**Final**

# Framework Adjustment 15 to the Northeast Multispecies Fishery Management Plan

To Reduce the Bycatch of Harbor Porpoise
in the Gulf of Maine Sink Gillnet Fishery

Prepared by

New England Fishery Management Council
in consultation with the
National Marine Fisheries Service

Initial Framework Meeting: June 6, 1996
Final Framework Meeting: July 17, 1996
Submitted by NEFMC: July 24, 1996

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## 1.0 Introduction

In 1993, at the request of the National Marine Fisheries Service (NMFS) the New England Fishery Management Council agreed to develop a strategy to reduce the bycatch of harbor porpoise in the Gulf of Maine sink gillnet fishery by integrating a mitigation plan with fishery management measures. A management objective was adopted and included in Amendment #5 to the Northeast Multispecies Fishery Management Plan (FMP). The goal was to reduce the bycatch to a level not to exceed 2 percent of the population, based on the best estimates of abundance and bycatch. Amendment #7 to the FMP, implemented in July, 1996, included a revised objective that reflected several new provisions of the Marine Mammal Protection Act (MMPA ) which was reauthorized in late spring, 1994. The Council adopted the following language:

> *to reduce proportionately, consistent with the Magnuson Fishery Conservation and Management Act and the Marine Mammal Protection Act guidelines, the incidental mortality and serious injury of harbor porpoise in the Gulf of Maine sink gillnet fishery to the potential biological removal (PBR) level identified for this stock through the process described in section 117 of the MMPA by April 1, 1997, the date required for compliance with section 118(f)(5)(A) of the MMPA.*

Based on current population and life history information, the PBR is 403 animals for Gulf of Maine porpoise.

As a means of achieving this goal, the Council proposes a modification to the porpoise bycatch mitigation measures first implemented under Amendment #5. If approved, Framework Adjustment 15 to the Multispecies Plan would extend the time period of the Mid-coast Closure Area to include September 15 through December 31. During the period September 15 through October 31 the Council proposes that fishing be allowed in the area if acoustic deterrents ('pingers") are used on sink gillnets according to specifications determined by the National Marine Fisheries Service (NMFS). If for administrative or other reasons NMFS is unable to authorize the use of pingers as a condition of fishing in the Mid-coast area, the Council proposes an experimental fishery to collect additional information on acoustic deterrents and their impact on the porpoise bycatch. This action is predicated on other restrictions associated with Amendment 7.

## 2.0 Purpose and Need

### 2.1 Background

The 1988 amendments to the Marine Mammal Protection Act (MMPA) classified the Gulf of Maine multispecies sink gillnet fishery as Category I, a classification which denotes fisheries with "frequent incidental takes of marine mammals." Because of

this status the gillnet fleet has been subject to observer coverage through the Northeast Fisheries Science Center's (NEFSC) Sea Sampling Observer Program since 1989.

Annual estimates of porpoise bycatch (CV in parentheses) have been derived from the information collected through the observer program: 2,900 in 1990 (0.32); 2,000 in 1991 (0.35); 1,200 in 1992 (0.21); 1,400 in 1993 (0.18) and 2,000 in 1994 (0.19). The bycatch in the northern Gulf of Maine occurs between June and September. In the southern Gulf of Maine bycatch takes place from January to May and again during September through December. According to the most recent stock assessment conducted by NMFS in 1995 the abundance estimate is 74,000 (0.20) animals for the Gulf of Maine/Bay of Fundy population. Since cetacean populations may not generally grow at rates much greater than 4% given the constraints of their reproductive life, the harbor porpoise population growth rate is estimated to be 4 percent annually.

The first framework adjustment to address porpoise mortality, Framework 4 (See Appendix IV), was implemented early in 1994. Measures included thirty-day closures for areas designated as Massachusetts Bay, the Mid-coast and Northeast. The removal of all sink gillnets was required in the defined areas.

Framework 12, implemented in November, 1995, expanded the size of the Mid-coast Closure Area to include the Jeffreys Ledge or "Z-Band" west of 69° 30'W except the Tillies Bank area (See map, Appendix I). The action also extended the duration of the closure, initially November 1-30, through November and December, 1995. The area was closed to fishing with sink gillnets during that two month period.

Spring closures were established through Framework 14. Beginning in 1996, the Mid-coast Area with the Jeffreys Ledge Band west of 69°30' incorporated (except Tillies Bank), was closed to fishing with sink gillnets from March 25 through April 25 inclusive. Additionally, the framework required closure of an area in southern New England from March 1 - 30. In both cases, the National Marine Fisheries Service Regional Director authorized fishing for gillnet vessel operators willing to use pingers in accordance with the requirements of an experimental fishery.

**2.2 Need for Adjustment**

The Northeast Fisheries Science Center provided 1990-1995 bycatch information for the Mid-coast Area during the fall period. During the months September through December bycatch was highest in October and November. September and December were months with more variability, but in some years accounted for a significant percentage of the fall bycatch. In view of the Council's revised objective, to reduce the porpoise bycatch to the potential biological level (PBR) by April 1, 1997, and given the most recent bycatch estimate, further management action appears to be appropriate. The Council is cognizant that, although the 1995 bycatch estimate is not yet available, it is expected to be somewhat lower than the most recent figure, 2,000 animals in 1994.

Despite a projected bycatch reduction, however, there is no preliminary information indicating that the figure approaches 403. Framework 15 is proposed as a means of continuing progress toward the PBR level.

The Council's Harbor Porpoise Review Team (HPRT), charged with evaluating the effectiveness of existing regulations provided comments that relate to the framework now under consideration. In a memorandum to the Chairman of the Marine Mammal Committee (Appendix III) the team recommended that for the Mid-coast Area in 1996:

> the Council adjust and expand the time frame of the closure as indicated by further analyses and define an area in which fishing activity would be allowed if nets were deployed with pingers. Because the Mid-coast accounts for a large share of the porpoise bycatch, the HPRT suggests pinger use for the Jeffreys Ledge Band or other limited area in which studies could be conducted to provide further information about habituation to the devices and possible impacts on porpoise behavior, but in a manner that would not jeopardize the Council's bycatch reduction goals.

The majority of the HPRT members (7 of 8, 1 absent) have agreed with the proposed action.

For the reasons discussed above, in addition to the fact that the Mid-coast Area in the fall accounts for the greatest percentage of porpoise bycatch in the Gulf of Maine sink gillnet fishery, the Council proposes a September 15 through December 31 closure period for the existing Mid-coast Area and the use of acoustic deterrents either as a requirement to fish in the area or as a condition of an experimental fishery.

**2.3 Need for a Final Rule**

The Council requests publication of these management measures as a final rule after considering the required factors stipulated under Framework Adjustments to Management Measures in the Northeast Multispecies FMP, 59 CFR Section 651.40., and has provided supporting analyses for each factor considered. The Council has taken into account information, views and comments at a meeting of its Marine Mammal Committee held in Saugus, Massachusetts on May 21, 1996 and at a full Council meeting held in Danvers, Massachusetts on June 5-6, 1996. A final decision to approve this framework adjustment was made at the July 17-18 Council meeting in Peabody, Massachusetts.

In view of the need for further porpoise mortality reductions given the Council's revised goal, and because the Mid-coast Area accounts for the highest percentage of takes in the Gulf of Maine, the Council requests waiver of the proposed rule and

additional comment period and publication of the proposed management measures as a final rule.

## 3.0 Proposed Action and Rationale

The following action is proposed under the framework for abbreviated rulemaking procedure established by Amendment #5 to the Northeast Multispecies FMP. To reduce porpoise takes in the Gulf of Maine sink gillnet fishery, the Council proposes Framework Adjustment 15, which would extend the time period of the Mid-coast Closure Area to include September 15 through December 31. During the period September 15 through October 31 the Council proposes that fishing be allowed in the area if acoustic deterrents ('pingers") are used on sink gillnets in accordance with the conditions stipulated in the 1995-96 experimental fisheries authorized by the National Marine Fisheries Service.

In the experimental fisheries vessels enrolled in the program were required to use an acoustic deterrent device (pinger) that met the acoustical standards used in the fall 1994 pinger experiment conducted in the Mid-coast Area by the New England Aquarium, Woods Hole Oceanographic Institution and the New Hampshire Gillnet Fishermens Association. Sound characteristics had to meet the following criteria: when immersed in water the pinger would broadcast a 10 Khz sound at 132 DB re at 1 micropascal @ 1 meter). Pingers had to be deployed such that a working pinger was located at the end of each string of nets and at the bridle of every net within a string of nets. Pingers had to be maintained to assure that they remained operational and functioning during the course of the experiment. In this current proposal, they would be maintained in working order throughout the closure period.

If for administrative or other reasons NMFS is unable to authorize the use of pingers as a condition of fishing in the Mid-coast area, the Council proposes an experimental fishery to collect additional information on acoustic deterrents. It is the Council's intent that the timing and area considered for pinger use be predicated on other restrictions associated with Amendment #7.

The action recommended by the Council is based on NEFSC data collected through the sea sampling program,including bycatch rates for September-December 1990-1995 and an analysis of the Mid-coast Area, the Jeffreys Ledge Band and an area outside these two regions (Appendix I). Bycatch rates observed in October and November were about 1.5 times higher than the bycatch rates observed in September-December, though these differences were not statistically different. Rates in the Mid-coast Area were much higher than the Jeffreys Ledge Band and "Outside" areas. The rate in the Jeffreys Ledge Band was intermediate to the Mid-coast and outside region.

This recent NEFSC analyses coupled with the previous information on porpoise bycatch indicates that effort can be displaced into areas and/or times that result in

little or nor reductions in bycatch (See Framework 12, Appendix IV). To address this problem the Jeffreys Ledge Band was added to the Mid-coast Area and closed in 1995, but the closure period did not encompass all months in which the greatest number of takes occurred. The sea sampling data had demonstrated that kill rates were highest in October and November, but for administrative reasons November and December were closed.

The area east of 69°30'W was excluded from the Mid-coast closure in 1995 based on historic low levels of sink gillnet activity and the absence of harbor porpoise bycatch. Likewise, harbor porpoise bycatch rates in the vicinity of Tillies Bank have been substantially lower than elsewhere in the Jeffreys Ledge Band. Sea sampling efforts have confirmed that this pattern has not changed, prompting no areal modifications at this time.

Information on the use of pingers (Appendix IV) collected during the 1994 experiment, which tested the effectiveness of pingers, and in the 1995 experimental fishery (Appendix IV) which evaluated the use of acoustic devices on an operational basis, indicated that in November and December the porpoise bycatch in the Mid-coast area was reduced to levels close to zero. No analyses of pinger use have been undertaken in the September/October period although the prosecution of the fishery and catch composition appear to be similar to the November/December period. The recommendation for pinger use during the period September 15 through October 31 in an experimental fishery or as a requirement stipulated by regulation, therefore, may be a matter contingent on administrative procedures and enforceability rather than analyses of the existing information.

## 4.0 Alternatives to the Proposed Action

### 4.1 No Action

The time and area closure restrictions described in Framework Adjustment 12 to the Multispecies Plan applied to sink gillnets for November and December in 1995 only. Without further action, the closure period would default to the Framework 4 measures --- closure for the month of November in the Mid-coast Area, exclusive of the Jeffreys Ledge Band. The result of this action in 1994 produced no reduction in byctach levels because of effort displacement into the areas not covered by the closure and a high bycatch during the month of October when animals were moving southward through the Mid-coast Area.

### 4.2 Other Alternatives

<u>Marine Mammal Committee Recommendation</u>

The Marine Mammal Committee recommended a framework adjustment that would modify the timing of the Mid-coast Closure Area and asked the Regional Director to investigate additional fishing opportunities by considering experimental

work on the use of pingers in the gillnet fishery. Experimental fisheries took place under the auspices of NMFS in fall, 1995, and in 1996 in the spring to study the use of pingers outside of a structured experiment and to evaluate any seasonal variations in the results. The purpose was to determine if pingers, when used in a commercial operation, would continue to demonstrate the bycatch reduction effects shown in the 1994 pinger experiment. No porpoise were taken on observed or unobserved trips in the fall experimental fishery (See Appendix IV).

