measured against the potential benefits. If the benefits minus the costs are positive, then the management action is generating positive net national benefits, and it is generally deemed to be worthwhile. With marine mammal actions, calculating the benefits can be problematic because mammals are not sold in a competitive market and therefore assigning a value to saved marine mammals is difficult.

Strand, et al. (1994) conducted a study of Massachusetts households in order to estimate what individuals would pay to protect harbor porpoise. These contingent valuation methods have been endorsed by a NOAA Blue Ribbon Panel of expert economists, including Nobel Laureates. Their results showed a mean willingness-to-pay per household of between $176 dollars and $364 dollars to eliminate human induced mortality of 1,000 harbor porpoise. Using the lower figure of $176 dollars, and multiplying by the total number of Massachusetts households yields a total willingness-to-pay of $395 million dollars to eliminate human induced mortality of 1,000 harbor porpoise. Because this survey was based on a single payment, the value needs to be amortized to determine a yearly value. Doing so yields a value of approximately $28 million dollars a year. As this plan would save slightly more than 1,000 harbor porpoise, the yearly benefits are likely to be higher. This is far more than the maximum estimated cost of $4.5 million dollars shown in Table 15. Clearly, if these values are an accurate representation of what people are willing to pay for harbor porpoise protection, then the benefits of this action outweigh the costs.

4.2 Alternative 2: Status Quo, or No Action Alternative

4.2.1 Discussion

Taking no new action would be in violation of section 118 of the MMPA because a TRP would not be developed to reduce the mortality of harbor porpoise below the PBR level for that stock. Section 118 requires the preparation and implementation of a TRP for strategic marine mammal stocks that interact with Category I or II fisheries to reduce the take of strategic stocks below the PBR level. It is highly unlikely that the goal of section 118 could be achieved under the No Action Alternative.

Under the No Action Alternative, the GOM sink gillnet fishery would continue to operate under the management measures in the NE Multispecies FMP, including the measures implemented under Framework 25 (Table 1): the Northeast Closure Area would continue to be closed to fishing from August 15 through September 15; the Mid-Coast Closure Area would be closed from September through December and from March 25 through April 25, except for vessels using pingers; the Jeffreys ledge area would be closed year-round; in Massachusetts Bay, no sink gillnet fishing would be allowed from March 1 through March 31; the Cape Cod South area would continue to be closed from March 1 through March 31; Cape Cod Bay would be closed from January 1 through March 31; and the Great South Channel would be closed from April 1 through June 30. Additionally, one-month rolling closures would continue to be in effect from Cape Cod Bay to Penobscot Bay from March 1 through June 30 and a one-month closure would be in effect in the Offshore area during June.

Under the No Action Alternative, the Mid-Atlantic gillnet fishery would continue to be unregulated for impacts to harbor porpoise. Two proposed fishery management actions could have an impact on the bycatch of harbor porpoise in the Mid-Atlantic region even if a TRP is not implemented. The two fishery management actions are the proposed Monkfish FMP, and the proposed Dogfish FMP. The preferred alternative now under consideration by the NEFMC and the MAFMC will provide no benefits to harbor porpoise conservation in the near future because the regulations do not become effective until May 1, 1999. If the Monkfish FMP goes into effect, the harbor porpoise conservation benefits expected appear to be as a result of overall effort reduction through Days-At-Sea and Total Allowable Catch restrictions. However, any conservation benefits may be negated as a result of the relatively high gillnet limits set by the FMP. According to the MATRT, the average number of nets employed by Mid-Atlantic fishermen is 80 nets. The Monkfish FMP, if approved, would allow fishermen to use up to 160 nets.

Discussions are in progress on the development of a Dogfish FMP. NMFS does not expect that dogfish management measures will be in place for 1999, therefore increased effort in the dogfish fishery could occur. If this does happen, then there could be greater bycatch of harbor porpoise in the dogfish or small mesh fishery in the short-term. At this time, NMFS is not able to determine if this possible increase in bycatch would be offset by the expected decrease in bycatch in the monkfish fishery.

4.2.2 Environmental Consequences

Impacts of No Action on Harbor Porpoise

GOM Component Between 1990 and 1994, an estimated 300 harbor porpoise per year were entangled in sink gillnets in the Northeast closure area. Harbor porpoise bycatch dropped significantly in 1995 and 1996. Based on 1996 data and estimates of Framework 25 bycatch reduction, the bycatch for this area is expected to be 41 animals per year under the No Action Alternative.

The Mid-Coast area has had the largest portion of the harbor porpoise bycatch problem. From 1990 to 1994, approximately 1600 harbor porpoise per year were entangled in sink gillnets in the Mid-Coast area. Closures in the Mid-Coast area during 1995 and 1996 did reduce bycatch (578 & 113, respectively), but fishing effort appeared to shift elsewhere. The Massachusetts Bay area has accounted for an estimated 373 harbor porpoise entanglements per year from 1990 to 1994. Bycatch has gone down in the last two years (201 & 246, 1995 & 1996 respectively), but still remains significant in the spring. Bycatch for the Mid-Coast and Massachusetts Bay areas are expected to be over 300 animals per year.

The Cape Cod South Closure Area was responsible for an estimated 170 entanglements each year between 1992 and 1994. Since the Cape Cod South Closure Area is closed to fishing with sink gillnets during the month of March, a high month for bycatch, the expected continued bycatch under the Status Quo is 176 animals per year.

Based on 1996 data, harbor porpoise bycatch in the Offshore area is estimated to be 247 animals per year. These takes, totaling 1172 animals per year for the Gulf of Maine, would be expected to continue under the No Action Alternative.

In summary, the results of the bycatch estimates suggest that, under the No Action Alternative: 1) bycatch reduction is being achieved in the Mid-Coast and Northern Maine closure areas; 2) bycatch increased in the Mid-Coast and South Cape Cod areas in 1997; 3) although bycatch reduction is occurring in specific areas and times, the PBR level is not being achieved in the GOM overall. If additional measures are not taken, these results are expected to continue.

Mid-Atlantic Component Under the No Action Alternative, 207 harbor porpoise, on average, are expected to be taken off the Mid-Atlantic coast, between January and April.

Taking no action in the Mid-Atlantic could have a variety of impacts. Since no fishery management measures are in effect for the predominant fisheries in the Mid-Atlantic, pending a monkfish or dogfish FMP, the estimated bycatch is expected to continue or increase, depending on effort shifts from New England fishermen. In one scenario, if no measures are put in place at this time to address harbor porpoise take in the Mid-Atlantic, harbor porpoise bycatch could increase. This would most likely result because fishermen from New England, faced with further restrictions in their traditional fishing areas, will likely increase effort on monkfish and dogfish or on other unregulated species in the Mid-Atlantic.

Impacts of No Action on Threatened and Endangered Species

In the GOM and in the Mid-Atlantic, management measures being implemented under the ALWTRP for gillnet vessels should have a positive impact in reducing large whale entanglements, but these measures are not expected to have any impact on the current rate of harbor porpoise mortalities due to gillnet fisheries (see Section 4.1.5).

There will be no additional expected benefits to endangered whales than what is already occurring under the ALWTRP, nor will there be expected benefits to sea turtles as a result of taking no action. Under the current fishing scenario, the Mid-Atlantic fisheries prosecuted during the given times and areas do not usually interact with sea turtles because these fisheries occur north of Virginia when sea turtles are not concentrated there. However, there may be expected negative impacts under existing conditions because some overlap of sea turtle distribution and the fisheries occur in the fall as sea turtles are migrating south for the winter, particularly in Virginia and North Carolina. Taking no action to change fishing patterns and practices would most likely result in the continued interactions of these fisheries and sea turtles.

Impacts of No Action on Other Marine Organisms

If no action is taken to regulate these fisheries at this time, fishing effort is expected to remain the same or possibly increase in the Mid-Atlantic fisheries, but it is difficult to know how fishing effort will change.

4.2.3 Economic Impacts

Under the Status Quo or No Action Alternative, there would be no additional costs to the fleet either through gear modifications, purchase of pingers or losses in surplus due to time and area closures. Therefore, based on costs which the fleet would incur, this alternative is the least costly when compared to the proposed action or other alternatives.

However, there is a much larger cost in terms of foregone harbor porpoise protection. Based on the contingent valuation study conducted by the University of Maryland (Strand et al., 1994), households in Massachusetts were willing to pay between $176 dollars and $364 dollars to eliminate human induced mortality of 1,000 harbor porpoise. When compared against the other alternatives, the status quo is far inferior because it does not achieve the same level of consumer surplus due to a higher level of harbor porpoise mortality.

The University of Maryland study is the only study which has attempted to quantify the willingness-to-pay for harbor porpoise on the East Coast. As the study showed, individuals surveyed felt quite strongly about harbor porpoise protection and placed a high value on the species. Whether this figure would still hold if the survey was conducted again is unknown. However, the key difference between the status quo and any other alternative is the high harbor porpoise mortality which will continue to exist under the status quo.

There are no additional costs to the industry under the status quo because additional management measures are not imposed. If contingent valuation reflects the value that the public places on harbor porpoise, the Status Quo Alternative could have a significant economic impact because it would allow this highly regarded resource to continue to be taken at unacceptable levels.

4.3 Alternative 3: Acoustic Deterrent Devices

4.3.1 Discussion

This alternative proposes the use of pingers as a management tool for all gillnets in the GOM and Mid-Atlantic regions as a mechanism to reduce the bycatch of harbor porpoise without severe impacts on the gillnet fishery. For purposes of this plan, a pinger is defined as an acoustic deterrent device which, when immersed in water, must broadcast a 10 kilo herz (kHz) sound at 132 decibels (dB) reference to 1 micro Pascal (Pa) at 1 meter. The sound must last approximately 300 milliseconds (ms) and repeat approximately every four seconds. The pinger must be attached at the end of each string of gillnets and at the bridle of every net within a string of nets.

Pingers with other sound characteristics and deployed in other arrangements have not been tested and shown conclusively to be effective under given conditions at reducing harbor porpoise bycatch in the GOM, although field tests in Washington State waters using pingers that had a different peak frequency and loudness and that were deployed differently were also successful in reducing harbor porpoise bycatch (Gearin, et al., 1996). Until alternative products are proven to work in the GOM, the use of pingers that vary from the given specifications would add an additional risk to their effectiveness, with no obvious benefit.

This alternative would require pingers that meet the specifications stated above on all gill nets in the GOM (September 15 through May 31) and in the Mid-Atlantic (January 1 through April 30) during the time periods when harbor porpoise are present in those respective areas.

4.3.2. Environmental Consequences

For many years, NMFS, the fishing community, and the NEFMC have been exploring the potential of pingers to warn harbor porpoise of the presence of a gill net. These devices have shown promise as a bycatch reduction measure with varying success rates in both controlled scientific experiments and in experimental fisheries. Experimental fisheries are not scientifically designed experiments, but use of pingers under uncontrolled fishing conditions . However, scientists note that results of experiments need to be used with caution with respect to applying the success or failure in different geographic areas or during other times of year than those investigated within the experiment. Harbor porpoise may respond differently seasonally, between geographic areas, or with differing oceanographic conditions.

In the fall of 1994, NMFS authorized and provided support for a cooperative scientific experiment by New England gillnet fishermen and scientists. Building on work in previous years (1992-1993), the experiment sought to evaluate the effectiveness of pingers, attached to gill nets to prevent entanglement of harbor porpoise. The experiment was conducted in the Mid-Coast closed area. The experiment was designed with the recommendations of a NMFS scientific review panel. The experiment showed that pingers reduced the bycatch of harbor porpoise substantially during the fall in the Mid-Coast area: 25 harbor porpoise were caught in 423 control nets and two harbor porpoise were caught in 421 active nets (Kraus et al., 1995). Although the pingers used in the experiment represented a wide range of frequencies and the acoustic features of the devices may not have been consistent, the result was still a dramatic reduction in harbor porpoise bycatch (Kraus et al., 1995). A number of unanswered questions remained after this experiment (i.e., do harbor porpoise respond directly to the sound or does the sound mediate the behavior of harbor porpoise prey; do harbor porpoise become habituated to the sound; are there other environmental effects of widespread use?).

As a result of the success of the scientific experiment, experimental fisheries occurred in the fall of both 1995 and 1996 and in the spring of 1996. During the November to December fishery in 1995 there were zero takes of harbor porpoise in 225 nets (based on 48% observed trips) in the Mid-Coast area (the only vessels operating during this closure were vessels using pingers on their nets). Given observer coverage of 48%, there is a very low probability of observing zero takes by chance alone. There were also less than the expected number of seal takes based on past observed rates in non-pingered nets. In the fall 1996 experimental fishery (September 15 through October 31), 3 harbor porpoise were caught in 51 observed trips (198 hauls). Unfortunately the results of the spring 1996 experimental fishery were not encouraging--eleven harbor porpoise were caught in nets with pingers in the Jeffreys Ledge area (88 hauls = 9 harbor porpoise), Massachusetts Bay (171 hauls = 2 harbor porpoise), and in the Cape Cod South Closure Area (53 hauls = zero harbor porpoise) (Waring et al., 1997). Catch rates in nets with pingers attached were similar to historic rates of bycatch from nets without pingers (Potter, pers. com.). However, it is unknown what the take would have been without pingers since there were no controls. Bycatch rates can vary simply due to seasonal abundance and distribution of harbor porpoise. Therefore, in spite of the fact that the rate during the experiment was equal to the average bycatch rate the previous 5 years without pingers, no real conclusions can be drawn without a control.

As a result of this seeming inconsistency in spring results compared to fall results, the GOMTRT recommended an additional scientific experiment in the spring of 1997. Again, there were similar mean fish catch rates and similar numbers of seals caught between all treatments; zero harbor porpoise were caught in nets with active pingers, demonstrating that pingers reduced the incidental catch of harbor porpoise in sink gillnets during spring (Kraus et al., 1997). Kraus also notes that this appears to eliminate deterrent effects on herring, an argument once proposed to explain the discrepancy between results of the fall and spring experimental fisheries.

Recognizing the unanswered questions that add uncertainty to predictions of pinger effectiveness in areas other than those where the experiments occurred (in both time and area) and recognizing that conclusions cannot be drawn about the high bycatch observed in the spring 1996 experimental fishery because of lack of a control, management options concerning pingers in the HPTRP will use the results of the scientific experiments in assessing the contribution of these devices to harbor porpoise bycatch reduction in the GOM. NMFS recognizes that sufficient monitoring of this fishery must occur during plan implementation to insure that the technology meets these expectations of effectiveness.

Assuming that pingers are highly effective, one of the benefits of widespread use of pingers over long periods of time, as opposed to short duration total closures of areas, is that management measures will be in place to address the variability in the seasonal and annual abundance, distribution, and bycatch of harbor porpoise that may occur outside of the closed time periods. In addition, shifts in fishing effort to avoid closures may raise bycatch at their periphery, as was seen in 1994 through 1996.

The principle findings of the NMFS acoustic deterrence workshop in 1996 (Reeves, et al., 1996) noted that "it is appropriate to proceed with the full-scale integration of pingers into the management regime for the New England sink gillnet fishery provided that the regime includes observer and monitoring programs adequate to verify that the bycatch remains acceptably low and that no non-target species is affected adversely". A caveat was placed on this recommendation when the report was published that noted that the conclusion of the workshop might change depending on the 1996 spring experimental fishery results. One hypothesis is that the discrepancy between results may have been due to improper operation of the pingers. This suggests that fishermen may require training in order to ensure that the devices function properly. Another hypothesis is that the devices themselves may have been faulty. While this cannot be confirmed, training is addressed in the HPTRP through a mandatory certification requirement for fishers who want to use pingers in the closed areas.

Pingers were discussed at length as a management option for the Mid-Atlantic region. The NMFS acoustic deterrence workshop did recommend that if other options were available, pingers should not be used. Additionally, scientists and the TRTs have urged caution in applying the assumptions demonstrated in New England to other geographic areas, gear types, and times. It is mainly for these reasons and that widespread use of pingers has not been tested for other environmental effects, that this measure is being proposed only in the GOM portion of the plan. The other primary reason is that alternative management options in the form of gear modifications were available for the Mid-Atlantic. Additionally, pinger testing in the Mid-Atlantic would need to be widespread and over a long period of time (due to the scattered nature of observed bycatch in a wide area) therefore the overall cost of an experiment in the Mid-Atlantic was considered prohibitive compared to the gear modification options being proposed.

Impacts of Alternative 3 on Harbor Porpoise

The pinger sound source is designed to ensonify the sea water within a radius of 300 meters from each device, with the sound attenuating to 15 dB above ambient level at 100 meters. The pinger frequency used in the Kraus et al. (1995) experiment and subsequent experimental fisheries was chosen to be within the hearing range of harbor porpoise. According to an unpublished report written for NMFS by Dr. Darlene Ketten, a noted marine mammal hearing specialist, a sound would have to be at least 80 dB above the sensitivity threshold at a particular frequency to result in an adverse acoustic impact. Thus, according to data on harbor porpoise hearing presented in Richardson, et. al. (1995), the 132 dB level at a frequency of 10 kHz approaches the 80 dB limit (at a distance of 1 meter from the device), but is not loud enough to result in acoustic trauma to harbor porpoise, particularly since the sound attenuates rapidly just one meter from the source. Pingers used in the spring 1997 experiment, all variations of the *Netmark 1000* model, emitted harmonics above 120 db (re 1 micro Pa @ 1 meter) up to 150 Khz for the one type of pinger while the second type of pinger had limited harmonics below 70 Khz.

Throughout the period during which pinger use has been explored in the Mid-Coast area, no information has been collected which suggests that this particular sound source has resulted in attraction, displacement, or habituation of harbor porpoise. Neither the experiments in 1994 and 1997 nor the subsequent experimental fisheries were designed to collect information on the largescale displacement of harbor porpoise. Although harbor porpoise might be displaced from the area immediately surrounding a gillnet equipped with pingers, there is no evidence that they would be displaced from the entire fishing area or even parts of the areas that host the most dense fishing effort. The bycatch of harbor porpoise in nets without pingers during the Kraus et al. study suggests that pingers do not induce harbor porpoise to leave an area. Furthermore, in a study of porpoise response to active acoustic deterrent techniques, Baldwin and Kraus (1995) and Kraus (pers. comm.) reported that harbor porpoise moved away from the immediate area of an acoustic deterrent signal (50-50.2 kHz upsweep) but did not leave the study area.

To further evaluate the habituation and displacement question, NMFS is funding a study that will:

(1) Examine data from the Sea Sampling observer program to look at intra- and inter-annual trends in the bycatch rate of harbor porpoise in sink gill nets equipped with pingers. The analysis will be stratified by target species, to ensure that changing fishing practices do not confound (e.g. shifts from cod and pollock to monkfish) potential habituation effects.

(2) Examine the response of harbor porpoise to a simulated gillnet equipped with pingers over a long time period (several months). There are several areas in the Bay of Fundy where a shore-based observation program will be established. Observers would monitor the movement patterns (i.e. displacement away from the net), point of closest approach, and behavior (dive times, etc), with a theodolite. Similar data could be collected for harbor seals. A number of harbor porpoise will be equipped with VHF tags to follow their movements in detail with respect to the location of the pingers.

(3) Examine the short-term habituation of harbor porpoise to pingers by placing pingers in herring weirs containing a harbor porpoise. This situation provides access to a controlled situation in which the fine-scale behavior of a harbor porpoise can be monitored over several days in a natural acoustic setting.

All three approaches provide information on the potential habituation of harbor porpoise to pingers on different time and spatial scales. This is clearly important work and a critical next step in the assessment of the efficacy of acoustic alarms as bycatch mitigation tools.

Impacts of Alternative 3 on Threatened and Endangered Species

A few marine species listed as endangered or threatened may occur in the area where pingers would be used. Those which have a significant probability of becoming exposed to pingers are the northern right whale, humpback whale, and fin whale, all of which are listed as endangered. Other ESA-listed species that may occur are the endangered leatherback sea turtle, Kemp's ridley sea turtle and threatened loggerhead sea turtle).

<u>Large Whales</u> An audiogram has never been conducted on any baleen whales. What is known about large whale vocalizations suggests that frequencies of less than 1 kHz are of principal importance to the animals, but the whales detect significantly higher frequency signals. Some vocalizations reach up to 8 kHz (Richardson et al. 1995). Lien et al. (1989) used discrete signals of 3.1 - 3.5 kHz and a broadband signal centered at 4.0 kHz to deter humpback whales from fishing gear. NMFS has no information which suggests that the broad-scale use of 10 kHz pingers has a potential for adverse impacts on baleen whales. The GOMTRT has called on NMFS to investigate the effects of pingers on right whales, humpback, and fin whales.

Audiograms are available for 11 species of odontocetes and pinnipeds; for those species where audiograms are not available, ear anatomy can be used to estimate hearing ranges. Baleen whales are primarily adapted to hear low to infrasonic frequencies (<20 Hz) with probable functional ranges of 15 Hz to 20kHz, and minimal threshold 80 dB re 1 micro Pa). Odontocetes, on the other hand, are analyzing ultrasonic frequencies (>20 kHz). Marine mammals as a whole have functional hearing ranges of 10Hz to 200 kHz with best sensitivities in the range of 40-100 dB re 1 microPa. Field response trials of humpback, gray and bowhead whales show positive responses to signals with estimated received levels of 90 to 100 dB re 1 micro Pa (Ketten, 1996). Ketten notes that 100 dB re 1 microPa is a reasonable estimate for best sensitivity level for larger baleens. However, Ketten notes that others have suggested significantly higher levels (120-180 dB). In addition, Ketten reports that significant acoustic impacts can occur in mammals exposed to sounds 80 dB greater than thresholds. Depending which hypothesis used, this means that if the 90 - 100 dB theory is correct, then impulsive sounds between 120 to 180 dB could be moderate acoustic hazards for at least some whales; if the other theory is correct, it would take sounds >200dB to reach moderate hazard limits.

Impacts from acoustics can be divided into "lethal" impacts and "sublethal" impacts (Ketten, 1996) . Lethal impacts are profound injuries that would result from an intense source (i.e. explosion); sublethal impacts relate to hearing losses due to exposure to perceptible sound. Sublethal impacts can impair foraging or predator detection, although only the latter would be of any consequence to large baleen whales. If pingers do have an impact it would be sublethal, resulting in decreased sensitivity resulting in a temporary or permanent threshold shift. However, due to the rapid attenuation of the pinger sound just 1 meter from the source, it is unlikely that whales would be impacted at all.

Sea turtles Very little is documented about sea turtle hearing. Ketten (1996) notes that sea turtles are mid- to low-frequency animals (50 to 2000 Hz)(with relatively poor levels of sensitivity (120 dB re 1 micro Pa minimum threshold) in comparison to marine mammals (40 -60 dB re 1 microPa minimum threshold). Turtles, therefore, would be less subject to acoustic impacts than marine mammals. Consequently, as long as pingers are found to be as harmless as expected for marine mammals, they would not be expected to have any impact on sea turtles.

Impacts of Alternative 3 on Other Marine Organisms

The 10 kHz signal is within the hearing range of all the species of seals that occur in the affected area. There is no evidence that seals react to the sounds, although there are concerns that pingers may adversely affect seals or, alternatively, that seal predation on netted fish may increase if pingers are in use. Pinniped species are variable--some have best hearing sensitivities over 10 kHz (harbor seals) while others have low frequency adaptations (elephant seals). Neither of the two scientific experiments in the GOM in 1994 and 1997 indicated any significant difference in seal takes or predation on nets. Seal bycatch will be carefully monitored during the implementation stage of this plan.

Aside from marine mammals, few species of marine organisms are expected to be impacted by the introduction of pingers to the marine environment. Most fish can sense only low and medium frequency signals (10-1000 Hz). Clupeids (American shad, Atlantic herring, blueback herring, alewives) are believed to sense and may be averse to the frequencies (10,000 Hz) emitted by the pingers. Kraus et al. (1995) found that more herring were caught in the nets without pingers. Other anecdotal evidence suggests that gillnets with pingers catch significantly reduced numbers of Atlantic herring or shad. In fact, the displacement of these important porpoise-prey species may be the mechanism that serves to reduce harbor porpoise bycatch. Kraus et al. (1997) notes that the 1997 experiment, conducted during a time when herring were not present in large numbers, indicates that this phenomenon may not be occurring. Although clupeids may be displaced from the area immediately surrounding a gillnet equipped with pingers, there is no evidence to support the theory that they would be displaced from the entire fishing area or even parts of the areas that host the most dense fishing effort. The high frequency signal attenuates rapidly to ambient levels.

4.3.3 Economic Impacts

Alternative 3 would require all vessels fishing between September and May in New England, and between January and April in the Mid-Atlantic to use pingers. Each vessel owner would decide whether to purchase pingers based on their own set of circumstances. Each pinger is estimated to cost $50 dollars based on information obtained from NMFS Sea Sampling personnel. It is assumed that there would be one pinger required per net, and one on each buoy line. Using the average number of nets and strings fished in each region, a weighted average $3,437 dollars per vessel was estimated for the cost of pingers which translates into a total fleet cost of $608 thousand dollars.

The cost of pingers was estimated to be $608 thousand dollars if all vessels purchase pingers. However, some vessels may be unable to afford pingers. This would increase the total losses because vessels which were unable to afford pingers would have to stay tied up at the dock and therefore lose revenue. Table 16 shows the losses in producer surplus and crew rents given different percentages of vessels which purchase pingers. Losses in producer surplus are assumed to be linearly related to the percent of vessels which purchase pingers. For example, if 50 percent of the vessels use pingers, then the losses in producer surplus and crew rents will be reduced by 50 percent. Total pinger costs are also estimated based on the percent of vessels which purchase pingers. Losses calculated using these assumptions are estimated to be between zero and $7.4 million dollars.

Table 16. Change in Producer Surplus and Crew Rents Depending on Percentage of Fleet which use Pingers.