Council Recommendation

Because of the successful replication of the 1994 results in the 1995 fall experimental fishery, an possible alternative was approved at the June 5-6 Council meeting which proposed that gillnet vessels deploy pingers as a requirement of fishing in the Mid-coast Area. Pinger use would mirror the conditions and standards outlined for the 1995 experimental fishery and in accordance with all other stipulations required by NMFS relative to reporting, monitoring and enforcement. The question of whether the use of pingers should be a requirement for fishing in the Mid-coast Area or a condition of an additional experimental fishery was left to the discretion of the Regional Director.

## 5.0 Environmental Assessment

### 5.1 Purpose and Need for the Proposed Action

See Section 2.0 of this document.

### 5.2 Description of Proposed and Alternative Actions

See Section 3.0 and 4.0 of this document.

### 5.3 Description of the Physical Environment

**Habitat**: See Volume I, Final Environmental Impact Statement (FSEIS) for Amendment #5 to the Northeast Multispecies FMP, Section E.6.2, page 105 for a description of the Gulf of Maine.

### 5.4 Description of the Biological Environment

**Marine Mammals and Endangered Species:** See Volume I, FSEIS for Amendment #5 to the Northeast Multispecies FMP, Section E.6.3, pages 167-168 for a listing of affected species and the associated National Marine Fisheries Service (NMFS) Biological Opinion issued on November 30, 1993; and Volume I, SEIS for Amendment #7 to the FMP, E.6.3.4, pages 116-118 and the associated NMFS Biological Opinion issued on February 16, 1996.

## 5.5 Description of the Human Environment

**Gillnet Fishery:** See Volume I, FSEIS for Amendment #5 to the Northeast Multispecies FMP, Section E.6.4, pages 176-177 for a description of the New England fleet; and Volume 1, SEIS for Amendment #7 to the FMP, Section E.6.4.1, pages 119-121.

**Social and Cultural Aspects:** See Volume I, FSEIS for Amendment #5 to the Northeast Multispecies FMP, Section E.6.4.3. and Volume 1, SEIS for Amendment #7 to the FMP, Section E6.4.3, pages 169-179.

## 5.6 Biological Impacts

Impacts of the Proposed Action on Endangered Species: The Council discussed the biological impacts of Amendment #5, as reported in Section E.7.1 of the FSEIS, pages 310-322 and the SEIS for Amendment #7, Section E.7.1.2, pages 213-215. NMFS also issued Biological Opinion, most recently in February, 1996. NMFS concluded that existing fishing activities and related Amendment #5 management measures were not likely to jeopardize the continued existence of any threatened or endangered species. The time/area closures were discussed but had not been developed at the time of the consultation, but the impacts of Frameworks 4, 12 and 14 were discussed in each of those documents.

The most common endangered species to inhabit the proposed closed areas are right, humpback and fin whales. The period of highest use for these species in this area is spring and early summer and not during the October through December period (See Framework 4) when concentrated gillnet activity would most likely occur. Therefore, the probability of entanglements will not change from that described in the 1996 Biological Opinion. Because of the restrictive management regime now affecting the gillnet fleet as result of Amendment #7, incidental takes may be further reduced from present levels. The Council also has included language in the amendment to allow the closure of areas to protect marine mammals in addition to harbor porpoise. Therefore, the probability of whale entanglements will not change from levels determined in the Biological Opinion. Accordingly, the proposed action will not likely jeopardize the continued existence of any endangered or threatened species. This framework adjustment should not alter the basis for the NMFS Biological Opinion. With the submission of this assessment, the Council seeks the concurrence of NMFS.

Impacts of the Proposed Action on Harbor Porpoise: Porpoise closure periods associated with Amendments #5 and #7 were selected by identifying times and areas which exhibited high bycatch rates relative to "outside" areas in which there were either very low rates or no observed takes at all. On average, bycatch per haul in the vicinity of the Mid-coast Area appears highest in October and November. The rates in

September and December are similar. The estimated differences between months are not as great as between zones (Mid-coast Area and Jeffreys Ledge Band) or years, although these conclusions could be substantially affected by sampling variability. No harbor porpoise bycatch has been observed in the Tillies Bank area despite the potential for effort displacement into the area. Similarly, porpoise takes have not occurred in Jeffreys Ledge Band, between 69°30'W and 69°00'W (See Framework 12). With the implementation of this and previous Council actions the bycatch of porpoise in the sink gillnet fishery is expected to be reduced from levels most recently reported by the NEFSC.

**Impacts of Alternatives**

One alternative scenario would be to take no further action beyond the 1995 closure of the Mid-coast area. This would result in a failure to further reduce porpoise mortality rates and the likelihood that PBR levels would be achieved by spring, 1997. Differences in the impacts of an experimental fishery sanctioning pinger use and the use of acoustic devices as a requirement of fishing in the closure area are probably slight. The 1994 experiment and the 1995 experimental fishery produced very similar results, a decrease in bycatch without any known negative consequences to porpoise or other marine mammals. The Council's action should provide an effective means of reducing porpoise incidental takes during the entire fall period when bycatch has, historically, been higher than all other areas.

**5.7 Economic Impacts**

Sink gillnets capture a substantial amount of pollock, cod and white hake, several other groundfish species, and other species such as dogfish and monkfish (goosefish). Over ninety percent of gillnet vessels are less than 50 gross tons and use other gear for about 20 percent of the year, usually otter trawls and shrimp trawls, and to some extent hook gear. According to commercial fisheries data more than 42 percent of gillnetters fished in more than one statistical area compared to 24 percent 10 years ago. Annual revenues for the period 1987 through 1992 from gillnetting averaged about $60,000 for vessels less than 50 tons and about $83,000 for vessels larger than 50 tons. Individual vessels may have earned substantially more or less than the average. Average crew sizes range from about 2.7 for smaller vessels to about 4 for vessels over 50 tons.

The economic impact of the proposed measures will vary depending on the pinger usage and the extent of revenue replacement from other areas. If vessels do not use pingers and do not fish during the closures in the protected and/or other areas -- a worst case assumption -- vessel profits may decline by about $1 million, crew shares by $500,000 and the producer surplus by $1.4 million (for the fleet as a whole). It is reasonable to assume, however, that some vessels will choose to fish by equipping their nets with pingers since the loss of gross stock from not fishing during the closures exceeds the cost of pingers. For example, if 50 percent of the vessels fish with

pingers, the reduction in profits will be $586,018 instead of $1 million (again for the fleet as a whole). Similarly, use of pingers will lower the reduction in crew shares to $231,740 and the producer surplus to $817,758 compared to not fishing in the protected areas.

The economic benefits to consumers and producers are measured by the changes in consumer and producer surpluses with and without the proposed extension in the timing of closures. The cost of pingers is taken into account in estimating the changes in producer surplus with this adjustment. Because of the uncertainties about harbor porpoise mortality, pinger usage, and effort displacement, however, it is not possible to determine precisely the net benefits of this framework adjustment. The cost-benefit analysis (Appendix II) demonstrates that the net economic impacts can be negative or positive depending on the actual values of mortality reduction, pinger usage and revenue replacement. For example, given a one percent reduction in mortality, a 25 percent revenue recovery and pinger usage by 50 percent of vessels, there will be a small loss of $174,879 in benefits under the proposed action. A five percent reduction in harbor porpoise mortality, however, would generate a $1.3 million in net benefits if 25 percent of the revenue is obtained by switching to other fisheries and if 75 percent of the vessels use pingers.

The cost-benefit analysis contained in Appendix II provides a complete discussion of the results and the method used to evaluate the net economic benefits of this framework.

### 5.8 Social Impacts

The social impacts of 50 percent effort and fishing mortality reductions in the Northeast Multispecies fishery are described in Volume I, FSEIS for Amendment #5, Section E.7.4. and in Volume I, SEIS for Amendment #7, Section E.7.2. Because the proposed action has a more positive impact on the gillnet fishery than the range of alternatives described in Amendments #5 and #7, the proposed action is fully within the scope of the impacts described both documents.

### 5.9 Finding of No Significant Environmental Impact (FONSI)

NOAA Administrative Order 216-6 provides guidance for the determination of significance of the impacts of fishery management plans and amendments. The five criteria to be considered are addressed below.

1) Can the proposed action be reasonably expected to jeopardize the long-term productive capability of any stocks that may be affected by the action?
One of the principal objectives of Amendments #7 is to reduce the bycatch of harbor porpoise in the sink gillnet fishery. To the extent that the proposed action is effective, the Council expects to protect the Gulf of Maine/Bay of Fundy porpoise population by reducing interactions with commercial fishing

vessels to a level that is sustainable. Other marine mammal stocks could be affected by a displacement of effort resulting from the constraints on gillnet fishing, but the fleet is still subject to monitoring by onboard observers under the terms of the 1994 MMPA reauthorization. Any increased bycatch of other species, therefore, will be reported and subject to the provisions of the MMPA.

2) Can the proposed action be reasonably expected to allow substantial damage to the ocean and coastal habitats?

The proposed action which limits the bycatch of harbor porpoise is not expected to affect coastal or ocean habitat since the management measures will result is a reduction in fishing gear use.

3) Can the proposed action be reasonably expected to have an adverse impact on public health or safety?

The measure is not expected to have any impact on public health or safety.

4) Can the proposed action be reasonably expected to have an adverse effect on endangered or threatened species or marine mammal populations?

The NMFS Biological Opinion for Amendments #5 and #7, issued under authority of Section 7(a)(2) of the Endangered Species Act indicated that the "existing fishing activities and related management measures proposed . . . are not likely to jeopardize the continued existence of any threatened or endangered species under [NMFS] jurisdiction." The proposed measure does not change that finding.

5) Can the proposed action be reasonably expected to result in cumulative adverse effects that could have a substantial effect on the target resource species or any related stocks that may be affected?

The proposed action is intended to be a part of the overall groundfish management program implemented through Amendment #7. As such, the cumulative effect is expected to be consistent with that of the Multispecies FMP. The proposed action is not expected to add to the effect of the FMP on other stocks.

The guidelines on the determination of significance also identify two other factors to be considered: degree of controversy and socio-economic effects. The socio-economic impacts and the scope of the proposed action fall within the range of impacts and the scope of the harbor porpoise and groundfish catch reductions analyzed in Amendments #5 and #7, and in Frameworks 4 and 12 and 14 to the Northeast Multispecies FMP. The proposed action, therefore, does not have significant impacts beyond those already analyzed.

The time/area closure issue has been debated, but the degree of controversy has been minimal in that most fishermen agree that action to protect harbor porpoise is necessary. It has also been agreed that it is one of very few tools currently available to managers, although it is hoped that acoustic deterrents continue to show promise.

According to NAO 216-6, no action should be deemed significant solely on the basis of its controversial nature, but that the degree of controversy should be considered in determining the level of analysis needed to comply with NEPA regulations. Based on this guidance and the evaluation of the preceding criteria, the Council proposes a finding of no significant impact.

**FONSI Statement**

In view of the analysis presented in this document and in the FSEIS for Amendments #5 and #7 to the Northeast Multispecies Fishery Management Plan, it is hereby determined that the proposed action would not significantly affect the quality of the human environment with specific reference to the criteria contained in NDM 02-10 implementing the National Environmental Policy Act. Accordingly, the preparation of a Supplemental Environmental Impact Statement for this proposed action is not necessary.

_____ _____

Assistant Administrator for Fisheries, NOAA — Date

## 6.0 Applicable Law

### 6.1 Magnuson Fishery Conservation and Management Act Consistency with National Standards

See pages 52-57, Volume I of Amendment #5 and Volume I, Amendment #7, pages 47-51 to the Northeast Multispecies FMP for a summary of the Council's determination of consistency with the National Standards. This framework adjustment is a change to the rules promulgated under those amendments. The Council does not find cause to reconsider that earlier determination.

### 6.2 National Environmental Policy Act (NEPA)

There are no economic and social impacts from this action beyond the extent of those identified and discussed in the FSEIS included in Amendment #5, the SEIS for Amendment #7 and the Environment Assessment contained in this document. The economic and social impacts of the proposed action are indeterminate.

### 6.3 Regulatory Impact Review

This section provides the information necessary for the Secretary of Commerce to address the requirements of Executive Order 12866, the Regulatory Flexibility Act and the National Environmental Policy Act. The purpose and need for management (statement of the problem) is described in Section 2.0 of this document. The alternative management measures to the proposed regulatory action are described in Section 4.0. The economic and social impact analysis is contained in Sections 5.7 and 5.8 and is summarized below. Other elements of the Regulatory Impact Review are included below.