			Percent Using Pingers		
	0	25	50	75	100
Producer Surplus Loss	-7,442,960	-5,582,220	-3,721,480	-1,860,740	0
Pinger Cost	0	152,066	304,133	456,199	608,266
Total Loss	-7,442,960	-5,734,287	-4,025,613	-2,316,939	-608,266

In reality, vessels can either purchase pingers and continue to fish, shift their effort to other areas, or elect not to purchase pingers and stay tied up at the dock. Because the time and areas where pingers are required are quite extensive, vessels would be unlikely to switch areas and continue fishing without pingers.

Table 17 shows losses in producer surplus and crew rents given different combinations of pinger use and effort shifts. It is assumed that fishing in closed areas requires pingers, and that losses in producer surplus and crew share are linearly related to the percent of vessels using pingers and shifting areas. For example, if 25% of the vessels use pingers and 25% shift areas, then the losses in producer surplus and crew rents will be reduced by 50%. The total cost will then be the loss in surplus and crew rents plus the cost of the pingers. Some combinations are not feasible, and are signified by an N.A. entry. For example, a 50% shift in effort and a 75% use of pingers is not feasible.

Without a more formal model, it is not possible to predict the number of vessels which will adopt either strategy. Changes in surplus would be between zero and $7.4 million depending on the percentage of vessels which can either shift their effort, or purchase pingers. The only case where there would be zero losses would be if all vessels could shift their effort to other areas. The probability of this happening is likely to be quite low given the extensive time and area closures proposed.

Table 17. Changes in Producer Surplus and Crew Rents under Non-Preferred Alternative 3 for the New England and Mid-Atlantic Regions

			Percent Pinger Use		
	0	25	50	75	100
Percent Effort Shift					
0	-7,442,960	-5,734,287	-4,025,613	-2,316,939	-608,266
25	-5,582,220	-3,873,547	-2,164,873	-456,199	N.A.
50	-3,721,480	-2,012,806	-304,133	N.A	
75	-1,860,740	-152,066	N.A.		
100	0	N.A.			

The losses estimated only include producer surplus and crew rents, and not consumer surplus gains from reduced harbor porpoise mortality. The implicit assumption when comparing this Alternative 3 to the proposed action is that the reduction in mortality is equivalent to the proposed action. To the extent that this is not true, then the differences in mortality need to be factored into any comparison to the proposed action.

4.4 Alternative 4: Coast-Wide Closures

For the GOM, this alternative would mean complete closure to vessels fishing in the NE multispecies sink gillnet fishery from September through May. These are the times of bycatch. This alternative does not recognize the potential for pingers to be effective in reducing bycatch in the GOM.

In the Mid-Atlantic, the New Jersey and southern Mid-Atlantic waters would be closed for both large mesh and small mesh gillnet fishery from January 1 through April 15. This alternative does not differentiate between local and non-local fishing practices as a means to reduce bycatch. The management measure is based on the concern that gear modifications and time/area closures are too complicated and too difficult to implement and enforce. Although this alternative appears to be the most restrictive because it does not distinguish among gillnet fisheries, i.e., all fisheries are closed during the same time period throughout the entire Mid-Atlantic region, this alternative reduces the need to make changes to gear that may be determined unnecessary in the future. This alternative should achieve a greater bycatch reduction than the proposed action because the timeframe of these measures encompasses all of the months in which harbor porpoise bycatch occurs and includes all gillnet fisheries.

Time-area closures are fisheries management tools commonly employed to restrict fishing activities from certain areas. Time/area closures have several advantages. They are easy to understand, implement and enforce. They provide the resource complete protection in designated times and areas, and even offer additional protection to endangered and threatened species that also interact with this type of fishing gear. They allow fishing activities to occur in an area during times when interactions are unlikely. Such measures may provide a means of reducing fishing effort temporarily in fisheries that experience excessive fishing capacity.

Time-area closures also have several disadvantages. First, fishers are displaced from fishing in preferred times and areas. In fact, some fisheries could potentially disappear entirely. Detailed information is required on the distribution of interactions between marine mammals and fisheries in both time and space in order for discrete closures during finite time periods to be effective. These interactions must occur in times and areas that are predictable from year to year. Such restrictions do not take into account the potential effects of displaced fishing effort, nor do they take into account shifts in abundance and distribution of harbor porpoise.

This method can be used to test the relationship between fishing effort and bycatch. The concerns associated with this measure are that it may pose extreme economic hardships. Time and area closures must be sufficiently broad to preclude the possibility of bycatch exceeding the PBR level outside the closed area, which is what has occurred in past years with closures in the GOM. There are currently closed areas in the GOM for 30-day periods, but no closed areas in the Mid-Atlantic for dogfish, monkfish or other ocean gillnet fisheries.

For the GOM, the periods for which closures would need to occur are the primary months in which the fishery can be successfully conducted. In addition, management of this fishery to protect the groundfish resource is also placing significant restrictions on fishery operation.

For the Mid-Atlantic, effort has increased dramatically since 1989, particularly in response to diminishing opportunities for groundfish fishing in the GOM and a viable European market for the species (NEFSC, 1994). Fishing further south resulted in increased opportunities for fishing into the fall and winter months. Likewise, fishing for monkfish as an alternative to traditional groundfish species has dramatically increased in recent years and is generally a fall, winter, and spring fishery in the Mid-Atlantic. Both of these fisheries are comprised of both local fishermen and fishermen coming from the New England Area. The former generally fish less gear for shorter amounts of time than fishermen coming to the Mid-Atlantic area from New England. Both gear characteristics and practices differ between the two groups. After reviewing data on observed harbor porpoise takes in this fishery it appears that local fishermen have a generally lower bycatch rate than the New England boats. Therefore, gear modifications modeled after those fishing practices and gear used by local fishermen would be expected to be a viable option for reducing harbor porpoise takes without the disadvantages to the fishing industry of complete closures.

4.4.1 Environmental Consequences

The GOMTRT considered achieving the desired reduction in harbor porpoise entanglement solely through closures. This would be the surest way of meeting the requirement to reduce bycatch to below the PBR level. To achieve this reduction in the GOM would necessitate closing virtually all the times and areas during which the proposed action would allow sink gillnets to be deployed with pingers. The reason for broad time/area closures is to minimize the potential for effort shifts to areas and times adjacent to closed areas. As we have observed in the GOM, closures can be ineffective if they cause fishing effort to become more intensive outside the closed areas. Under Alternative 4, the effect on harbor porpoise bycatch in the GOM would be profound. Given the bycatch estimates in Table 4, broadscale closures would result in a reduction of approximately 1,131 harbor porpoise takes, leaving a take of approximately 41 harbor porpoise per year. Combined with expected bycatch reduction in the Mid-Atlantic, the take of harbor porpoise would be well below the PBR level.

Many of these times and areas are economically important to gillnetters, however, and the economic burden that would result from such extensive closures are not necessary at this time to reduce bycatch to the PBR level (section 4.4.2).

This alternative would also close all Mid-Atlantic gillnet fisheries for extended time periods. This option was also considered by the MATRT given that the proposed action relies on management measures that may be complicated and difficult to implement and enforce. Therefore, one broad time/area closure that encompasses all fisheries during the times of highest bycatch would be easier to implement and therefore would be more successful in achieving the PBR goal.

This alternative may appear to be the most restrictive for both geographic areas because it does not allow any fishing in the closed areas regardless of gear configuration i.e., all fisheries are closed during certain time periods throughout the entire GOM and Mid-Atlantic region. However, it reduces the need for fishermen to make changes to gear. This alternative is expected to achieve 100% bycatch reduction in the Mid-Atlantic, or a reduction of 207 harbor porpoise takes per year. Therefore, the total bycatch expected under this alternative would be 41 animals per year, taken solely in the GOM.

Another closure option in the Mid-Atlantic is a coast-wide 30 day closure during the time period of highest bycatch. A 30 day coast-wide closure during the month of March was proposed during the MATRT discussions. Under that scenario, a reduction of 89 harbor porpoise would be expected, leaving a take level of 118 animals per year in the Mid-Atlantic. When this take is combined with the expected take from the GOM under Alternative 4, the total take of harbor porpoise in U.S. fisheries would be approximately 159 animals per year.

Impacts on Endangered and Threatened Species

The time and area closures would benefit endangered whales by taking gillnet gear out of the water when they are migrating north in spring. Both whales and sea turtles may be negatively impacted by closures late in the spring and in early summer if they cause effort shifts into summer when these species are concentrated in New England. This is unlikely since the fishery is not as viable during those months in New England. As mentioned, during years with warmer water temperatures, turtles may move inshore earlier in North Carolina and southern Virginia waters.

Turtles are not likely to be present in waters north of Virginia so the closures in the Mid-Atlantic would not be expected to have impacts in the areas being fished during that time period.

Impacts on Other Marine Organisms

This alternative would not be expected to negatively impact other marine life unless it results in a shift of effort to other fisheries or gear types by fishermen that can no longer afford to participate in the sink gillnet fishery. However, this potential cannot be quantified or predicted. As long as no major shift to other fisheries occurs, this option would reduce impacts to other marine life because it effectively removes sink gillnet gear from the water for extended periods of time.

4.4.2 Economic impacts

Table 18 shows the losses for each region under this alternative, assuming no effort displacement. The areas which were designated closed, but with pinger use allowed are now closed entirely. The change in producer surplus and crew rents is estimated using the same assumptions as in the proposed action, i.e., that crew wages and variable costs are 25% and 23% of gross revenue respectively. The losses given no effort displacement by the fleet are outlined below.

Mid-Coast Area This area would be closed between September and May 31, and there would be no pingers allowed. The loss in producer surplus and crew rents for these time periods is estimated to be $707 thousand dollars, and there are an estimated 58 vessels which would be impacted. This translates into a per vessel loss of slightly more than $12 thousand dollars.

Massachusetts Bay Losses in producer surplus and crew rents between September and May are estimated to be $1.6 million dollars, and there are 63 vessels which would be impacted. This translates into a per vessel loss of approximately $25 thousand dollars.

Cape Cod South Losses in producer surplus and crew rents during this time period are estimated to be $1.1 million dollars, and there would be 53 vessels impacted. This translates into a per vessel loss of roughly $21 thousand dollars.

Offshore Closure Estimated losses in producer surplus and crew wages are expected to be $2.5 million dollars and 54 vessels would be impacted. On a per vessel basis, losses would be roughly $47 thousand dollars.

Mid-Atlantic Component The Mid-Atlantic region would be closed to all gillnet activity between January 1 and April 15. This would result in far greater costs to the fishing fleet then the time and area closures under the proposed action mainly because all vessels would be impacted. As Table 18 shows, the losses to the Mid-Atlantic fleet would be $1.4 million dollars assuming no effort displacement. An estimated 65 vessels would be impacted, for a per vessel loss of $22,000 dollars.

The total loss in producer surplus and crew rents for both regions from this alternative would be $7.4 million dollars. Overall, 177 vessels would be impacted (some vessels fish in multiple areas) for a per vessel loss of roughly $42 thousand dollars.

Table 18. Change in Revenue, Profit and Producer Surplus from Area Closures under Non-Preferred Alternative 4 assuming no Effort Displacement.					
					A-B
	A	B	C	D	Change in
	Change in	Change in	Change in	Change in	Producer Surplus
Area	Gross Revenue	Variable Cost	Crew Share	Profits	& Crew Rents
Mid-Coast (Close)	-918,316	-211,213	-229,579	-477,524	-707,103
Mass. Bay	-2,125,084	-488,769	-531,271	-1,105,044	-1,636,315
Cape Cod South	-1,463,976	-336,714	-365,994	-761,268	-1,127,262
Offshore	-3,297,430	-758,409	-824,358	-1,714,664	-2,539,021
Mid-Atlantic	-1,861,376	-428,116	-465,344	-967,916	-1,433,260
Totals	-9,666,182	-2,223,222	-2,416,546	-5,026,415	-7,442,960

Losses with Effort Shifting As was stated in the proposed action discussion, vessels can shift their operations to other areas and make up for any revenue loss. This puts bounds on the losses of between zero, if revenue was totally replaced in other areas, and $7.4 million dollars. For Alternative 4, it will be more difficult for vessels to shift to other times and areas because the areas are all closed at the same time. There is the opportunity for GOM vessels to move to the Mid-Atlantic in the Fall, or to the Northeast closure area. Some may do so, but it is likely that most would not be able to switch. Gillnet vessels have traditionally fished in certain times and areas depending on many factors, including the vessel's homeport. Because these proposed time and area closures are so extensive, it is unlikely that many vessels will be able to shift their operations and replace lost revenue.

4.5 Cumulative Impacts to Harbor Porpoise

A variety of factors, both natural and anthropogenic, have resulted in the overall decline of marine mammals throughout their range (Terwilliger and Musick, 1995). Human population growth, particularly in coastal areas, has negatively impacted marine mammal habitat. Many studies confirm that top predators, such as bottlenose dolphin and harbor porpoise, are susceptible to bio-magnification of toxins and other pollutants (Evans 1987; Jefferson et al, 1993; Hoyt, 1984).

Commercial ship traffic is a threat to sea turtles and marine mammals (Beach and Weinrich, 1989; Blaylock , 1985; Morgan et al., 1995). Small commercial whale watching vessels can pose threats if they approach animals too closely or stay too long in the area and impact their behavior (Wiley, et al., 1995). Other human activities along the coast (such as military activities), have the potential to disrupt or injure animals in the area (Read and Gaskin, 1988; Keinath et al., 1994).

The most significant impact on marine mammals has historically been from subsistence hunting and the use of these animals by humans (Frazier, 1981). Currently, commercial fishing is considered one of the greatest rangewide threats to marine mammals. Among commercial fishery impacts, most marine mammal mortalities in the U.S. occur in gill nets.

Other Fisheries Interactions Harbor porpoise interact with a number of fisheries in addition to the New England sink gillnet and Mid-Atlantic coastal gillnet fisheries: the Canadian gillnet, the U.S. and Canadian weir, and Atlantic pelagic driftnet.

The Canadian gillnet fishery occurs mostly in the western portion of the Bay of Fundy during the summer and early autumn, when the density of harbor porpoise is highest there. The 1986 estimated harbor porpoise bycatch was 116, and estimated bycatch in 1989 was 130 harbor porpoise. (Trippel et al., 1996). An observer program implemented in the Canadian Bay of Fundy sink gillnet fishery during the summer of 1993 provided total bycatch estimates of 424 harbor porpoise. This program was expanded in 1994, and the 1994 bycatch was estimated to be between 80 to120 harbor porpoise in a fishing fleet consisting of 28 vessels. In 1995, the estimated bycatch was 87 harbor porpoise (Trippel et al., 1996). During 1995, due to groundfish quotas being exceeded, the gillnet fishery was closed from July 21 to August 31. The gillnet fishery was again closed in 1996 from August 20 to September 30. Currently, harbor porpoise take in the Canadian Bay of Fundy gillnet fishery is estimated to be less than 50 harbor porpoise per year (Trippel, pers. comm.)

Some harbor porpoise are caught in Canadian and U.S. weirs in a fishery which occurs from May to September each year along the southwestern shore of the Bay of Fundy and scattered along the western Nova Scotia and northern Maine coasts. There were 180 active weirs in the western Bay of Fundy and 56 active weirs in Maine in 1990 (Read 1994). Smith et al. (1983) estimated that approximately 70 harbor porpoise became trapped annually and, on average, 27 harbor porpoise died annually in Bay of Fundy weirs. The rest were released alive. In 1993, a cooperative program between fishermen and Canadian biologists resulted in greater live releases of harbor porpoise (Read 1994).

The estimated total number of hauls in the Atlantic large pelagic driftnet fishery increased from 714 in 1989 to 1,144 in 1990; thereafter, with the introduction of quotas, effort was severely reduced. Fifty-nine different vessels participated in this fishery at one time or another between 1989 and 1993. In 1995, there were 11 vessels in the fishery. Observer coverage, expressed as percent of sets observed, went from 8% in 1989 to 99% in 1995. Effort was concentrated along the southern edge of Georges Bank and off Cape Hatteras. Estimated annual fishery-related mortality of harbor porpoise attributable to this fishery was 0.7 in 1989, 1.7 in 1991, 0.4 in 1992, 1.5 in 1993, 0 in 1994 and 1995. Average estimated harbor porpoise mortality and serious injury in the Atlantic large pelagic driftnet fishery during 1991-1995 was 0.5. This fishery is being addressed by the AOCTRT. A plan to reduce harbor porpoise bycatch in this fishery is under discussion.

The Atlantic Large Whale Take Reduction Plan The ALWTRT was formed on August 6, 1996 because of interactions between North Atlantic right whales, humpback whales, and fin whales with pot and gillnet fisheries in the Western Atlantic. Specifically, the ALWTRT addressed the GOM sink-gillnet fishery, the GOM/U.S. Mid-Atlantic lobster trap/pot fishery, the Mid-Atlantic coastal gillnet fishery, and the southeastern U.S. Atlantic shark gillnet fishery.

The Interim Final Rule implementing the ALWTRP is expected to achieve the necessary take reductions through a series of closures of critical habitat areas and requirements for gear modifications and modification of fishing practices.

The ALWTRP regulations apply to all anchored gillnets regardless of the target species and would include dogfish and monkfish nets. Vessels in the GOM and Mid-Atlantic are required to use various modifications from a list of approved gear modification options. This went into effect in January 1998. Most of these modifications, however are not likely to be effective at reducing injury and mortality of small cetaceans or sea turtles, as they are designed for much larger whales with unique entanglement potential. Closures are beneficial to all species, but the times and areas of these closures do not impact the primary gillnet fisheries in the GOM and Mid-Atlantic during the times when harbor porpoise bycatch is greatest.

5.0 Non-Regulatory Measures and TRT Discussions

GOMTRT The GOMTRT's original consensus was contingent upon three measures. First, that the management regime be implemented for only one year and that NMFS reconvene the team in the seventh month after the GOMTRP's implementation, and semiannually thereafter, in order to review the effectiveness of the recommended actions and to revise the TRP, if necessary. The GOMTRT requested that NMFS provide a variety of detailed and updated information regarding fishery effort, bycatch rates, bycatch estimates throughout the species' range (to include Canada and the Mid-Atlantic), and compliance with the plan.

The second measure upon which the GOMTRT's full consensus was contingent, was that a scientific experiment be conducted during the spring closure in the Mid-Coast Area in 1997 to determine the effectiveness of pingers as a harbor porpoise conservation technique. This experiment was conducted in March and April of 1997. The results of the experiment were reviewed during the December 16-17 meeting of the GOMTRT. This information was incorporated into the proposed HPTRP.

A third measure upon which the GOMTRT's consensus was contingent is that research be conducted on the effects of pingers on harbor porpoise and other marine life. The GOMTRT recommended that research be conducted in the Mid-Coast Area from September 15 to October 31 (when pingers would be in use) to begin to address: (1) whether harbor porpoise are displaced from important habitat areas by pingers, (2) whether the rate of entanglement of harbor porpoise in sink gillnets changes with continued pinger use, and (3) whether pingers affect other marine life.

The draft GOMTRP also included recommendations considered necessary for successful plan implementation. The specific recommendations with NMFS responses were detailed in the 1997 proposed rule (62 FR 43302, August 13, 1997) and are incorporated by reference.

The GOMTRT recognized that its area of concern did not reflect the full range of the harbor porpoise and that takes incidental to fishing operations occur throughout its range in Canadian waters and along the Mid-Atlantic coast. In hopes of ensuring that the Canadian Department of Fisheries and Oceans (DFO) implements measures in the northern range of the harbor porpoise commensurate with the HPTRP, the team recommended that NMFS consult extensively with DFO. Specifically, the GOMTRT recommended that NMFS seek DFO's comments on the plan, urge DFO to develop a complementary plan, review with DFO the progress of the HPTRP and any Canadian take reduction strategies, and outline a schedule for meetings between NMFS, representatives of the GOMTRT, DFO, and representatives of the DFO's Harbor Porpoise Advisory Team to jointly review population and bycatch data. NMFS has a collegial relationship with DFO and values the exchange of data and ideas that such a relationship affords. NMFS wil continue to include Canada in harbor porpoise conservation efforts. Canada has developed their own Harbor Porpoise Conservation Plan and takes in

Canadian waters has continued to decrease. . Takes are currently estimated at less than 50 animals.

The GOMTRT agreed that NMFS should conduct research on:
1) Habituation and displacement effects of pingers on harbor porpoise. *This first part of this research was conducted in the summer 1998 and a final report is in progress.*
2) Overall environmental effects of pingers. *This is part of NMFS, NEFSC 1999 research plan.*
3) Gillnet fleet census. *Work to develop better methods of effort estimation is ongoing.*
In addition to the GOMTRT's request, NMFS has developed the following as part of the research plan component:
4) Enforcement hydrophone to insure that pingers on nets are active, and
5) Research project to assess whether changes occur in the acoustics of pingers after prolonged use.

Both of these latter two projects are aimed at removing technical variables should the bycatch rate not be reduced as expected.

MATRT The MATRT submitted their report to NMFS in August 1997. The MATRT submitted a report instead of a draft TRP because the MATRT did not reach consensus on the use of a pinger experiment in the Mid-Atlantic. The MATRT Report is divided into two sections: 1) The Consensus Agreement which consists of those take reduction measures that the team agreed to by consensus, and 2) a section addressing several non-consensus issues on which the MATRT members were not able to reach agreement. The Consensus Agreement includes recommendations regarding the reduction of harbor porpoise bycatch in the monkfish and dogfish subfisheries, general management recommendations for other Mid-Atlantic winter ocean gillnet fisheries, outreach and education programs for fishers, improvements to the marine mammal observer program, and research and data recommendations for Mid-Atlantic coastal bottlenose dolphins. In addition, the Consensus Agreement details some of the data concerns of the MATRT. The Non-Consensus portion of the Report includes a summary of members' opinions regarding the proposed pinger experiment in the dogfish fishery and details some specific data concerns expressed by some, but not all, MATRT members.

The MATRT recommended several measures to enhance the effectiveness of NMFS' observer program. The MATRT recommended expanding marine mammal observer coverage in the Mid-Atlantic coastal gillnet fishery to include all areas covered by the MATRT, especially during those times when harbor porpoise are known to be in the region. The MATRT stressed the need for increased observer coverage in small mesh fisheries, where observations may need to be made from alternative platforms. In addition, the MATRT recommended further coordination between the activities of the stranding and observer programs to allow shifts of observer coverage in response to stranding information.

In order to ensure that observer coverage is both random and representative, the MATRT recommended that NMFS: 1) coordinate local, state, and Federal fishing permit data bases to locate all vessels participating in each fishery; 2) educate observers and fishers regarding requirements for observer placement; 3) ensure compliance with the observer program; 4) review the observer placement sampling strategy to ensure that all categories of boats are proportionately sampled; and 5) provide vessel owners/operators with proof of liability insurance for observers, except for cases of vessel owner/operator willful misconduct.

The MATRT recommended that NMFS use the following strategies to increase confidence in marine mammal mortality rates: 1) Define the level of observer coverage and stratification necessary to provide confidence in estimates of marine mammal mortality and evaluate the existing observer program for the fishery; 2) educate fishers regarding the importance of observer coverage and observer data to the design of least restrictive bycatch reduction measures, 3) review the information recorded by observers on gear characteristics and fishing practices to ensure that all gear characteristics that may influence bycatch are documented, and 4) analyze bycatch data in a timely manner and make accessible to take reduction teams.

NMFS is planning to expand observer coverage to ensure that all components of the fishery are observed. Due to limited resources, NMFS will not be able to increase observer coverage in areas of the fishery that are already being observed at some level. NMFS will distribute observer coverage in a manner which ensures that the observed boats represent a random and representative sample of all boats in the fishery. NMFS is providing education to both observers and vessel owners regarding both observer requirements and the importance of observer data to accurate bycatch estimates. NMFS is attempting to obtain data on all permits and landing data on all permitted Mid-Atlantic fisheries through state and Federal authorities to ensure compliance with the observer program. In addition, NMFS is expanding stranding observer coverage to allow for responsiveness to observed strandings.

Research and Data Recommendations for Mid-Atlantic Coastal Bottlenose Dolphin In addition to developing recommendations to reduce bycatch of harbor porpoise, the MATRT discussed developing take reduction measures to address bycatch of Mid-Atlantic coastal bottlenose dolphins in the Mid-Atlantic coastal gillnet fisheries. The MATRT made several recommendations to assist NMFS in focusing its research and data gathering efforts.

The MATRT recommended that NMFS's first research priority be to identify functionally discrete stocks of coastal bottlenose dolphins. Surveys should then be designed and conducted on these coastal stock(s) throughout their ranges, to determine a reliable population estimate(s). NMFS should then generate a reliable estimate of fishery-related mortality by 1) expanding marine mammal observer coverage; 2) evaluating the need and viability of alternative observer platforms; 3) identifying sources of non-fishery related mortality; and 4) evaluating the socioeconomic factors associated with these fisheries.

The MATRT further recommended that NMFS: improve regional stranding networks through training of stranding network members, timely response and analyses of stranded animals, and increased coordination between stranding networks and stranding response letter-holders; work with the appropriate state, regional, and Federal counterparts, to identify and characterize all fisheries that have a potential to interact with coastal bottlenose dolphins; explore options for such mitigation measures such as the use of experimental fisheries using different gear designs or the use of other gear technology which may reduce the potential for interactions between bottlenose dolphins and coastal gillnets.

Consensus Concerns During the MATRT process, team members raised a number of concerns and issues regarding the data and data analysis that were used as a basis to develop harbor porpoise bycatch reduction strategies for the Mid-Atlantic area. The following are concerns of MATRT members that were incorporated into the consensus portion of the MATRT Report:

Bycatch Rate Estimates Pooled Across All Gillnet Types MATRT members were concerned that the data analyses used during the team discussion used harbor porpoise bycatch rate estimates that were pooled across all gillnet types in the Mid-Atlantic coastal gillnet fishery. Ocean gillnets used to target different species (i.e. spiny dogfish, monkfish, shad, etc.) are likely to exhibit different finfish catch rates in addition to different harbor porpoise bycatch rates. MATRT members believed that the data analyses should incorporate temporal, spatial, and inter-species gear differences to allow the accurate analysis of harbor porpoise bycatch rates and the design of effective bycatch reduction strategies.