### 6.4 Executive Order 12866

The proposed action does not constitute a significant regulatory action under Executive Order 12866. (1) It will not have an annual effect on the economy of more than $100 million (See Tables 2-5 in Appendix II). (2) The proposed action will not adversely affect in a material way the economy, productivity, competition and jobs. (3) It will not affect competition, jobs, the environment, public health or safety, or state, local or tribal governments and communities. (4) The proposed action will not create an inconsistency or otherwise interfere with an action taken or planned by another agency. No other agency has indicated that it plans an action that will affect this fishery. (5) The proposed action will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of their recipients. (6) The proposed action does not raise novel legal or policy issues. Time/area closures have long been used to manage fisheries in the Northeast.

### 6.5 Regulatory Flexibility Act

The proposed action does not require a regulatory flexibility analysis because it does not affect more than 20 percent of the small business entities in the multispecies fishery. In 1993, NMFS issued 4,442 multispecies permits. Of these, 442 were issued to gillnet vessels and it is estimated during 1993 only 52 vessels (or 1.2 percent) fished in the area to be closed from September 15 through October 31 (Appendix II, Section 3.2).

### 6.6 Marine Mammal Protection Act and Endangered Species Act

An adequate discussion of protected species is contained in Section E.6.3.4, Endangered Species and Marine Mammals, Volume I of the Amendment #5 FEIS to the Northeast Multispecies FMP, in Volume I of the Amendment #7 SEIS and the associated NMFS Biological Opinions issued in November 1993 and February, 1996.

### 6.7 Coastal Zone Management Act (CZMA)

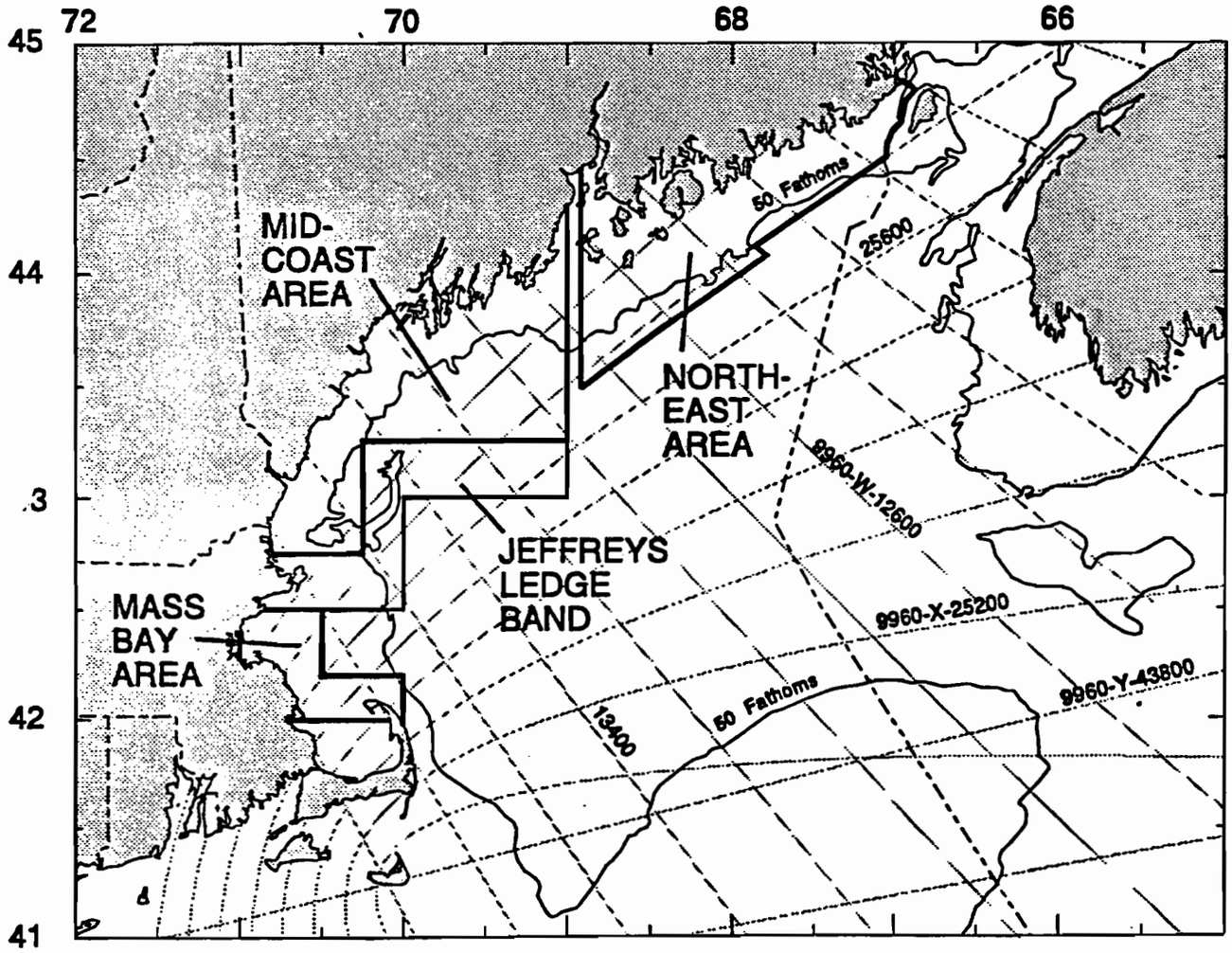
See Section 8.5, Volume IV of Amendment #5 and Section 8.5, Volume I, SEIS for Amendment #7 to the Northeast Multispecies FMP.

### 6.8 Paperwork Reduction Act (PRA)

Copies of the PRA analysis for Amendments #5 and #7 to the Northeast Multispecies FMP are available from the NMFS Regional Office, Gloucester, Massachusetts. No new collection of information is required.

# Appendices 7.0

# Appendix I
# Biological Analyses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# September 1995
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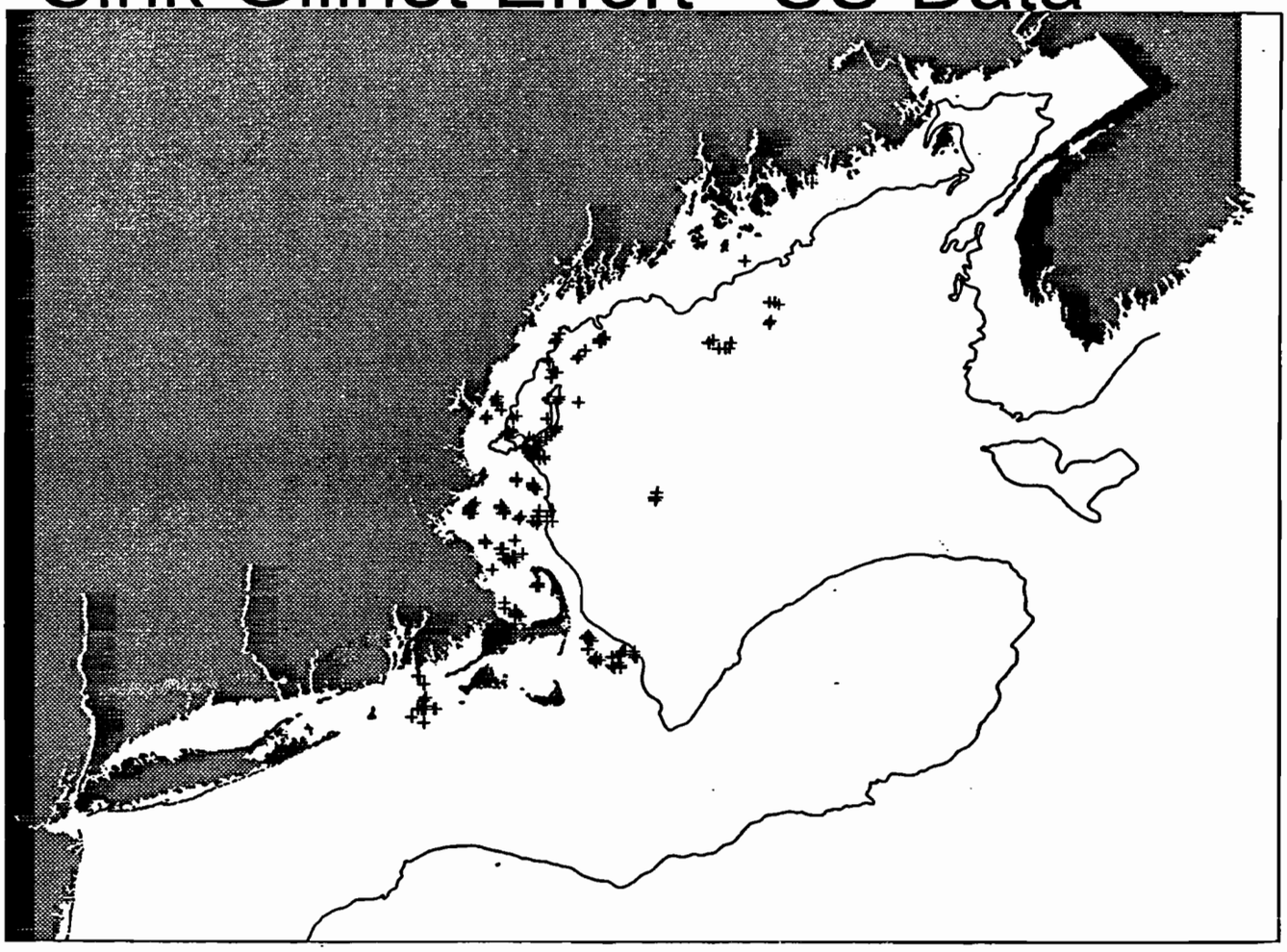

+ = observed hauls

Sea sampler effort was dedicated to collecting marine mammal data

Sea sampler effort was dedicated to collecting fisheries data

month9 by hapo
+0 (51)

month9 by hapo
+0 (235)

# October 1995
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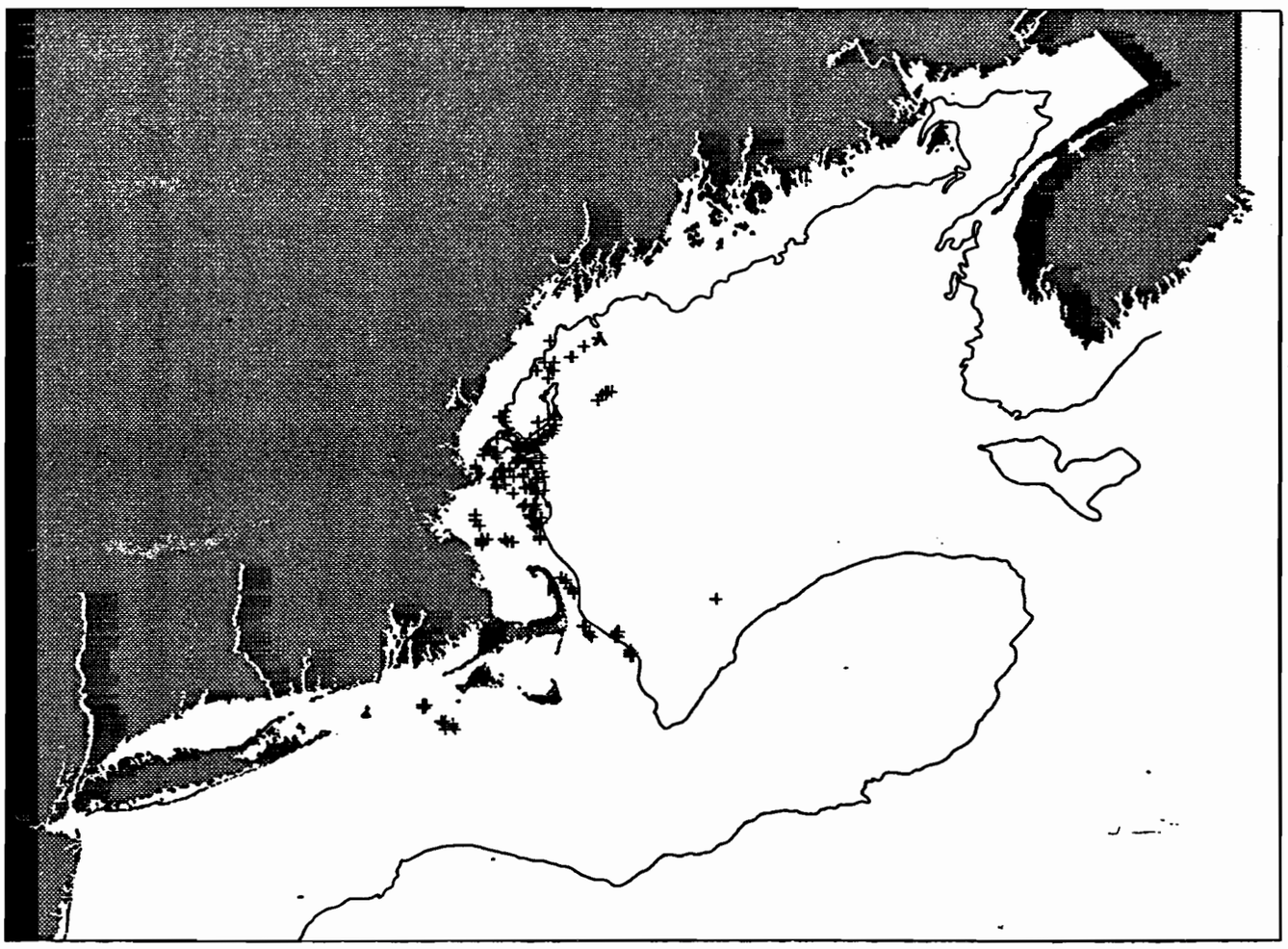
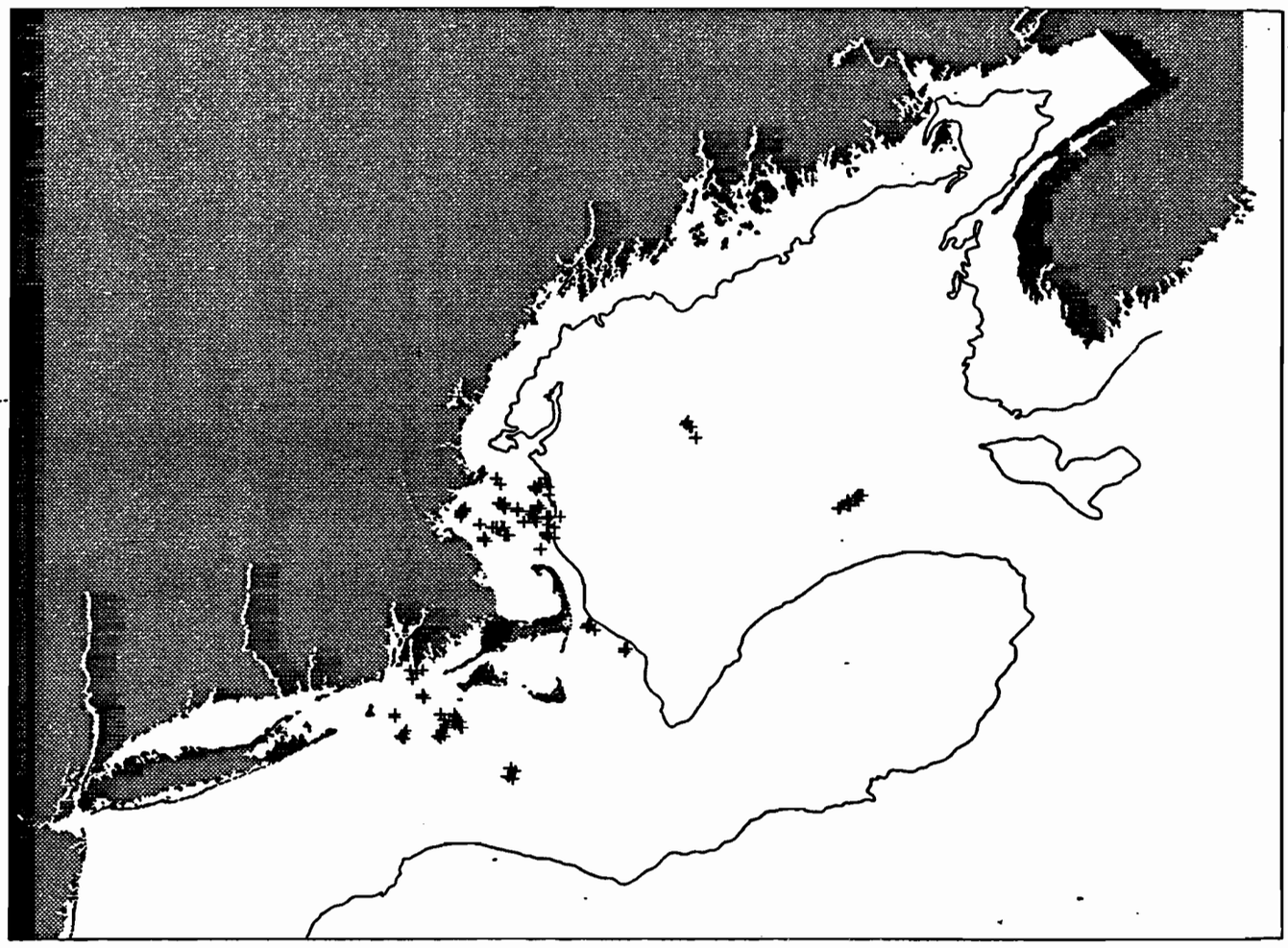


+ = observed haul
^ = haul with porpoise take

| month10 by hapo | |
|---|---|
| + 0 | (291) |
| ^ 1 | (6) |
| month10 . by hapo | |
| + 0 | (51) |
| ^ 1 | (5) |

# November 1995
# Sink Gillnet Effort - SS Data



closure in effect
Nillies Bank open

month11 by hapo
+ 0 (302)
▲ 1 (2)
month11 by hapo
+ 0 (74)

# December 1995
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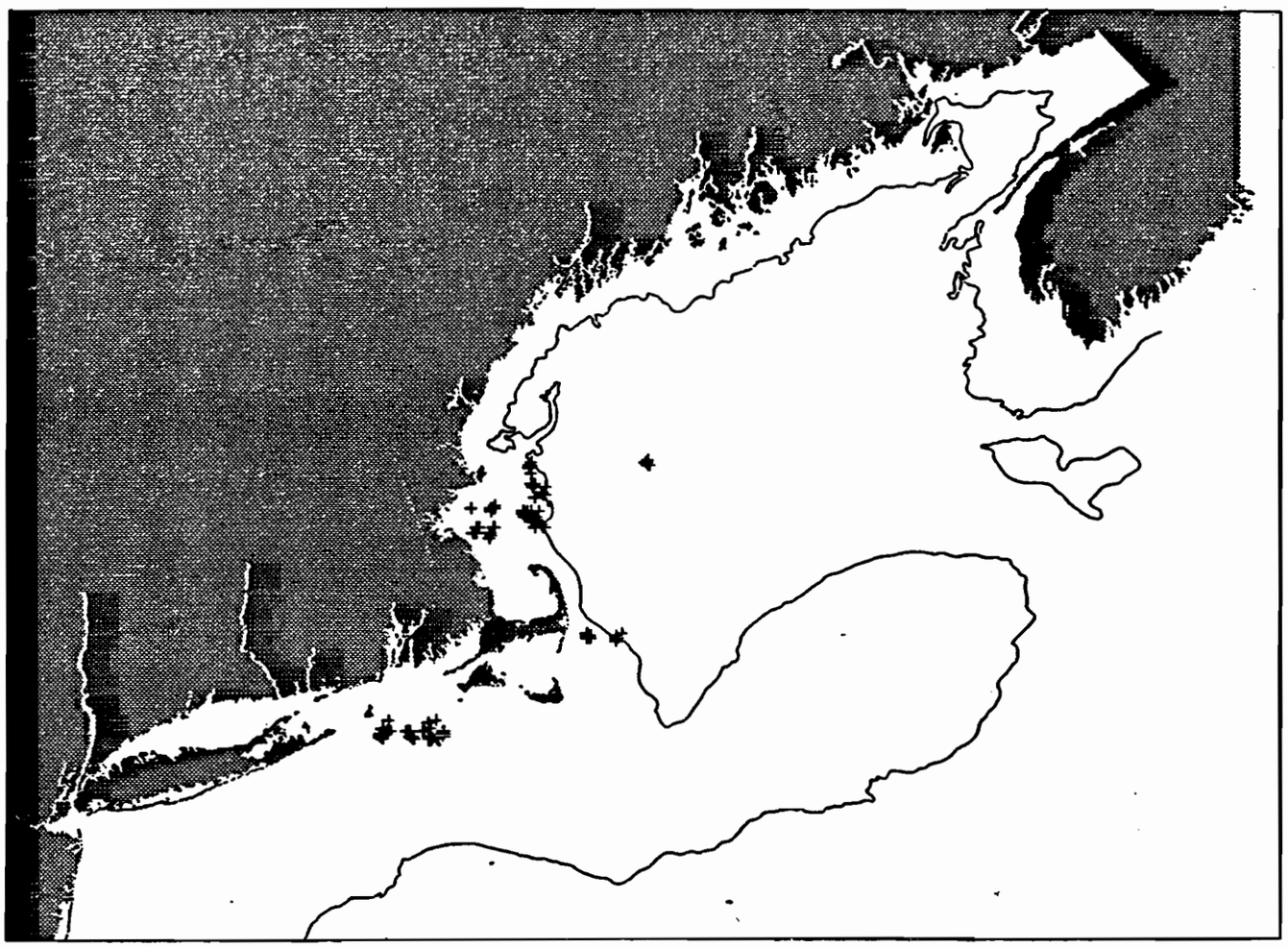


closure in effect
Tillies Bank open

month12 by hapo
+0 (110)
month12 by hapo
+0 (63)
A1 (1)

## TRENDS ANALYSIS FOR MIDCOAST REGION

PURPOSE: Investigate general trends in harbor porpoise bycatch rates.
Compare annual, monthly, and areal patterns.

DATA: Sea sampling data.
Bycatch rate = number porpoises caught per haul.
1990-1995.
September to December.
Inside old Midcoast region, Z-band, and outside these two regions.

Reference point is September 1991 inside the Midcoast region.

**Estimated effect of year on bycatch rates relative to 1991. Standard error (SE) summarize the uncertainty in each estimate of mean effect compared with its reference year.**

| YEAR | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|
| Effect (%) | 217 | 100 | 96 | 86 | 325 | 84 |
| SE | 168 | - | 56 | 49 | 133 | 54 |

RESULTS: The bycatch rate varies greatly between years. 1994 had the highest bycatch rate, which was 3.25 times greater than 1991. 1993 and 1995 had the lowest bycatch rates, which were about 85% of the bycatch rate observed in 1991. 1995 is statistically different than 1994, but not different than 1991, 1992, and 1993.