NMFS agrees that the harbor bycatch rate may vary within the Mid-Atlantic coastal gillnet fishery and that a more specific assessment of the harbor porpoise bycatch rate is needed. NMFS will continues to collect more information on gear differences and variations within the fishery, NMFS will investigate the potential for development of gear-specific bycatch rate estimates.

Use of Landings Data as a Unit of Effort MATRT members were concerned with the use of landings data as a measure of fishing effort during team discussions. Team members feel that, because finfish catch rates are affected by several variables, they may not be representative of actual fishing effort. MATRT members believed that NMFS should investigate more appropriate methods of calculating effort.

NMFS agrees that there may be some problems with using landings data as a unit of fishing effort. NMFS is investigating the use of more appropriate indicators of fishing effort, but landing data is currently the best data available for making bycatch estimates.

<u>Non-Consensus Concerns</u> During the MATRT process, team members raised additional concerns that were not accepted by consensus. The following are concerns of MATRT members that were incorporated into the non-consensus portion of the Team Report:

Pinger Experiment The MATRT did not reach consensus on whether a pinger experiment should be conducted in the Mid-Atlantic coastal gillnet fishery to evaluate pingers as a measure to reducing harbor porpoise bycatch. New England vessels fishing in Mid-Atlantic waters during the winter months use a finer twine gear type and longer floatline lengths than that used by local fishers. Current data indicate that this fine-twine gear and longer floatlines used by New England vessels is associated with a higher level of harbor porpoise bycatch. The MATRT discussed the feasibility of conducting a pinger experiment in the Mid-Atlantic dogfish gillnet fishery on this fine-twine gear type.

Since the MATRT did not reach consensus on this issue during its last meeting, the MATRT agreed that individuals and/or groups of MATRT members could submit statements reflecting their positions on the MATRT's non-consensus items, including the pinger experiment.

Several MATRT members strongly supported the use of a pinger experiment in the dogfish fishery to determine whether pingers are an effective way of reducing harbor porpoise bycatch in fine-twine fishing gear. If pingers provided a means by which the finer gauge twine could be successfully deployed without significant harbor porpoise bycatch, then New England vessels could continue to use their existing gear types. Without a pinger experiment in this fishery, all New England vessels will be forced to convert their gear to the larger gauge twine used by local fishers or stop fishing in Mid-Atlantic waters during the winter months. Thus, the use of pingers on fine-twine gear in the dogfish fishery could significantly reduce the economic burden on New England fishers who want to fish in Mid-Atlantic waters.

In addition to the economic benefits to fishers, several members noted that this pinger experiment would provide valuable information not only for the dogfish fishery, but also for other small-mesh fisheries in the Mid-Atlantic region.

Several other MATRT members opposed the pinger experiment for the fine-twine dogfish gillnet fishery. Their opposition to the pinger experiment was based on several arguments:

1) Since the MATRT agreed that the adoption of "locally prevailing practices" would significantly reduce harbor porpoise bycatch, pinger experiments on gear types that do not conform to these practices are unnecessary.

2) Pinger experiments should be reserved for those areas in which alternatives are not available. The use of acoustic devices is not justified in this fishery because equally effective non-acoustic methods of reducing harbor porpoise bycatch in this fishery exist.

3) The pinger experiment can not be justified on the basis that it alleviates the economic burden on fishers. If a pinger experiment is conducted, only a small portion of the northern boats will be able to participate in the experiment. The majority of these vessel owners boats will be required to convert their gear to the larger twine size used by local fishers. Thus, the majority of northern boats will need to invest in new gear regardless of the presence of a pinger experiment.

4) Due to the nature of the dogfish fishery, a pinger experiment would be very complicated and unlikely to result in statistically significant results. The statistical power of any pinger experiment conducted with this fishery will be very low, and such an experiment would require a very large number of hauls to produce a meaningful result.

5) A pinger experiment in the dogfish fishery would require a significant amount of NMFS' limited funding and observer resources and would greatly limit research in the other Mid-Atlantic coastal gillnet fisheries.

6) The presence of a pinger experiment in the dogfish fishery would require an allocation of a substantial portion of the PBR level to harbor porpoise taken by vessels participating in the pinger experiment. This PBR level allocation punishes fishers who are already using gear types and/or fishing practices that produce low bycatch rates.

In the Mid-Atlantic, data indicated that other options, in the form of gear modifications, might be successful in reducing bycatch without some of the uncertainties surrounding widespread pinger use. NMFS believes that the gear modifications and time/area closures recommended by the MATRT and proposed in this rule will be sufficient to reduce the incidental mortality of harbor porpoise below the PBR level.

PBR Calculation Several MATRT members believed that the PBR level for harbor porpoise is overly conservative because the population estimate between sample years may be affected by a variety of factors that may bias the estimate. MATRT members were concerned that the counting of individual harbor porpoise during population surveys may be affected by the potential for harbor porpoise to exhibit ship-avoidance behavior and/or that the movements of animals in the population may result in the double-counting of individuals. In addition, some MATRT members had concerns about the process by which the PBR level is calculated. There was concern among some team members that the use of the twentieth percentile of a log-normal distribution and a low recovery factor may result in an overly conservative calculation given the relatively high reproductive rates of harbor porpoise.

Conversely, other MATRT members expressed the need for a great deal of conservatism in the calculation of PBR level. Historically, high bycatch rates may have significantly reduced the population, thus causing this stock to be a candidate for listing as a threatened species under the ESA. These members believe that there is a need for conservative removals from the population to allow recovery of this stock.

All members of the MATRT believed that the PBR level calculation should be regularly revisited and, if necessary, recalculated.

NMFS developed a process for calculating the PBR level and for defining the types of information that should be used in this process. NMFS published this proposed process for calculating the PBR level and requested public comments. This process is an open public process that is continuously reviewed by NMFS. If NMFS determines that any changes to this process are necessary, these changes are reflected in the Stock Assessment Reports.

NMFS is unaware of new scientific information that could be used to re-assess the PBR default parameters. Any new valid scientific information would be welcome, evaluated, and incorporated, as appropriate, into these assessments. However, in the absence of other information, the default model parameters used in the PBR formula represent the best available scientific information on this topic. The life history of harbor porpoise, among other related issues, were discussed in length at a meeting in 1996, the results of which are published by Wade and Angliss, 1997 in "Guidelines for assessing marine mammal stocks: report of the GAMMS workshop April 3-5, 1996, Seattle Washington". A peer-reviewed scientific article that describes some of the work that went into defining the parameters is summarized by Wade, 1998, in "Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds".

PBR Allocation

MATRT members were concerned with the equitable allocation of bycatch reduction between Canada and the Northeast and Mid-Atlantic regions in the U.S. Regional responsibility for harbor porpoise bycatch reduction needs to be re-examined pending the outcome of Mid-Atlantic and GOM mitigation strategies.

Under the MMPA, takes throughout the range of the species are considered in developing management measures in the TRPs. Since the HPTRT is expected to meet semi-annually the first year, and annually thereafter, changes in information on Canadian takes, as available, can be evaluated by the TRT at the same time US bycatch information is discussed and recommendations made on all these issues at the same time.

The Teams discussed allocation between regions and agreed to reduce their respective bycatch by 79% of the estimated level of bycatch for that region. The Teams felt that this strategy was both equitable and fair.

<u>Education and Outreach</u> The MATRT recognized the importance of communicating the TRP to the fishing industry and the general public and included several educational outreach recommendations in the MATRT's Report. The MATRT recommended that an outreach program be conducted to inform fishers of both new and existing regulations regarding incidental takes in their fisheries. The comprehensive outreach program should be conducted by interested individuals and organizations and should include workshops, information bulletins, and technical assistance with bycatch reduction technologies.

The MATRT recommended that additional education efforts be focused on communicating to fishers the importance of harbor porpoise conservation. The MATRT believes that these educational efforts should, if possible, be specifically directed toward those fishers using the fishing gear and/or practices that have higher levels of harbor porpoise bycatch. NMFS agrees that skipper education workshops are an important part of this plan. The plan provides for voluntary skipper education workshops. NMFS plans to prepare educational materials which will describe the take reduction process and explain the key components of the

MATRP and its accompanying regulations. NMFS will ensure that these educational materials are widely distributed throughout the fishery.

6.0 Affected Environment

The purpose of this section is to provide a description of the relevant resources that are likely to occur in the area that will be affected by the proposed action. This discussion provides a baseline with which to understand the effects of the alternatives discussed in section 4.0.

6.1 Physical Environment

The Gulf of Maine is bordered on the east, north and west by the coasts of Nova Scotia, New Brunswick and the new England States. To the south, the Gulf is open to the North Atlantic ocean at the surface. The interior of the gulf is characterized of deep basins which are separated by irregular topography that includes a number of shallow ridges, ledges and banks. The distributions of benthic species and assemblages of species in the Gulf of Maine are strongly related to the bottom type and the properties of the water overlying the bottom.

Climatic, physiographic, and hydrographic differences separate the ocean region south of Massachusetts to Florida into two distinct areas: the Mid-Atlantic area and South Atlantic area, with the natural division occurring at Cape Hatteras. A major zoogeographic faunal change occurs at Cape Hatteras as a result of those differences (Briggs, 1974). The Mid-Atlantic area is relatively uniform physically and is influenced by large estuarine areas including Chesapeake Bay, the largest estuary in the United States, Narragansett Bay, Long Island Sound, the Hudson river, Delaware bay, and the almost continuous band of estuaries behind the barrier beaches from New York to Virginia. The southern edge of the region includes the estuarine complex of Currituck, Albermarle, and Pamlico Sounds, a 2500 square mile system of large interconnecting sounds behind the Outer Banks of North Carolina.

6.2 Biological Environment

6.2.1 Harbor porpoise (*Phocoena phocoena*) (The following section is largely summarized from the 1996 Marine Mammal Status Report (Waring et al. 1997).

The harbor porpoise is found in U.S. and Canadian Atlantic waters. During the summer (July to September), harbor porpoise are concentrated in the northern GOM and southern Bay of Fundy region, generally in waters less than 150 meters deep (Gaskin 1977; Kraus et al. 1983; Palka 1994a). During fall (October to December) and spring (April to June), harbor porpoise are widely dispersed from North Carolina to Maine, and their density is much lower than during the summer. Harbor porpoise are seen from near the coastline into the middle of the GOM (in areas greater than 200 meters deep) in both spring and fall. There is little information about the distribution of harbor porpoise during winter through spring (December to April), although strandings and bycatch data suggest that at least some of the animals are found from the North Carolina to New York area at this time. The proportion of the population in this region is unknown.

<u>Population Estimates</u> Although current population growth rates of western North Atlantic harbor porpoise have not been estimated due to lack of data, several attempts have been made to estimate potential population growth rates. Barlow and Boveng (1991) estimated the upper bound

of the annual potential growth rate to be 9.4 %. Woodley and Read (1991) estimate the likely annual growth rate to be 4 %. Caswell et al. (1994) calculated a distribution of growth rates which indicated that the potential growth rate is unlikely to be greater than 10 % per year. The median of this distribution is approximately 4 %, but it is not known whether this is the best estimate (Palka 1994b). Therefore, for purposes of this environmental assessment, the maximum net productivity rate was assumed to be 0.04, the default value as suggested in Anon (1994).

Mortality Estimates and Population Impacts Refer to section 2.1 for a detailed discussion of mortality estimates. In addition to direct mortality from interactions with fisheries, Read (1989 and 1987) and Read and Gaskin (1988) found a decrease in the proportion of mature females in the population and a shift in the overall population size distribution towards smaller, younger animals in samples collected from 1981 to 1986, compared to samples collected from 1969 to 1973. In addition, pronounced increases have been observed in the mean length of calves between these two sets of samples (Read and Gaskin, 1988; Read, 1989) as well as a decline in the age and size of sexual maturity for females (Read, 1989). Such changes in age distribution and reproduction characteristics are consistent with theoretical density-dependent responses for a population that has been reduced as the result of exploitation. However, such changes could be due to changes in environmental conditions, such as decreases in prey abundance.

6.2.2 Bottlenose Dolphin (*Tursiops truncatus*)

In the U.S. Atlantic, bottlenose dolphins are commonly found along the coast from Long Island, New York to the Florida Keys (Leatherwood and Reeves, 1982). There are two distinct forms of bottlenose dolphin in the western North Atlantic, coastal and offshore, which may be separate species (Dowling and Brown, 1993).

Beginning in early June, 1987, through May, 1988, unprecedented numbers of bottlenose dolphins washed ashore along the Atlantic coast from New Jersey to Florida. Over 740 animals died in those 11 months. Scott et al. (1988) estimated that 50% or more of the coastal migratory stock between Florida and New Jersey died during this period. The North Atlantic coastal migratory bottlenose dolphin population was designated as depleted under the MMPA on April 6, 1993, because it was estimated to have declined to less than 50% of levels observed prior to the 1987-1988 die-off.

Reliable estimates of the current coastal migratory stock are not presently available. The calculated minimum population for the coastal stock of bottlenose dolphins is 2,482, which is below OSP. The PBR level is 25. This stock is a strategic stock because it is listed as depleted under the MMPA.

The level of incidental take in inshore and coastal fisheries is difficult to. The extent of incidental take by fisheries is poorly known, but gillnets appear to be implicated more than other fishing gear (Costen-Clements and Hoss, 1982). The Mid-Atlantic coastal gillnet fishery appears to be particularly problematic for coastal bottlenose dolphins.

6.2.3 Other Marine Mammal Stocks found in the Mid-Atlantic

Right Whales Individuals of this population range from wintering and calving grounds in coastal waters of the southeastern United States to summer feeding, nursery, and mating grounds in New England waters and northward to the Bay of Fundy and the Scotian Shelf. A description of the natural history and taxonomy of the northern right whale can be found in the Right Whale

Recovery Plan (NMFS, 1991a). During the winter, a portion of the population moves from the summer foraging grounds of Cape Cod Bay, the Great South Channel, the mouth of the Bay of Fundy and Brown's Bank (NMFS, 1991a) to the calving/breeding grounds off Florida, Georgia, and South Carolina. The winter location of the bulk of the population is unknown. Calves are produced in winter off the coast of the southeastern United States.

The minimum population for right whales is 295, and the PBR level is 0.4. The western North Atlantic population size was estimated to be 295 individuals in 1992. Because this was nearly a complete census, it is assumed that this represents a minimum population size estimate. The size of this stock is considered to be low relative to OSP, and this species is listed as endangered under the ESA. This is a strategic stock because it is listed under the ESA and estimated annual fishery-related mortality and serious injury exceeds the PBR level.

At least one-third of all right whale mortality is caused by human activities. The principal activities impacting these whales are ship strikes and entanglement in fishing gear.

Humpback Whales Humpback whales migrate to the Caribbean in winter, where courtship, breeding, and calving occur. During summer, they gather into feeding aggregations in the GOM and further north. Feeding is the principal activity of humpback whales in New England waters. In recent years, the number of sightings of young humpback whales in the Mid-Atlantic region has increased. From 1985-1992, researchers reported 38 humpback whale strandings along the Mid-Atlantic and southeastern U.S. coasts.

The western North Atlantic population is currently estimated to include approximately 5,543 individuals (Katona et al., 1994). Katona and Beard (1990) estimated the population's annual growth rate at 9.4 % (with broad confidence intervals). The Humpback Whale Recovery Team has recommended an interim recovery goal of twice the current population estimates within the next 20 years.

The calculated minimum population of humpback whales is 4,848 and the PBR level is 9.7. The size of this stock is considered to be low relative to OSP, and this species is listed as endangered under the ESA. This is a strategic stock because the humpback whale is listed as an endangered species under the ESA.

Fin Whales In the North Atlantic, fin whales summer from Cape Cod to the Arctic Circle and winter south to Florida and the greater Antilles (Leatherwood and Reeves, 1983). Fin whales mate and calve in the wintering grounds and females bear a single calf every two to three years (gestation periods lasting 12 months). The population is focused in the northeastern GOM, and the waters of New England are known to be popular feeding grounds. While part of the population resides year-round in these northern waters, evidence suggests calving and mating occur in Mid-Atlantic water. Waring et al. (1997) estimate the minimum population to be 1,704 fin whales, and the PBR level to be 3.4 animals. This is a strategic stock because it is listed as endangered.

Sperm Whales In the western North Atlantic sperm whales range from Greenland to the Gulf of Mexico and the Caribbean. In most areas, sperm whales are found in waters greater than 180 meters in depth. Like swordfish, which feed on similar prey, sperm whales migrate to higher latitudes during summer months, when they are concentrated east and northeast of Cape Hatteras.

The calculated minimum population for sperm whales is 226, and the PBR level is 0.5. The total number of sperm whales off the U.S. or Canadian Atlantic coasts is unknown. A minimum population estimate of abundance was based on an autumn 1991 aerial survey population estimate of 337 sperm whales. The status of this stock relative to OSP is unknown, but the stock is strategic because it is listed as endangered under the ESA.

Pilot Whales There are two species of pilot whales in the Western Atlantic, the Atlantic or long-finned pilot whale and the short-finned pilot whale. The long-finned pilot whale is distributed from North Carolina to Iceland, and possibly to the Baltic Sea. The calculated minimum population of long-finned pilot whales is 3,537 and the PBR level is 28. The status of long-finned pilot whales relative to OSP in U.S. Atlantic coast waters is unknown. There are insufficient data to determine the population trend for this species. This is a strategic stock because fishing mortality exceeds the PBR level.

Spotted Dolphin - There are two species of spotted dolphin in the Western Atlantic, the Atlantic spotted dolphin (*Stenella frontalis*), and the pantropical spotted dolphin (*S. attenuata*). Atlantic spotted dolphins are distributed in tropical and warm temperate waters of the western North Atlantic. Their distribution is from southern New England, south through the Gulf of Mexico and the Caribbean to Venezuela. Off the northeast U.S. coast, spotted dolphins are widely distributed on the continental shelf and shelf-edge, and offshore over the deep ocean south of 40°N. They regularly occur in the inshore waters south of Chesapeake Bay, and have also been sighted near Gulf Stream features.

The calculated minimum population of spotted dolphins is 4,885. No PBR level was calculated because of the difficulty in identifying each species. The total number of spotted dolphins off the eastern U.S. coast is unknown. The minimum population estimate of abundance was based on the CeTAP (1982) abundance estimate of 6,107 spotted dolphins. The status of spotted dolphin (both species), relative to OSP in the U.S. Atlantic Exclusive Economic Zone (EEZ) is unknown. Both stocks are strategic because the average annual fishery-related mortality and serious injury of spotted dolphins would exceed the PBR level.

6.2.4 Sea Turtles

Kemp's Ridley Sea Turtle Of the seven extant species of sea turtles of the world, the Kemp's ridley is in the greatest danger of extinction. The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempi*) (NMFS and USFWS, 1992a) contains a description of the natural history, taxonomy, and distribution of the Kemp's or Atlantic ridley turtle.

Adult Kemp's ridleys are found primarily in the Gulf of Mexico. Hatchlings leave the beach and are not seen again until they reach over 20 cm, when they are found in northern Gulf of Mexico and inshore embayments along the eastern Atlantic seaboard as far north as Cape Cod Bay. Ridleys enter northeast coastal embayments when water temperatures approach 20°C (Burke et al., 1989; Musick et al., 1984) and become benthic feeders. Sea turtles leave the northern embayments in the fall, when water temperatures cool (Burke et al., 1991). The current major threat to this species is incidental capture, drowning, and entanglement in fishing gear (NMFS and USFWS, 1995).

Leatherback Turtle The Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) contains a description of the natural history and taxonomy of this species (NMFS and USFWS, 1992b). Leatherbacks are widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour, 1972).

Shoop and Kenney (1992) observed leatherbacks during summer months scattered along the continental shelf from Cape Hatteras to Nova Scotia. Researchers in the Chesapeake have observed leatherbacks in the mouth of the Bay during summer months (Byles, 1988).

Green Turtle Green turtles are distributed circumglobally, mainly in waters between the northern and southern 20°C isotherms (Hirth, 1971). In the western Atlantic, several major nesting assemblages have been identified and studied (Pritchard, 1969; Carr et al., 1978). However, most green turtle nesting in the continental United States occurs on the Atlantic Coast of Florida (Ehrhart, 1979). Juvenile green turtles occur north to Long Island Sound, presumably foraging in coastal embayments. In North Carolina, green turtles are known from estuarine and oceanic waters, and a small number of nests are reported annually as far north as Cape Hatteras National Seashore.

Loggerhead Turtle The threatened loggerhead is the most abundant species of sea turtle occurring in U.S. waters. Like Kemp's ridleys, they commonly occur throughout the inner continental shelf from Florida through Cape Cod, Massachusetts. The loggerhead's winter and early spring range is in estuarine rivers, coastal bays, and shelf waters of the southeastern United States. Loggerheads move northward and enter northeast coastal embayments as water temperatures approach 20°C (Burke et al., 1989, Musick et al., 1984) to feed on benthic invertebrates, leaving the northern embayments in the fall when water temperatures drop. Sources of human caused mortality are similar to those discussed above for ridleys.

6.2.5 Marine Fish

The New England gillnet fishery targets a broad range of groundfish, including cod, haddock, pollock, ocean perch, white hake, red hake, silver hake, ocean pout, yellowtail flounder, winter flounder, American plaice, witch flounder, windowpane flounder, monkfish and dogfish.

Atlantic cod Atlantic cod are distributed in the Northwest Atlantic from Greenland to Cape Hatteras, North Carolina , and form near-shore areas to depths exceeding 400 m. Off the northeast coast of the United States, the greatest concentrations of cod are commonly found on rough bottoms in waters between 10 and 150 m depth. Cod grow rapidly, attaining an average size of 26 cm by the end of their first year of life. Spawning occurs during winter and early spring. In New England, cod exhibit seasonal movements into shoal waters in the spring followed by a retreat into deeper water during winter. The commercial fisheries are conducted year-round with otter trawls and gill nets as primary gear. Recreational fishing also occurs year-round. Maximum age i8s in excess of 20 years, although young fish (2 to 5 years) generally comprise the bulk of the catches.

Haddock Haddock range from West Greenland to cape Hatteras. Highest concentrations off the United States coast occur on the northern and eastern section of Georges Bank and in the southwestern Gulf of Maine. Haddock prefer broken ground, and gravelly, pebbly, and sandy bottom rather than ledges. Major spawning concentrations occur on eastern Georges Bank, although some spawning also occurs to the east of Nantucket Shoals and along the Maine coast. Spawning occurs between January and June, with peak activity during late March and early April. Haddock are moderately longlived (up to 18 years) and have relatively rapid growth.

Pollock Pollock are most abundant on the Scotian Shelf and in the Gulf of Maine in the Northwest Atlantic. One major spawning area exists in the western gulf of Maine. Adult pollock inhabit depths ranging from 70 to 280 m. Pollock form spawning aggregations during winter months in the western Gulf of Maine where considerable fishing effort is directed. Maximum ages of up to 18 years have been documented but the major portion of the catch consists of 3 - 6 year old fish.

Ocean perch Ocean perch, or redfish, are distributed throughout the Northwest Atlantic from the Grand Banks to Georges Bank. Redfish are most common in deep waters of the Gulf of Maine to depths of 300 m. Mating takes place in autumn, with subsequent larval extrusion occurring the following spring and summer. Redfish are associated with rocky bottom types and are most abundant in cold water. The natural mortality rate is quite low. In the past, redfish were often distributed in numerous dense local aggregations and were fished quite heavily during the developmental phase of the fishery. Because of their low fecundity and low natural mortality rate, the stock is particularly vulnerable to increase in mortality.

White hake White hake occurs from Newfoundland to Southern New England, on muddy bottoms throughout the Gulf of Maine. Depth distribution varies by age and season; juveniles typically occupy shallower areas than adults, but individuals of all ages tend to move inshore in spring and summer, dispersing to deeper areas in autumn. White hake are relatively long-live, with ages over 20 years having been documented. The median age at maturity occurs at about 1.5 years.

Red hake Red hake are distributed from the Gulf of St. Lawrence to North carolina, but are most abundant between Georges Bank and new Jersey. They are most common in relatively deep water and appear to prefer sandy or muddy bottoms. Spawning occurs from may through November, with major spawning areas located on the southwest part of Georges Bank and in the Southern New England area. Red hade are relatively short-live, reaching a maximum age of about 12 years.

Silver hake Silver hake or whiting are widely distributed, ranging from Newfoundland to South Carolina. The center of abundance is from Maine to New Jersey. Migration is extensive. Silver hake are found at a variety of depths, from the shoreline to depths as great as 900 m. Major spawning areas include the coastal region of the Gulf of Maine. Silver hake are a summer spawner, with peak egg production occurring during July and August. Growth of silver hake is initially rapid. Ages up to 15 years have been reported, but few fish beyond age 6 have been observed in recent years.

Ocean pout Ocean pout is a demersal, eel-like species, ranging form Labrador to Delaware. Ocean pout do not undertake extensive migrations, but move seasonally to different substrates. In summer, ocean pout cease feeding and move to rocky areas, where spawning occurs in September and October.

Yellowtail flounder Yellowtail flounder range from Labrador to Chesapeake Bay. Commercially important concentrations are found on Georges Bank, off cape cod, and in Southern New England. This is a medium sized flatfish. Spawning occurs during spring and summer, peaking in April to June .

Winter flounder The winter flounder is distributed in the Northwest Atlantic from Labrador to Georgia. Winter flounder may attain ages in excess of 15 years. Spawning commences in early winter in the southern extent of the range and may extend into April and may on Georges Bank. The height of the spawning season is between January and March.

American plaice The American plaice or dab is distributed along the Northwest Atlantic continental shelf from souther Labrador to Rhode Island in relatively deep waters. Primary concentrations of the Gulf of Maine stock occur in inshore waters along coastal Maine and Massachusetts. The maximum age is between 24 to 30 years. Spawning occurs from February to June in the coastal areas of western Gulf of Maine.