**Estimated effect of month on bycatch rates relative to September. Standard error (SE) summarize the uncertainty in each estimate of mean effect compared with the reference month.**

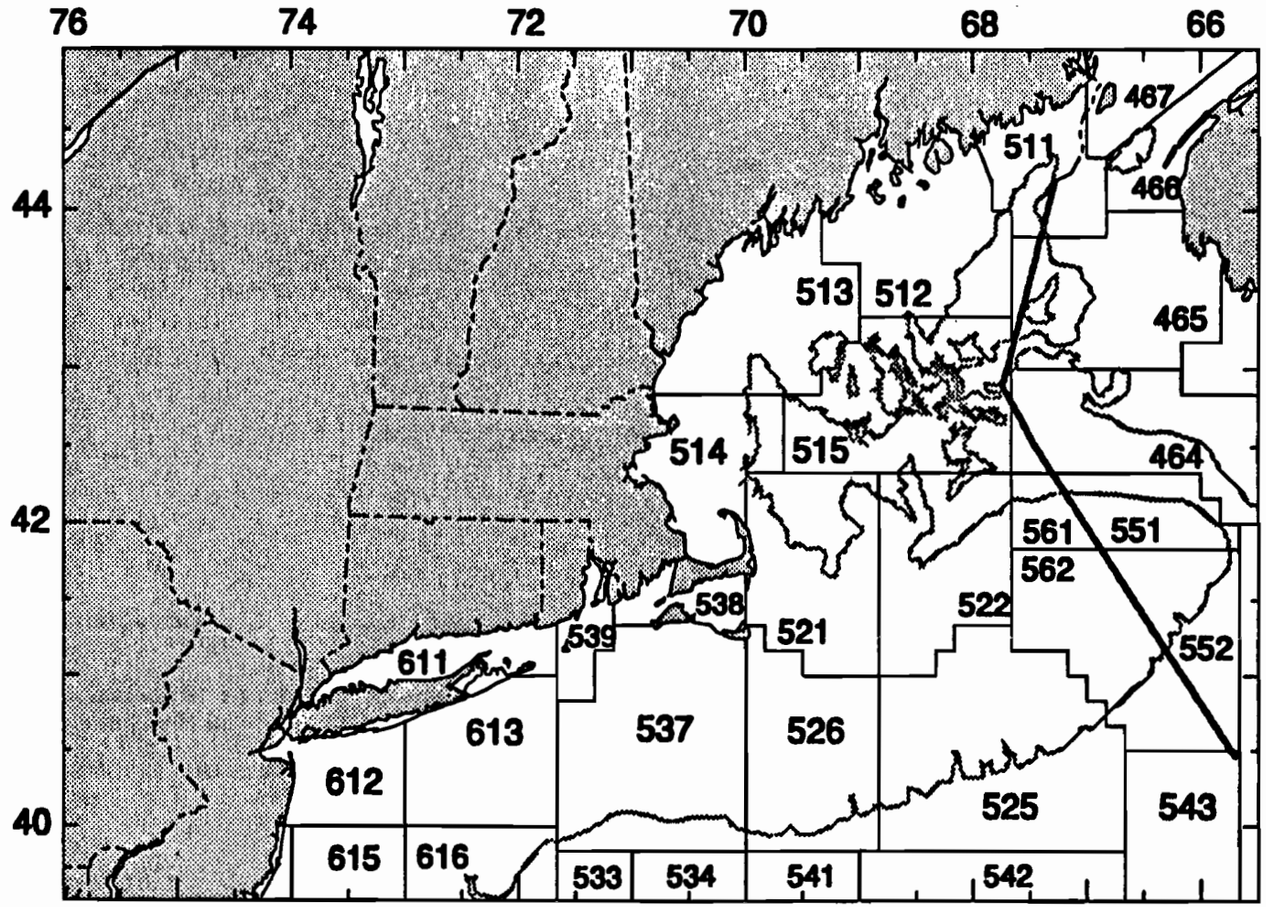
| Month | Sept | Oct | Nov | Dec |
|---|---|---|---|---|
| Effect (%) | 100 | 145 | 165 | 102 |
| SE | - | 53 | 68 | 62 |

RESULTS: Bycatch rates observed in October and November were about 1.5 times higher than bycatch rates observed in September and December, though these differences are not statistically different.

**Estimated effect of area on bycatch rates relative to inside the old Midcoast region. Standard error (SE) summarize the uncertainty in each estimate of mean effect compared with its reference area.**

| AREA | Inside Midcoast | Z-band | Outside |
|---|---|---|---|
| Effect (%) | 100 | 30 | 4 |
| SE | - | 10 | 4 |

RESULTS: Bycatch rates observed in the Midcoast region were much higher than the Z-band and Outside areas, these differences are statistical significant. The bycatch rate of the Z-band is intermediate to the Midcoast and outside region




Northeast Statistical Areas (100 Fathom line shown in gray)

Timing harbor porpoises were caught during fall 1995

| MONTH | DAY | AREA | LATITUDE | LONGITUDE |
|---|---|---|---|---|
| Oct | 12 | 513 | 43° 29 | 69° 39 |
| | 17 | 513 | 42° 50 | 70° 19 |
| | 17 | 513 | 42° 50 | 70° 15 |
| | 18 | 513 | 43° 02 | 70° 01 |
| | 20 | 514 | 42° 49 | 70° 11 |
| | 20 | 513 | 42° 50 | 70° 20 |
| | 25 | 513 | 42° 50 | 70° 16 |
| | 31 | 514 | 42° 49 | 70° 17 |
| | 31 | 513 | 42° 50 | 70° 13 |
| | 31 | 513 | 42° 50 | 70° 13 |
| | 31 | 514 | 42° 49 | 70° 13 |
| Nov | 3 | 514 | 42° 19 | 70° 29 |
| | 3 | 514 | 42° 19 | 70° 29 |
| Dec | 15 | 537 | 41° 01 | 71° 02 |

MONTH=9

| OBS | DAY | YEAR | AREA | HAPO | LAT | LON |
|---|---|---|---|---|---|---|
| 1 | 8 | 94 | 513 | 2 | 4328 | 6941 |
| 2 | 8 | 94 | 513 | 1 | 4328 | 6941 |
| 3 | 9 | 94 | 513 | 2 | 4329 | 6938 |
| 4 | 10 | 94 | 513 | 1 | 4329 | 6938 |
| 5 | 10 | 94 | 513 | 1 | 4329 | 6938 |
| 6 | 11 | 94 | 513 | 3 | 4328 | 6941 |
| 7 | 11 | 94 | 513 | 1 | 4328 | 6941 |
| 8 | 13 | 94 | 513 | 1 | 4326 | 6958 |
| 9 | 14 | 94 | 513 | 1 | 4320 | 7002 |
| 10 | 19 | 94 | 513 | 1 | 4317 | 7002 |
| 11 | 21 | 94 | 513 | 1 | 4252 | 7038 |
| 12 | 21 | 94 | 513 | 1 | 4252 | 7029 |
| 13 | 22 | 94 | 513 | 1 | 4303 | 7029 |
| 14 | 22 | 94 | 513 | 2 | 4304 | 7028 |
| 15 | 22 | 94 | 513 | 3 | 4256 | 7029 |
| 16 | 22 | 94 | 513 | 1 | 4256 | 7029 |
| 17 | 27 | 93 | 513 | 1 | 4334 | 6917 |
| 18 | 29 | 93 | 513 | 1 | 4335 | 6919 |
| 19 | 29 | 93 | 513 | 1 | 4336 | 6917 |
| 20 | 30 | 93 | 513 | 2 | 4334 | 6917 |
| 21 | 30 | 94 | 514 | 1 | 4249 | 7019 |
| 22 | 30 | 94 | 514 | 1 | 4248 | 7017 |

MONTH=10

| OBS | DAY | YEAR | AREA | HAPO | LAT | LON |
|---|---|---|---|---|---|---|
| 23 | 02 | 90 | 513 | 1 | 4328 | 7004 |
| 24 | 03 | 92 | 513 | 1 | 4253 | 7009 |
| 25 | 07 | 92 | 513 | 2 | 4331 | 6938 |
| 26 | 07 | 94 | 513 | 1 | 4256 | 7002 |
| 27 | 07 | 94 | 513 | 1 | 4253 | 7008 |
| 28 | 11 | 93 | 513 | 1 | 4329 | 6939 |
| 29 | 11 | 94 | 513 | 1 | 4257 | 7020 |
| 30 | 11 | 94 | 513 | 1 | 4253 | 7007 |
| 31 | 12 | 94 | 513 | 1 | 4250 | 7012 |
| 32 | 13 | 94 | 513 | 2 | 4252 | 7009 |
| 33 | 13 | 94 | 514 | 1 | 4245 | 7019 |
| 34 | 14 | 92 | 513 | 1 | 4325 | 6958 |
| 35 | 14 | 93 | 513 | 2 | 4329 | 6939 |
| 36 | 14 | 94 | 513 | 1 | 4250 | 7013 |
| 37 | 14 | 94 | 513 | 1 | 4252 | 7011 |
| 38 | 14 | 94 | 513 | 1 | 4257 | 7022 |
| 39 | 14 | 94 | 514 | 1 | 4249 | 7019 |
| 40 | 14 | 94 | 514 | 1 | 4249 | 7016 |
| 41 | 15 | 93 | 513 | 1 | 4331 | 6957 |
| 42 | 16 | 93 | 513 | 1 | 4320 | 7014 |
| 43 | 18 | 94 | 513 | 2 | 4253 | 7025 |
| 44 | 18 | 94 | 513 | 1 | 4255 | 7026 |
| 45 | 18 | 94 | 513 | 1 | 4250 | 7012 |
| 46 | 19 | 92 | 513 | 1 | 4307 | 7002 |
| 47 | 19 | 94 | 513 | 1 | 4251 | 7010 |
| 48 | 19 | 94 | 514 | 1 | 4249 | 7016 |
| 49 | 20 | 94 | 513 | 1 | 4251 | 7020 |
| 50 | 22 | 90 | 514 | 1 | 4248 | 7017 |
| 51 | 23 | 91 | 513 | 1 | 4325 | 7003 |
| 52 | 23 | 92 | 513 | 1 | 4330 | 6938 |
| 53 | 23 | 94 | 513 | 1 | 4300 | 7000 |
| 54 | 23 | 94 | 513 | 1 | 4301 | 7002 |
| 55 | 23 | 94 | 513 | 1 | 4252 | 7011 |
| 56 | 23 | 94 | 513 | 1 | 4253 | 7010 |
| 57 | 23 | 94 | 513 | 1 | 4253 | 7009 |
| 58 | 23 | 94 | 513 | 3 | 4253 | 7036 |
| 59 | 23 | 94 | 513 | 1 | 4258 | 7032 |
| 60 | 23 | 94 | 513 | 1 | 4259 | 7031 |
| 61 | 23 | 94 | 513 | 1 | 4252 | 7008 |
| 62 | 24 | 93 | 513 | 1 | 4325 | 7004 |
| 63 | 24 | 93 | 513 | 1 | 4307 | 6935 |
| 64 | 24 | 94 | 513 | 1 | 4250 | 7020 |
| 65 | 24 | 94 | 514 | 1 | 4247 | 7017 |
| 66 | 24 | 94 | 514 | 2 | 4247 | 7018 |
| 67 | 25 | 90 | 514 | 2 | 4246 | 7030 |
| 68 | 25 | 93 | 513 | 1 | 4329 | 6939 |
| 69 | 25 | 94 | 513 | 2 | 4252 | 7029 |
| 70 | 25 | 94 | 514 | 1 | 4246 | 7016 |
| 71 | 26 | 94 | 513 | 1 | 4257 | 7025 |
| 72 | 26 | 94 | 513 | 1 | 4305 | 7003 |
| 73 | 26 | 94 | 513 | 1 | 4255 | 7029 |
| 74 | 26 | 94 | 514 | 1 | 4249 | 7014 |
| 75 | 27 | 91 | 513 | 1 | 4301 | 7002 |
| 76 | 27 | 94 | 513 | 3 | 4250 | 7016 |
| 77 | 29 | 93 | 513 | 1 | 4309 | 7000 |
| 78 | 29 | 94 | 514 | 1 | 4249 | 7017 |
| 79 | 30 | 92 | 513 | 1 | 4252 | 7029 |
| 80 | 30 | 94 | 513 | 1 | 4259 | 7001 |
| 81 | 31 | 94 | 513 | 1 | 4305 | 7003 |