Witch flounder Witch flounder or gray sole, is common throughout the gulf of Maine and also occurs in deeper areas on and adjacent to Georges Bank and along the shelf edge as far south as Cape Hatteras. Spawning occurs in late spring and summer, with peak spawning occurring in July and August.

Windowpane flounder Windowpane or sand flounder is distributed along the Northwest Atlantic continental shelf from the Gulf of St. Lawrence to Florida. The greatest commercial concentration sexist in waters near Georges Bank and Southern new England. Spawning occurs from la te spring to autumn, peaking in July-August on Georges Bank and September in Southern New England.

Monkfish The monkfish, also commonly referred to as the goosefish is a widely distributed benthic fish, which occurs in the Northwest Atlantic Ocean from the northern Gulf of St. Lawrence southward to Cape Hatteras, North Carolina. The species is known to inhabit waters from the tide-line to depths as great as 840 m (Markle and Musick, 1974). They also tolerate a wide range of temperatures. Adults inhabit the sea floor over the entire range of substrate types including hard sand, gravel, broken shell, and soft mud (Bigelow and Schroeder, 1953).

During spring and autumn, monkfish are distributed widely both north and south of Georges Bank. Armstrong et al. (1992) determined maximum ages for monkfish as nine years for males, and 11 years for females. They observed spawning to occur in May and June in the area from Cape Hatteras to Southern New England. Spawning appears to occur over most of the depths inhabited by monkfish (Bowman, 1919). Direct estimates of annual mortality from fishery dependent data are not possible at this time. The resource is at least fully-exploited and might be overexploited. The displacement of fishing effort from other fisheries into the unregulated monkfish fishery is problematic.

Spiny Dogfish Spiny dogfish are distributed in Northwest Atlantic waters between Labrador and Florida. They migrate seasonally, moving north in spring and summer and south in fall and winter. The stock is distributed throughout the Canadian maritimes during the summer months and concentrated in US waters during the fall through spring. The spiny dogfish is a relatively long-lived, slow growing animal reaching a maximum size of four feet and 40 to 50 years of age in the Northwest Atlantic.

Age composition of the catch of spiny dogfish is lacking. Several methods have been used to evaluate the status of the stock. The results indicate that the Northwest Atlantic stock of spiny dogfish is currently at high level of biomass. NMFS concluded that considerable evidence exists that suggests the spiny dogfish stock is stable or possibly declining. The trend suggests an increasing fishery mortality and a decrease in the sizeable catch of dogfish, suggesting that the stock is near full exploitation. NMFS further concluded that if the current historic high level of dogfish abundance is to be maintained, then current fishing mortality rates should not be increased (NEFSC, 1994).

Weakfish Weakfish (*Cynoscion regalis*) range along the Atlantic coast from Florida to Massachusetts. The area of greatest abundance extends from North Carolina to New York during the warm season, while the stock retreats to the North Carolina area during the winter. Spawning and early development occur in the nearshore ocean waters and estuaries from March to October.

Juveniles spend their first summer in estuaries. Weakfish have supported important fisheries as early as the 1800s. Commercial fishermen harvest them in inshore waters with pound nets, haul seines, gill nets and trawls during spring, summer and fall. The winter fishery employs trawls and gill nets along the coast of North Carolina.

Shad The four species of *Alosa* which occur on the Atlantic coast are anadromous members of the herring family Clupeidae. All spawn in freshwater and mature at sea, making extensive migrations in their overlapping distribution. The American shad is a highly valued food fish and is the largest and most important member of this group. It ranges from southeastern Labrador to northern Florida, and virtually every major river along the Atlantic seaboard supports spawning runs. These runs begin as early as January in Florida and progress into July in northern waters. The center of abundance is in the Mid-Atlantic where most spawning occurs in April and May. Shad have been an historically important fishery. However, the fishery declined in the 1960s and has not rebounded to early levels.

Spot Spot (Leiostomus xanthurus) range from the GOM to Mexico. They inhabit estuarine and coastal waters to a depth of 6,600 feet. Along the Atlantic coast they are most abundant from Chesapeake Bay to North Carolina. Spot migrate seasonally, entering bays and estuaries in the spring and moving offshore in late summer or fall to spawn. Spot are an important fishery resource along the Atlantic coast, particularly from the Chesapeake Bay southward. They are harvested by a variety of commercial gear including haul seines, pound nets, gill nets and trawls. .

Menhaden Atlantic menhaden (Brevoortia tyrannus) occur from central Florida to Maine, from small creeks to the open ocean. Menhaden play an important role in the marine ecosystem because they are a predominant prey for many fish, birds, and marine mammals. Spawning occurs mostly during the fall and winter in the ocean from the Carolinas to New Jersey, about 20-30 miles offshore. Menhaden gather in large schools off North Carolina during November - January, migrating northward along the coast in April and May. Fishery landings peaked in 1956 at 1.5 billion pounds and then fell in the 1960s and 1970s, with it stabilizing at around 795 million pounds in the late 1980s.

6.2.6 Seabirds

Commercial fisheries interact with seabirds in a number of ways. Commercial fisheries can compete for available food resources. Discarded wastes from fishing vessels can impact seabirds, which often feed on the offal. Finally, these animals can be caught and killed as incidental catch in fishing gear. Species that may be impacted by the subject gillnet fisheries are the Greater Shearwater, the Northern Fulmar, and the Northern Gannet, however, no significant impacts are expected from the proposed action.

The Greater Shearwater is a Southern Hemisphere-breeding species with a broad Atlantic Ocean range that stretches from Tierra del Fuego and the Cape of Good Hope to Newfoundland and Europe (Terres, 1980). The bird occurs regularly along the U.S. East Coast (Desagte and Pyle, 1986). The greater shearwater is both a diurnal and nocturnal feeder and it forages by surface feeding as well as diving (Clapp et al., 1982). Prey species are primarily fish and squid, but the shearwater also follows ships in order to scavenge on offal (Palmer, 1962). The greater shearwater follows surface-feeding fish, and then plucks them from just under the water's surface. Greater shearwaters are one of the most common birds taken in fishing nets off Newfoundland.

Piatt and Nettleship (1987) estimated that over 2,200 greater shearwaters were taken annually in incidental catch in fishing operations in this area between 1981 and 1984.

The Northern Fulmar is abundant in both the Pacific and Atlantic Oceans. In the North Atlantic, the northern fulmar ranges from Virginia to Newfoundland. The northern fulmar does not migrate, although winter dispersal takes place in September and October. Single birds are widely dispersed at sea, but they congregate in large numbers where food is copious: reefs, edges of currents, fishing vessels, and trawling operations (Palmer, 1962). The northern fulmar feeds on fish and offal as well as almost any aquatic animal small enough to swallow or kill. The northern fulmar generally gathers its food while floating or swimming on the water's surface, although the bird will sometimes dive to catch prey. The bird forages nocturnally as well as diurnally (Prince and Morgan, 1987). Fulmars have been reported killed in the New England groundfish gillnet fishery.

The Northern Gannet is found along the U.S. Atlantic Coast from Virginia as far north as Greenland. It routinely forages in Atlantic coastal waters during the nonbreeding season. The northern gannet dives and swims underwater, but not to great depths. Northern gannets swim underwater using both wings and feet so they can fish while swimming. The diet consists mainly of schooling fishes, although squid and mollusks are consumed occasionally. Northern gannets have been reported killed in incidental catch in the New England groundfish gillnet fishery.

6.3 Description of Fisheries

6.3.1 New England sink gillnet fishery

Gillnetting is a traditional New England fishery, originally introduced in 1880. The gillnet fishery has undergone fluctuations since its inception. The gillnet fishery had a resurgence in the early 1970's and 1980's primarily due to the introduction of monofilament netting. Partly as a result of restrictions to conserve cod and the groundfish, many gillnet vessels have now switched to targeting monkfish and dogfish. The New England fisher today consists of about 300 boats but may decline with implementation of new fishery regulations.

The fishery consists of mostly small vessels, about 30 to 50 feet (10 to 17 meters), that operate from numerous ports throughout New England. Many vessels leave their nets in the water around the clock, and some vessels attempt to haul them on a daily basis as weather permits. There is some variability in soak time within the fishery, depending on the target species. Vessels targeting flounder may use multiple day sets to accomplish the need for longer soak time. Most gillnet vessels fish close to shore, but a few fish farther out from shore, making trips lasting form two to eight days, hauling their nets on a daily basis throughout each trip. These vessels bring their nets back with them at the end of the trip. Some vessels enter and exit the gillnet fishery on a seasonal basis and pursue other fisheries when not gillnetting . For example switching from groundfish to monkfish or dogfish or to lobster which are taken using traps. A vessel may fish between 40 and 200 nets, depending on target species. Nets are 300 feet long and are tied together in string of one to 30 nets. The highest portion of the net may extend nearly 12 feet above the seabed. Generally, the inshore fishery is conducted about 45 miles from shore and the offshore fishery 45 miles and beyond. However, the distance from shore differs by area.

6.3.2 Mid-Atlantic Gillnet Fisheries

New York The ocean gillnet fishery in New York ranges along the entire south shore of Long Island from Gardners Bay and Montauk to New York City. In addition to the gillnet fishery in the ocean of the south shore of Long Island, there are gillnetters who fish in Long Island Sound. The ocean gillnet fishery primarily targets bluefish, monkfish, weakfish, and dogfish. However, there is a limited striped bass gillnet fishery. In general, gillnet effort increases in March, peaks in July, and continues through December. The size of the typical net is about 900 feet to 1800 feet with mesh sizes generally ranging between 4.5 and ten inches.

New Jersey The ocean fishery is centered around Barnegat Light and extends from Point Pleasant to Cape May. An extensive gillnet fishery also exists in Delaware Bay. Primary target species include American shad, bluefish, weakfish, monkfish, dogfish, and black drum. The majority of the fishing effort occurs in state waters (three miles offshore), but extends out to 20 - 200 miles for several important species. Large mesh gillnet fisheries for monkfish and dogfish that generally occur in the EEZ utilize bottom tending gear. The size of the typical net ranges from 2,400 to 6,000 feet in length with mesh sizes ranging between six to 12 inches. Smaller mesh nets for bluefish, weakfish, and bonito are generally used in state waters, but also extend as far as 20 miles offshore where they center on bottom structure or topography. These nets can be surface, mid-water or bottom tending with lengths of 1,200 to 2,400 feet and mesh sizes in the range of 3.4 to five inches. Gillnets, in general, are in the water from March to November with peak fishing activity in the spring and fall, when many species are migratory along the coast. Gillnet activity during the winter months from December through February is limited to fisheries for monkfish and spiny dogfish. There are approximately 300 licensed gillnet fishermen in New Jersey, with less than one-third of them fishing more than a few nets on a part time basis. The ocean fishery probably has less than 40 active fishermen that fish more than a few months per year.

Delaware There are two major gillnet fisheries in Delaware: anchor and drift gillnet fisheries. Drift gillnets that target weakfish, bluefish, spot, and menhaden are deployed and retrieved the same day. This fishery is active from April to December, operating mostly in Delaware Bay. Anchor (or fixed) gillnets targeting primarily shad and weakfish are set for days but tended daily (weather permitting). The maximum anchored gillnet effort is generally reached in April to May. A total of 255 commercial fishing licenses were issued in 1994, which included 126 commercial gillnetters. A moratorium on gillnet licenses was put in place in 1984 which restricted new migrants into the gillnet fishery.

Maryland Maryland has supported a coastal gillnet fishery for shad, smooth dogfish, spiny dogfish, weakfish, striped bass, and monkfish for many years. Currently, there are approximately 14 local (Maryland residents) and at least 25 transient (generally from New England) gillnetters. The transient gillnetters target mostly monkfish and dogfish, and are active off Maryland in the winter and spring. All of these gillnetters fish out of Ocean City.

The shad fishery generally operates between February and the end of April. In 1996, there were ten participants in this fishery, who reported fishing a total of 53,900 yards of net, with landing of 75,000 pounds of fish. This fishery usually operates close to shore, generally within three miles.

The number of local and transient participants in the monkfish fishery in Maryland has expanded in recent years. About 90% of the fishing effort takes place at least 12 miles offshore, with the remainder between three and 12 miles. Most fishermen let their nets soak from one to three days. The fishery is carried out from December through May.

Spiny and smooth dogfish are caught in all offshore areas, however, the greatest effort takes place beyond 12 miles. This fishery has expanded greatly in recent years as an increasing number of transient fishermen from New England mover further south. This fishery takes place in the winter and spring months. There is a small fishery that takes place during the spring and the fall for striped bass and weakfish using both anchored and drift gillnets. These fish are caught within three miles of the shore.

Virginia Coastal gillnet fisheries use both anchored and drift gillnets to harvest anadromous as well as coastal pelagic and nearshore species. Large mesh gillnet fisheries are more prevalent during spring and early summer months, for harvesting dogfish, other sharks, and black drum. In coastal Virginia waters, there is a moderate harvest of dogfish during the winter. This fishery mainly takes place in winter and spring months in both state and adjacent federal waters. Smooth dogfish landings peaked in the spring while spiny dogfish peak in winter.

A small portion of the late winter and early spring American shad gillnet harvest occurs in federal waters. The shad harvest in state waters is a coastal intercept fishery and is principally from seaside Eastern Shore locations. In 1995, these landings peaked in March with approximately 130,000 pounds.

Summer through late fall fisheries are principally for drum fish, with the majority of harvest from state waters. Harvest of dogfish and sharks are fairly evenly distributed between the two areas. In excess of 600 individuals hold gillnet licenses. Of those, approximately 50 individuals fish 100 days or more per year in coastal waters.

North Carolina The principal ocean gillnet fishery in North Carolina is the sink gillnet fishery off Dare County. The principal season is December to April, which accounts for about 80% of the annual sink gillnet trips in that area. For the January 1994 to June 1996 period, Dare County sink gillnet trips accounted for 69% of the total state gillnet effort. Landings are dominated by dogfish which are taken mostly with 6 to 6.5 inch stretched mesh nets. Striped bass, monkfish, bluefish, and few king mackerel, are also take with large mesh gillnets. Smaller mesh nets (3.1 to 4.5 inch stretch mesh) are used for the very important winter fishery for weakfish and croaker. Vessels generally set a number of nets in an area and tend them in turn, depending on conditions. The nets are usually retrieved at the end of the day.

7.0 Final Regulatory Flexibility Analysis (FRFA)

7.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to reduce the impacts of burdensome regulations and record keeping on small entities. To achieve this goal, the RFA requires government agencies to describe and analyze the effects of the regulations and possible alternatives on small entities. On the basis of this information, the FRFA determines whether the proposed action would have a "significant economic impact on a substantial number of small entities."

7.2 Purpose and Need for Action

The purpose of the proposed action is discussed in section 2.0 of this document.

7.3 Objectives

The objective of the proposed action is to reduce harbor porpoise bycatch to 483 animals per year in the GOM and Mid-Atlantic regions. The proposed action attempts to achieve the bycatch reduction goals of the MMPA while minimizing the economic impact to any one segment of the NE multispecies sink gillnet fishery and the Mid-Atlantic gillnet fishery. The proposed action would be promulgated under the MMPA and would therefore regulate gillnet fishing in all state and Federal waters. The legal basis for this action is Section 118 of the MMPA.

7.4 Reporting Requirements

Under the Paperwork Reduction Act (PRA), gear marking regulations are considered a reporting requirement, and the burden hours need to be estimated. The final rule requires nets in the Mid-Atlantic region to be marked in order to identify the vessel and enforce net cap provisions. It is estimated that each tag will take 1 minute to attach to the net, and each net requires one net tag. The total number of nets which will need to be tagged is estimated by assuming that combination gillnet vessels are, on average, fishing 60 nets, and all other vessels are, on average, fishing 30 nets. This gives a weighted average of 49 nets per vessel. Using these figures, the total burden hours is estimated to be 49 minutes per vessel.

The 76 vessel owner/operators will have to order net tags, estimated at 2 minutes per request. Depending on whether net tags are lost or damaged, vessels are expected to only have to comply once over three years. The annual average over the 3 years would be 25.3 vessels affected.

7.5 Relevant Federal Rules

Currently, the NE sink gillnet fishery is subject to regulations under the NE Multispecies FMP. Recent NE groundfish conservation measures are implemented under Framework Adjustment 25 to the NE Multispecies FMP. The predominant Mid-Atlantic gillnet fisheries are not subject to regulations under a fishery management plan at this time. The proposed action is designed to complement Framework 25 and other fishery management regulations. In fact, the recommendations of the GOMTRT were modified by NMFS to take into consideration the combined effect of Framework 25 and the HPTRP on NE fishermen.

7.6 Economic Impacts of the Proposed Action and Alternatives

The economic impacts of the proposed action and alternatives are discussed in section 4.0 of this document.

The potential losses of the proposed action depend on assumptions about how individual vessels will react to the regulations. In most cases, these assumptions were very conservative in order to estimate the maximum possible losses. Non-Preferred Alternative 4 has the potential to cost more than either the proposed action, Non-Preferred Alternative 2 and Non-Preferred Alternative 3. This is because the area closures are large, and last for multiple months. The losses for Alternative 4 are expected to be $7.4 million dollars, and it is unlikely that vessels would be able to fish elsewhere to offset their losses. Allowing the use of pingers in the proposed action will lower the cost to the fleet, even with the price of pingers included. The provisions in the plan which allows the use of pingers in the New England region lowers the losses in the proposed action for New England vessels to $0.49 million dollars if all vessels elected to use pingers. The actual losses which will occur depend on which strategy vessels adopt to continue operating in the face of these regulations. Clearly, allowing pingers to be used will lower the cost to the fleet because it gives vessels added flexibility.

Non-Preferred Alternative 2 is lower in cost than any of the alternatives in terms of losses the fleet will incur. However, the losses in consumer surplus because of high harbor porpoise mortality are likely to be far greater than the losses in producer surplus and crew rents. If the contingent valuation study conducted by the University of Maryland is accurate, then the value of losses from harbor porpoise mortality would be far greater than any of the other options.

Non-Preferred Alternative 3 is the least costly alternative if all vessels impacted by the plan chose to fish with pingers. To the extent that some vessels would not be able to afford pingers, the costs will increase. Implicit in the analysis of this alternative was the assumption that the mortality reduction was the same as the proposed action. This assumption may not be true because pingers have not been formally tested in some of the times and areas where they would be allowed under this alternative. If mortality was higher, gains in consumer surplus would not be as high as under the proposed action, which means this alternative would have lower benefits than the proposed action.

In response to public comments, NMFS shortened the time periods when pingers would be required in certain areas, and reduced the number of net tags required in the Mid-Atlantic region. This lowered the estimated costs by approximately $613 thousand from the proposed rule for this action.

In summary, the proposed action will allow NMFS to achieve MMPA goals, reduction of harbor porpoise bycatch to acceptable levels, while minimizing the overall impact to affected fisheries, compared to the other available alternatives. The proposed action accomplishes this by placing carefully considered time-area closures in place, and allowing the use of bycatch reduction devices instead of total closures. This allows fishermen to continue to generate revenue. Further, the proposed action is less costly than other alternatives that would require pingers in the Gulf of Maine the entire time harbor porpoise are present there.

7.7 Determination of Significant Economic Impact on a Substantial Number of Small Entities of the Proposed Action

The NMFS standards for determining whether an action is significant under the RFA are: 1) a decrease in annual gross revenues of more than 5 percent for 20 percent or more of the affected small entities; 2) an increase in total costs of production of more than 5 percent as a result of an increase in compliance costs, for 20 percent or more of the affected small entities; 3) compliance costs as a percent of sales for small entities that are at least 10 percent higher than compliance costs as a percentage of sales for large entities, for 20 percent or more of the affected small entities; 4)capital costs of compliance that represent a significant portion of capital available to small entities, considering internal cash flow and external financing capabilities; or 5) two percent of the small business entities affected being forced to cease business operations.

The threshold for what constitutes a small entity is considered to be $3 million in gross annual sales. Since none of the gillnet vessels in the fleet earned this amount in 1996, they are all considered to be small entities.

An estimated 273 vessels used sink gillnet gear based on 1996 logbook data. Of these, 176 would be impacted by the regulations, either through the area closures, or the gear modifications. Based on the area closure part of this plan alone, and assuming the worst case scenario where a vessel which was shut out of an area could not shift to another area or use pingers, it is estimated that 105 vessels would have yearly revenue reduced by more than 5%. This is 5% of the total sink gillnet fleet, and 7.3% of the impacted vessels. There is assumed to be no revenue loss from the pinger requirements in the plan. If vessels could not afford to purchase pingers and had to tie up at the dock, then it is estimated that 80 vessels have greater than a 5% revenue loss, which is clearly more than 20% of the fleet.

Total costs of complying with these regulations were estimated to average between $0 and $12,000 dollars per vessel for Mid-Atlantic vessel, and between zero and $4,200 dollars for a New England gillnet vessel. In both cases, these numbers were based on an average number of strings or floatlines and nets fished per vessel in each region. Some vessels may have lower costs, and some higher. Each vessel impacted by the regulations had their total operating costs estimated by assuming that labor cost was 25% of gross stock, and variable costs were 23% of gross stock. This assumption is consistent with the assumptions for the economic analysis in Amendment 7 to the NE Multispecies FMP.

The total cost of complying with these regulations was then estimated for each vessel based on where they fished and by their vessel type (large mesh vs. small mesh). For each vessel, the percent increase in total costs caused by the regulations was then estimated based on their estimated total costs of production. Of the vessels impacted by these regulations, it is estimated that 95 vessels (35% of total, 54% of impacted) would see their total costs increase more than 5%. The cost increase was due to purchasing new gear or pingers, and the cost of gear marking requirements. Vessels could avoid these cost increases by not fishing during the time periods when they would have to modify their gear or use pingers. However, they would then lose some percentage of their yearly profit.

At this point, it is not possible to model the expected number of vessels which will go out of business based on these regulations. Two percent of the total gillnet fleet is 5.5 vessels, which is a very small number. Part of the problem with estimating potential bankruptcies is that there are other changes taking place along with these regulations. For example, stock sizes continue to decline in some areas which could reduce vessel profitability by a greater amount than these regulations.

Based on the NMFS standards, this action appears to be significant because of the increased operating costs caused by these regulations.

7.8 Additional Alternatives

The RFA lists certain types of additional alternatives that should be discussed in the analysis. These alternatives include: "1) the establishment of differing compliance or reporting requirements that take into account the resources available to small entities; the clarification, consolidation, or simplification of compliance and reporting requirements..for small entities; 3) the use of performance rather than design standards; and 4) an exemption...for small entities."

The costs associated with this proposed action are not related to reporting requirements. To the extent that the proposed action would allow fishery participants to select whether to acquire a new gear type or avoid the time/area closures, performance requirements can be substituted for design requirements at the participant's discretion. Since most of the affected entities are small entities, providing an exemption for small entities would not enable the agency to meet the conservation and management goals of the MMPA.

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FINDING OF NO SIGNIFICANT IMPACT

For the reasons discussed in the Environmental Assessment (EA) and summarized here, NMFS has determined that the proposed action to implement a Harbor Porpoise Take Reduction Plan (HPTRP) in the Gulf of Maine and the Mid-Atlantic regions, nor the alternatives to that action, will have a significant impact on the human environment. For this reason, no Environmental Impact Statement needs to be prepared.

With this proposed action, the National Marine Fisheries Service implements a HPTRP, pursuant to section 118 of the Marine Mammal Protection Act, to reduce the incidental mortality and serious injury of harbor porpoise in the Northeast (NE) and Mid-Atlantic gillnet fisheries to below the Potential Biological Removal (PBR) level for that stock. The PBR level for harbor porpoise, which encompasses the entire range from the Bay of Fundy, Canada to the South Atlantic, is estimated to be 483 animals. The estimated total annual average mortality and serious injury to this stock attributable to the NE sink gillnet fishery is 1,833 harbor porpoise per year. Mortality by the Mid-Atlantic gillnet fisheries is estimated to be 207 animals per year. Given the estimated total take of approximately 2,140 animals per year in all fisheries, a total reduction of approximately 1,657 is needed to achieve the PBR goal between the New England and the Mid-Atlantic regions (section 2.0 EA).

The proposed action combines the GOM and Mid-Atlantic geographic areas to achieve the bycatch reduction goal for harbor porpoise. The GOM component of the HPTRP is a series of time/area closures where fishing is prohibited, and time/area closures where gillnet fishing is allowed if fishing nets are equipped with acoustic deterrent devices or pingers. The Mid-Atlantic component is composed of a series of time/area closures where fishing is prohibited and time/area closures where fishing gear can be used if the gear is modified (section 4.0 EA).

Overall, the impacts of the proposed action on harbor porpoise are expected to be beneficial because it will reduce the incidental mortality and serious injury from approximately 2040 animals per year to less than 483 animals per year. The impacts are described in detail in the bycatch analysis section (sections 3.5 and 3.6 EA).

The proposed action is expected to have no adverse impact on threatened and endangered species, based on the determination of an informal consultation concluded on November 12, 1998 (section 4.2.2 EA). In some cases, the proposed action will have positive benefits on threatened and endangered species because it will reduce fishing effort and thereby reduce the probability of interactions during certain times of the year in certain areas.

The concerns of the affected public do not reflect a situation that is "highly controversial" as listed in section 1508.27(b)(4) of the CEQ regulations.

Some questions still remain on habituation of harbor porpoise to the sound of pingers that may reduce the effectiveness of pingers after prolonged periods of use, and over whether or not widespread use will displace harbor porpoise from their foraging habitat. Research is underway and will continue to be conducted on these issues concurrent to the first year of plan implementation. These knowledge gaps do not reflect a situation that involves highly uncertain or unknown risks as listed in section 1508.27(b)(5)

Of the 10 points under section 1508.27(b), the following ones will not be discussed further for these reasons: there are no effects on public health or safety; no unique geographic features within the context of the proposed action; no precedents for future actions; no cumulative effects (section 4.5 EA); no historic or cultural sites; and no violations of Federal, State or local laws.

DATE: NOV 24 1998

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