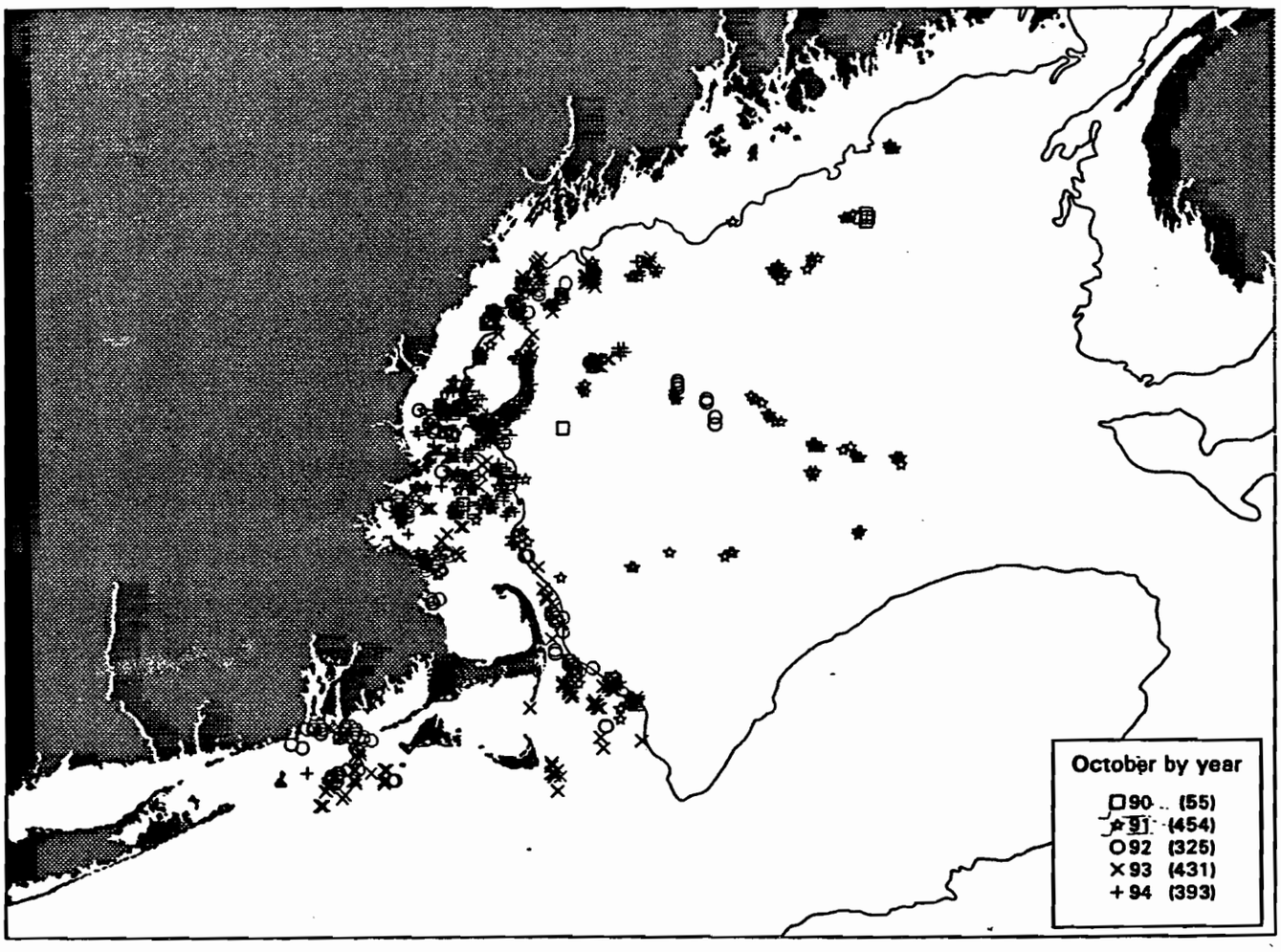
MONTH=11

| OBS | DAY | YEAR | AREA | HAPO | LAT | LON |
|---|---|---|---|---|---|---|
| 82 | 02 | 90 | 514 | 1 | 4246 | 7018 |
| 83 | 02 | 91 | 513 | 1 | 4302 | 7002 |
| 84 | 02 | 93 | 513 | 1 | 4301 | 7002 |
| 85 | 02 | 94 | 513 | 1 | 4254 | 7024 |
| 86 | 04 | 94 | 513 | 1 | 4250 | 7019 |
| 87 | 04 | 94 | 513 | 2 | 4301 | 7001 |
| 88 | 04 | 94 | 513 | 2 | 4301 | 7002 |
| 89 | 04 | 94 | 513 | 2 | 4253 | 7008 |
| 90 | 04 | 94 | 514 | 1 | 4249 | 7019 |
| 91 | 05 | 92 | 513 | 1 | 4329 | 6938 |
| 92 | 05 | 94 | 513 | 2 | 4251 | 7018 |
| 93 | 05 | 94 | 514 | 1 | 4225 | 7010 |
| 94 | 05 | 94 | 514 | 1 | 4249 | 7013 |
| 95 | 06 | 94 | 514 | 1 | 4246 | 7017 |
| 96 | 06 | 94 | 514 | 1 | 4247 | 7019 |
| 97 | 08 | 92 | 513 | 1 | 4308 | 7002 |
| 98 | 08 | 94 | 513 | 1 | 4251 | 7008 |
| 99 | 08 | 94 | 513 | 2 | 4250 | 7017 |
| 100 | 08 | 94 | 514 | 2 | 4249 | 7017 |
| 101 | 09 | 92 | 514 | 1 | 4242 | 7026 |
| 102 | 12 | 92 | 513 | 2 | 4252 | 7041 |
| 103 | 12 | 94 | 513 | 1 | 4255 | 7026 |
| 104 | 12 | 94 | 514 | 1 | 4249 | 7017 |
| 105 | 13 | 91 | 513 | 1 | 4302 | 7023 |
| 106 | 13 | 91 | 513 | 2 | 4328 | 7003 |
| 107 | 13 | 91 | 513 | 1 | 4329 | 6938 |
| 108 | 13 | 94 | 514 | 1 | 4249 | 7014 |
| 109 | 14 | 94 | 513 | 1 | 4250 | 7009 |
| 110 | 16 | 93 | 514 | 1 | 4226 | 7027 |
| 111 | 17 | 94 | 513 | 2 | 4250 | 7016 |
| 112 | 18 | 91 | 513 | 1 | 4252 | 7029 |
| 113 | 18 | 91 | 513 | 1 | 4253 | 7031 |
| 114 | 18 | 91 | 513 | 1 | 4304 | 7020 |
| 115 | 18 | 91 | 513 | 1 | 4329 | 6938 |
| 116 | 18 | 94 | 513 | 1 | 4251 | 7007 |
| 117 | 18 | 94 | 514 | 1 | 4249 | 7011 |
| 118 | 19 | 91 | 513 | 1 | 4326 | 7005 |
| 119 | 19 | 91 | 513 | 2 | 4302 | 7023 |
| 120 | 20 | 91 | 513 | 1 | 4307 | 7020 |
| 121 | 20 | 91 | 513 | 1 | 4332 | 6938 |
| 122 | 20 | 91 | 514 | 1 | 4249 | 7019 |
| 123 | 20 | 93 | 513 | 1 | 4310 | 6935 |
| 124 | 21 | 91 | 513 | 1 | 4250 | 7020 |
| 125 | 21 | 91 | 513 | 1 | 4258 | 7022 |
| 126 | 21 | 94 | 513 | 2 | 4253 | 7008 |
| 127 | 21 | 94 | 513 | 1 | 4255 | 7003 |
| 128 | 21 | 94 | 513 | 1 | 4250 | 7012 |
| 129 | 22 | 91 | 513 | 1 | 4253 | 7005 |
| 130 | 24 | 91 | 513 | 1 | 4253 | 7007 |
| 131 | 25 | 94 | 513 | 1 | 4254 | 7007 |
| 132 | 27 | 90 | 513 | 1 | 4324 | 7002 |
| 133 | 27 | 91 | 513 | 1 | 4313 | 7011 |
| 134 | 27 | 94 | 514 | 1 | 4249 | 7012 |
| 135 | 29 | 91 | 514 | 1 | 4248 | 7037 |
| 136 | 30 | 94 | 513 | 1 | 4250 | 7013 |

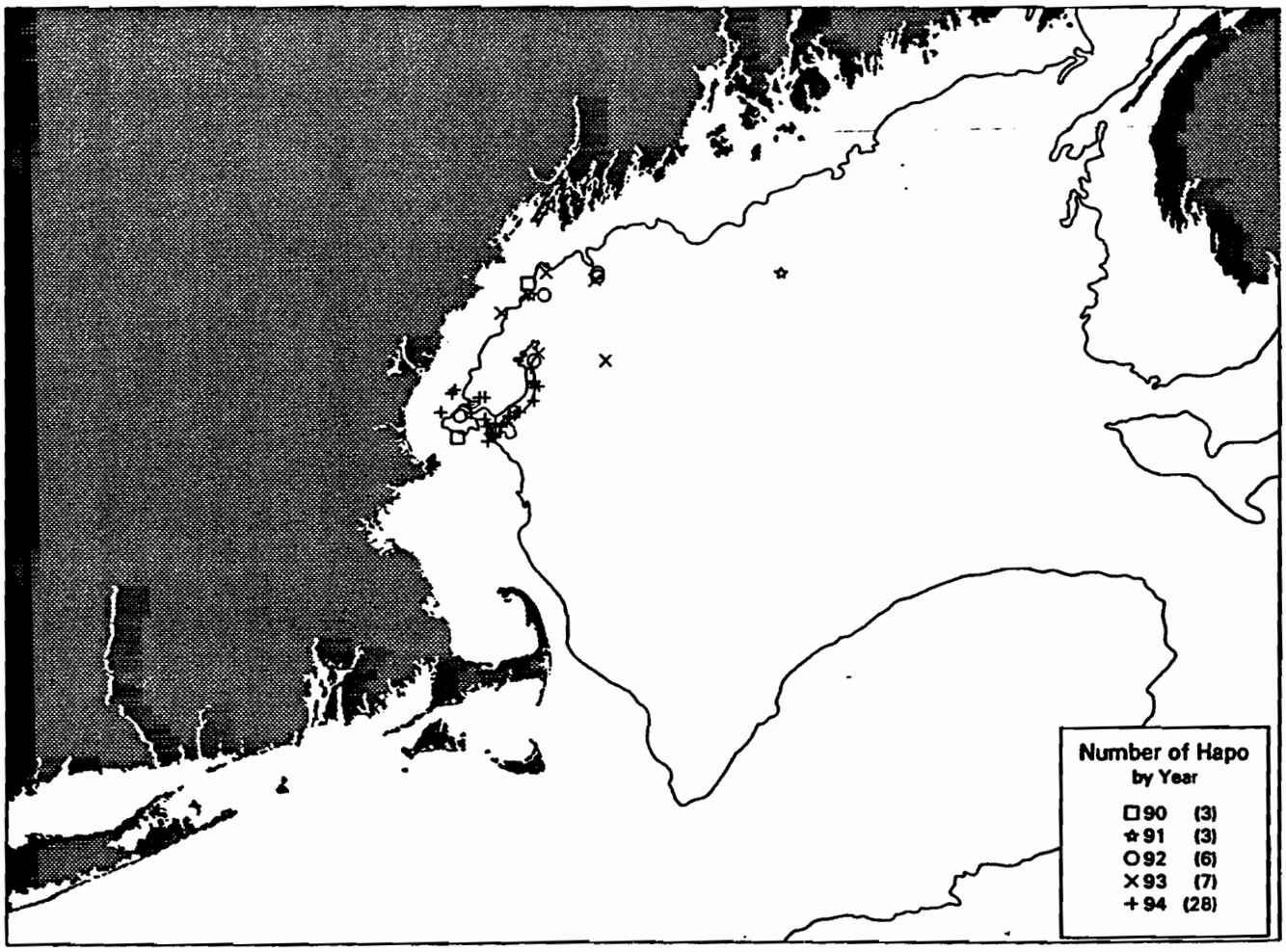
MONTH=12

| OBS | DAY | YEAR | AREA | HAPO | LAT | LON |
|---|---|---|---|---|---|---|
| 137 | 02 | 91 | 513 | 1 | 4253 | 7040 |
| 138 | 03 | 90 | 514 | 1 | 4222 | 7005 |
| 139 | 06 | 91 | 514 | 1 | 4241 | 7028 |
| 140 | 07 | 94 | 106 | 1 | 4218 | 7025 |
| 141 | 08 | 93 | 513 | 1 | 4327 | 6937 |
| 142 | 08 | 93 | 513 | 1 | 4328 | 6937 |
| 143 | 09 | 92 | 513 | 1 | 4329 | 6937 |
| 144 | 09 | 94 | 513 | 1 | 4253 | 7009 |
| 145 | 10 | 91 | 513 | 1 | 4300 | 7025 |
| 146 | 10 | 92 | 513 | 1 | 4329 | 6938 |
| 147 | 13 | 94 | 513 | 1 | 4251 | 7011 |
| 148 | 15 | 93 | 513 | 1 | 4327 | 6938 |
| 149 | 16 | 91 | 514 | 1 | 4241 | 7031 |
| 150 | 17 | 92 | 513 | 1 | 4300 | 7027 |

# October 1990 - 1994
# Sink Gillnet Effort SS Data



# October 1990 - 1994
# Harbor Porpoise Takes



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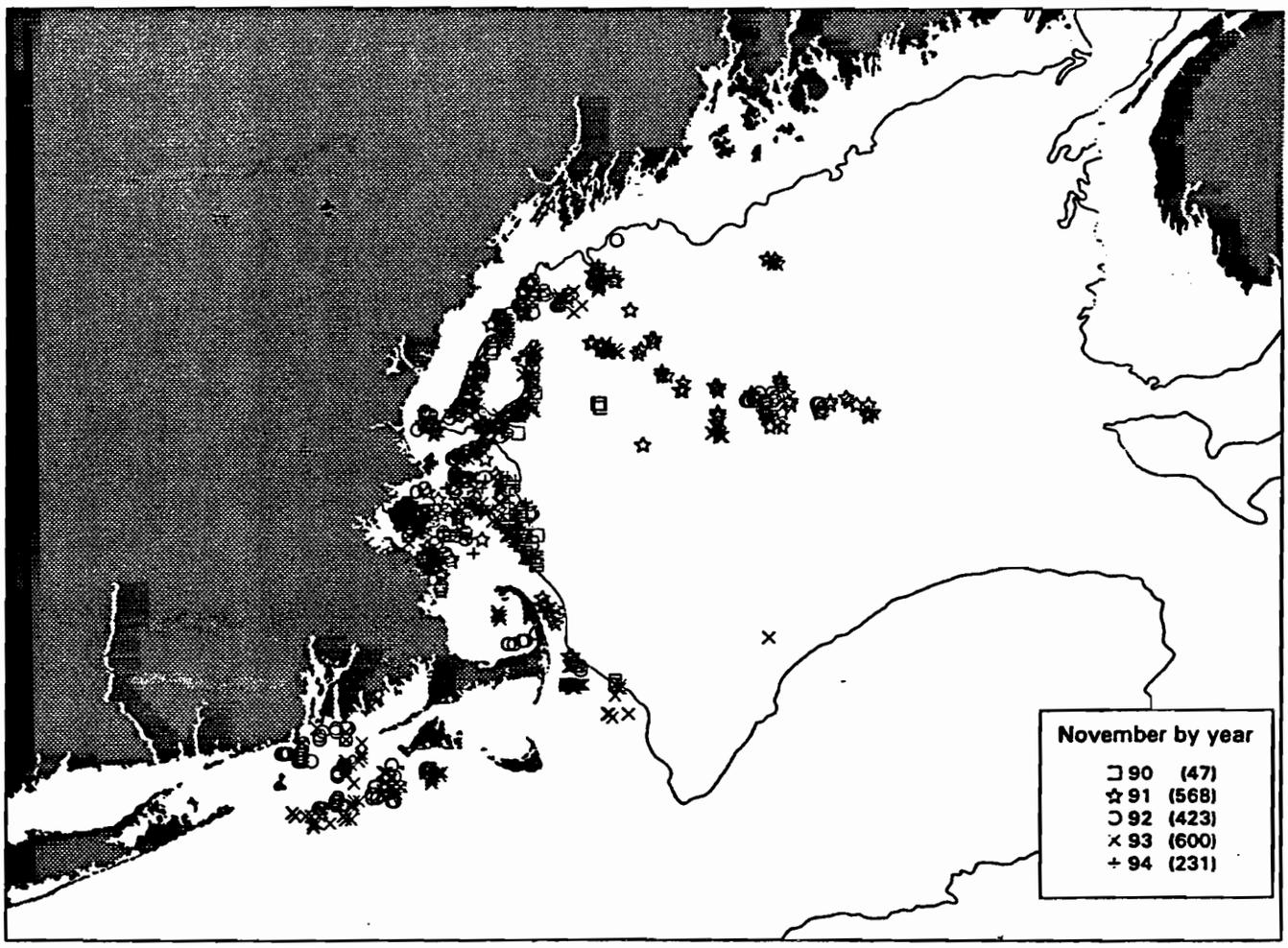
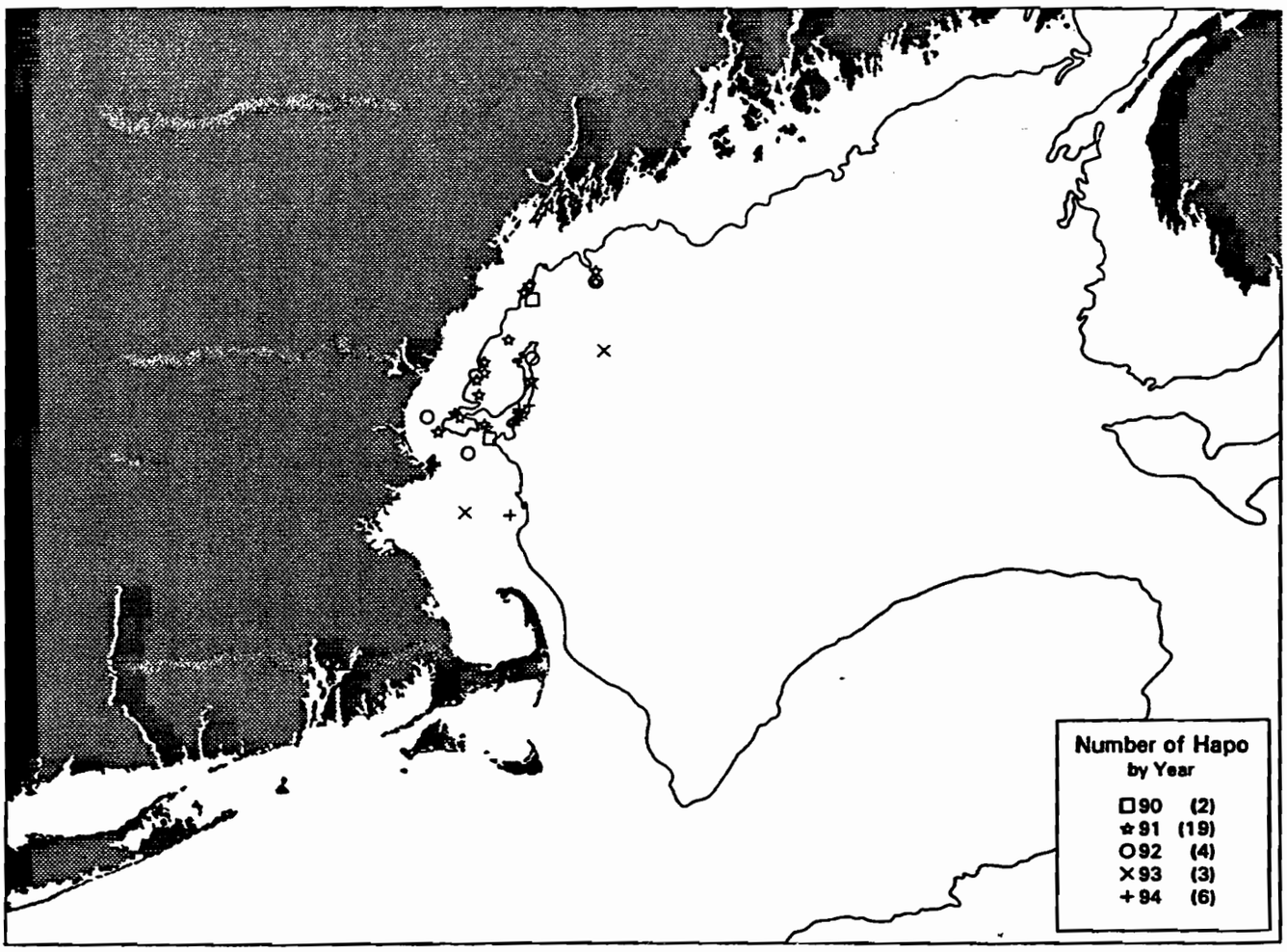
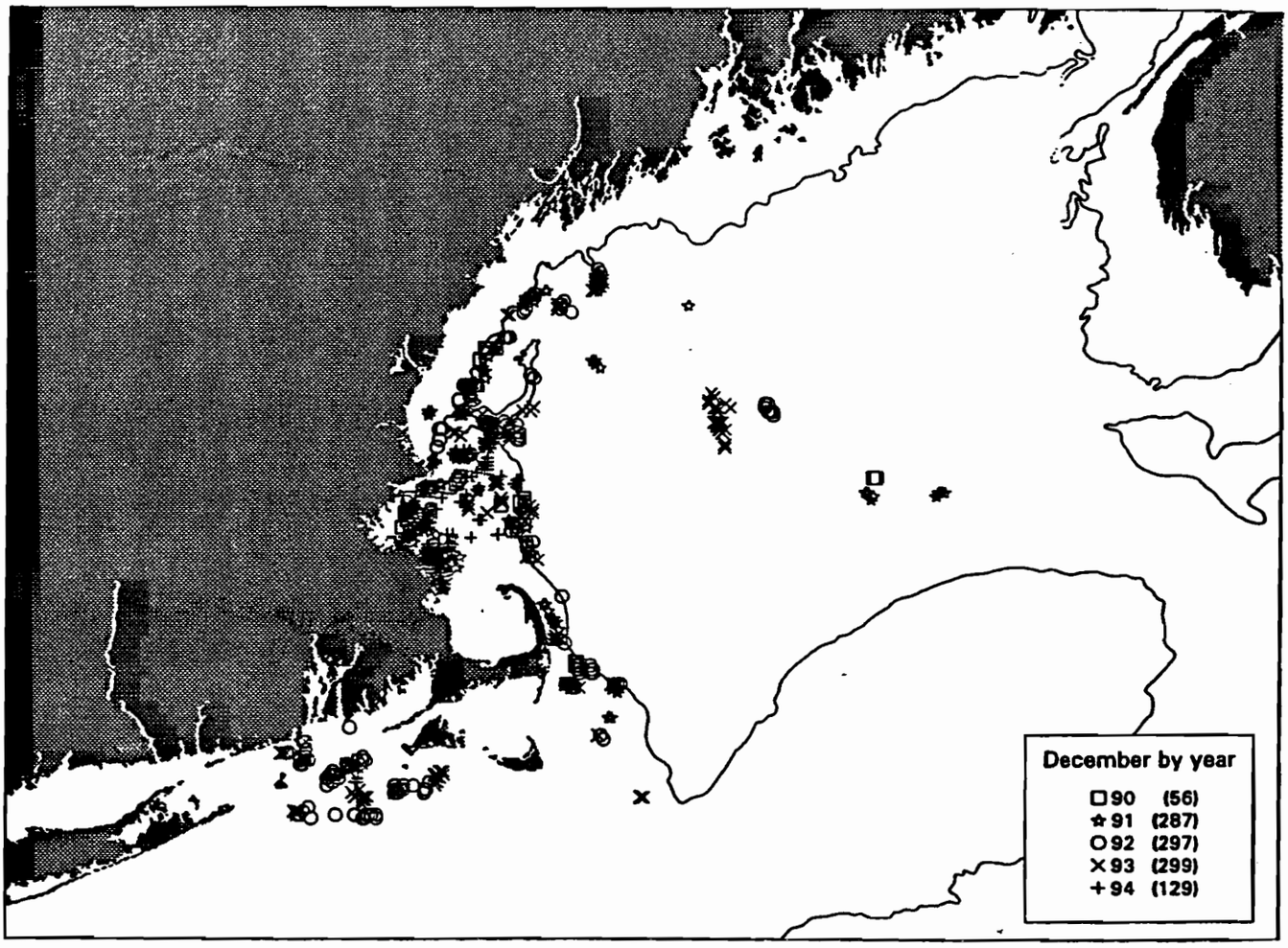
# Sink Gillnet Effort SS Data



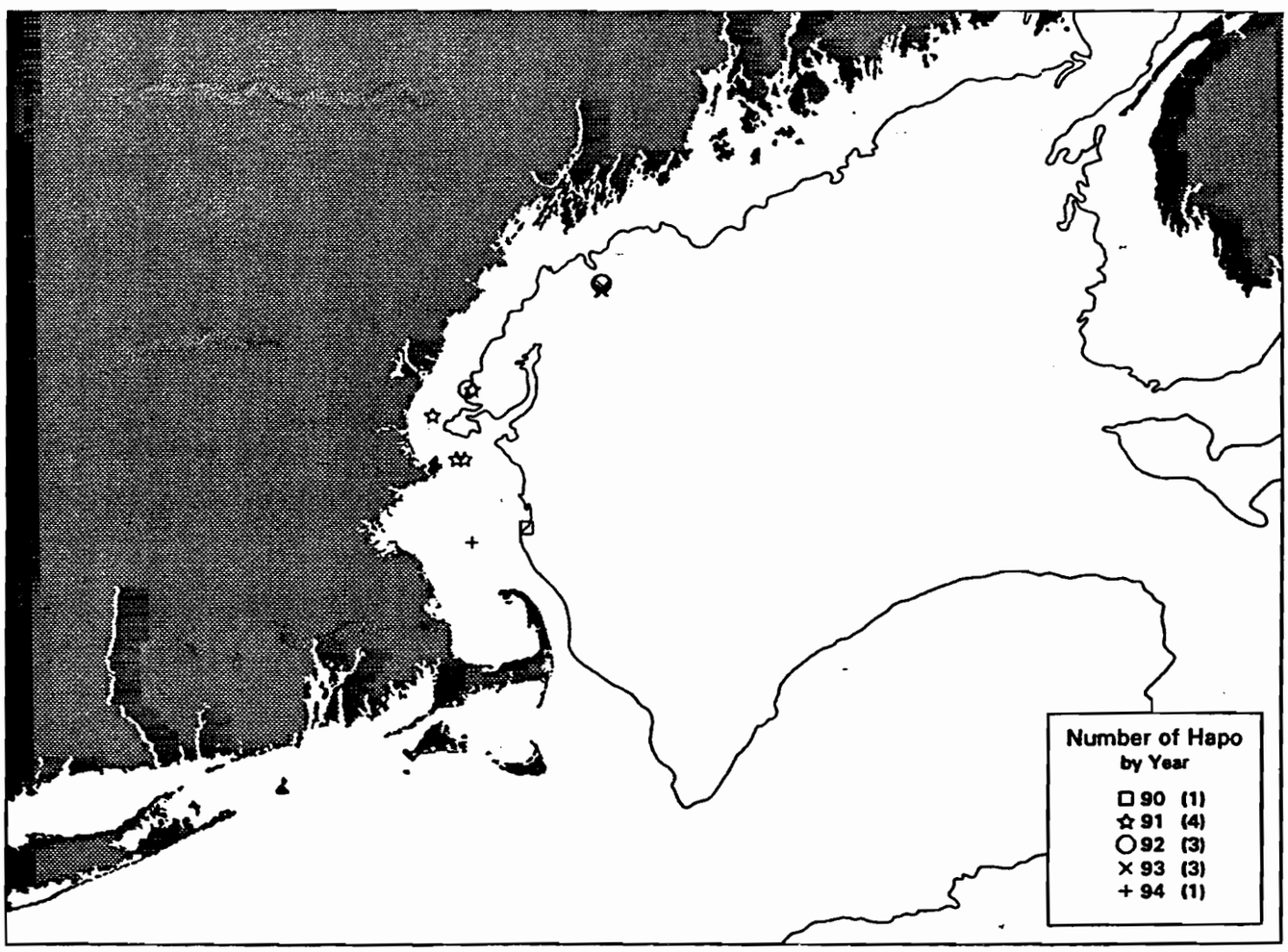
# November 1990 - 1994
# Harbor Porpoise Takes



# December 1990 - 1994
# Sink Gillnet Effort SS Data



# December 1990 - 1994
# Harbor Porpoise Takes



**Cost Benefit Analysis for Framework Adjustment 15**

## 1. Introduction

This analysis provides an assessment of the cost and benefits of Framework Adjustment 15 proposed to modify the current Mid-coast closure as described in Framework 14 (this incorporates the Jeffreys Ledge or Z-band area but excludes the region defined as Tillies Bank). With this framework, the timing of the closures will be extended to include the period from September 15 to December 31. Fishing would be allowed, however, with the use of pingers to mitigate the harbor porpoise bycatch (either through an experimental or operational fishery) in the Gulf of Maine sink gillnet fishery.

The method used to evaluate the net economic benefits of this framework is similar to the approach used in earlier analyses for Framework Adjustments 4, 12 and 14, previously implemented to reduce harbor porpoise bycatch. The economic benefits to consumers and producers are measured by the changes in consumer and producer surpluses with and without the proposed extension in the timing of closures. The cost of pingers is also taken into account in estimating the changes in producer surplus with this adjustment. Finally, the net benefits of Framework Adjustment 15 are measured as the difference in benefits and costs between the proposed action and the status quo.

## 2. Consumer Surplus

Since the level of the harbor porpoise mortality reduction from the management measures is difficult to predict, the benefits to consumers from harbor porpoise protection has been estimated for a range of conceivable reductions under the measures developed by Framework Adjustments 4, 12 and 14. This range of benefits includes probable reductions in harbor porpoise bycatch under the proposed regulations with Framework Adjustment 15. Therefore, this section mostly replicates the previous analysis on consumer surplus (for Framework Adjustment 14) for the convenience of the reader.

Consumer surplus is defined as the difference between what a good is worth to consumers and what they actually pay. A fishery management action would affect the consumer surplus if it results in a change in seafood prices. In this case, the retail prices of fish are not likely to change since the gillnet fleet lands only 7 percent of the total catch in New England. Therefore, the proposed framework adjustment is not expected to affect the consumer surplus in the seafood sector.

The benefits, however, also depend on the region's valuation of harbor porpoise protection. Although harbor porpoise never enter the market, society still

values their existence as shown by economists at the University of Maryland (Strand, McConnell and Bockstael 1994).[1] The study demonstrated that the public is willing to incur costs for the protection of harbor porpoise. According to the estimates, the mean willingness to pay (in the form of a one-time hypothetical tax) per household ranged from $176 to $364 for a reduction in human-induced mortality. Taking the lower figure for a conservative estimate, converting it to an annual cost of $12.74 by amortizing it at seven percent discount rate over a 50-year time horizon and then multiplying the annual cost by the number of Massachusetts households, the total willingness to pay is $28.6 million. This figure represents the amount households would pay to compensate gillnet vessel owners for not fishing in order to eliminate this human-induced source of mortality.

These results can be interpreted to indicate that people would also be willing to pay to reduce the mortality from the present levels. If the relationship between mortality and cost the public is willing to incur is assumed to be linear, total willingness to pay for a 1 percent decrease in harbor porpoise mortality would be $286,000 per year. Table 2 shows the corresponding numbers for a decrease in mortality from 1 to 5 percent. As an example, to reduce mortality from 5 percent to 2 percent, a 3 percent difference, the public would be willing to pay $858,000. If this framework adjustment accomplishes such a reduction in mortality, $858,000 would be considered a benefit to society.

There are some difficulties, however, in using these numbers for the total benefit calculations. Although the proposed framework is expected to reduce harbor porpoise bycatch by closing the Mid-coast area to gillnet activity for the additional period from September 15 to October 31 (in addition to the current closures in November and December) unless gillnets are equipped with pingers, the extent of the reduction in mortality cannot be predicted at this time. As a result, the benefits to the public from harbor porpoise protection could only be estimated for a range of presumable mortality reductions. In addition, the numbers shown in Table 1 should be taken as a lower bound on the valuation of harbor porpoise protection since the study includes only Massachusetts households. The estimated benefits are combined in Section 4 with the expected changes in the producer surplus to compute a range of values for net national benefits attributable to implementation of Framework Adjustment 15.

[1]Since this study was already reviewed in the Benefits/Cost Analysis of Framework Adjustment 12, only the results will be summarized here.

**Table 1. Consumer Benefits Based on Reductions in Harbor Porpoise Mortality**

| Decrease in Mortality | Cumulative Benefits |
|---|---|
| 1% | 286,000 |
| 2% | 572,000 |
| 3% | 858,000 |
| 4% | 1,144,000 |
| 5% | 1,430,000 |

### 3. Producer Surplus

The change in producer surplus is measured by the change in revenues and the corresponding change in variable costs under the proposed measures compared to taking no action.[2] Non-wage variable costs include operating expenses such as fuel, ice and oil which will decrease if the vessels are tied up at the dock. Since the proposed action allows fishing if pingers are used, the cost of pingers should also be taken into account in producer surplus calculations (see Section 3.2 below). Fishing with pingers, however, will only be allowed for the period September 15 through October 31. The specified areas will be closed to fishing during the months of November and December as required by Amendment 7 to the Multispecies FMP.

Labor expenses are generally considered to be a part of the total variable costs and a decrease in labor costs would increase a vessel's profitability. In the fishing industry, however, crews are compensated on the basis of shares of the vessel revenues and if these shares exceed the opportunity cost of labor (income from comparable employment) crew members earn an economic rent. Then any reduction in crew income due to the management action reduces the producer surplus. Since the additional time closures proposed in this framework are only for a month and a half (from September 15 to October 31), it is assumed that crew members will be unable to find alternative employment. Therefore, any reduction in share payments to crew members will be counted as a loss (i.e., a reduction in the producer surplus) rather than savings in variable costs.

To clarify the discussion, the two methods of calculating producer surplus can

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[2] Equivalently, the change in producer surplus is the change in economic rents obtained by vessel owners, the captain and the crew as a result of the management scheme.

be expressed in equation form as follows:

1) Change in Producer Surplus = Change in Gross Revenues
- Change in Total Variable Costs
- Cost of Pingers

2) Change in Producer Surplus = Change in Vessel Profits
+ Change in Crew Shares

The next section, evaluates the impacts of Framework Adjustment 15 on gross revenues, variable costs, crew income, profits and the producer surplus assuming that none of the vessels customarily fishing in the closed areas equip their nets with pingers. Section 3.2 incorporates the use and the cost of pingers into the analysis. Section 3.3 extends the analysis to include effort displacement during the closures.

### 3.1. Impacts of Closures if Vessels do not Invest in Pingers or are not Allowed to Fish With Pingers

Table 2 shows the changes in the producer surplus from two perspectives defined above (equations 1 and 2) assuming that vessels do not use pingers, and therefore, do not fish during the closures. Gross stock is defined as the sum of the revenue received from each species landed during the period of interest. The estimated reduction in gross stock (1993) for the two areas is provided by Northeast Fisheries Science Center (NEFSC) staff using the geographic information system (GIS) located at the Woods Hole Laboratory. Non-wage variable costs are trip costs such as crew share, fuel, oil, ice and food and they are assumed to be 23 percent of the gross stock based on the economic analysis by NEFSC staff (see Benefit-Cost Analysis, Framework Adjustments 12 and 14). As Table 2 demonstrates, the estimated savings from these items are deducted from the change in gross stock to calculate the change in the producer surplus by method one. The results show that closing the Mid-Coast and Jeffreys Ledge areas for the corresponding periods will reduce the producer surplus by $1,4 million compared to the current closures in the months of November and December (Framework Adjustment 12).

Table 2. Estimated Changes in Revenues, Costs and Producer Surplus

| Time Period | Area | Change in Gross Stock (1) | Variable Cost Savings (2) | Change in Producer Surplus (3) | Change in Vessel Profits (4) | Reduction in Crew Share (5) |
|---|---|---|---|---|---|---|
| Sept. 15 - Oct. 31 | Mid-Coast | - 796,304 | 183,150 | -613,154 | -414,078 | -199,076 |
| Sept. 15 - Oct. 31 | Jeffreys Ledge | -1,057,613 | 243,251 | -814,362 | -549,959 | -264,403 |
| Total Mid-Coast Closure | | -1,853,917 | 426,401 | -1,427,516 | -964,037 | -463,479 |

Crew shares are assumed to be 25 percent of the gross stock. They were deducted from gross stock along with other variable costs to estimate the change in vessel profits. The closures proposed in Framework Adjustment 15 are expected to reduce crew shares by $463,479 and vessel profits by $964,037 (Columns five and four, Table 2). The sum of these losses amounts to a loss in producer surplus again by $1,4 million (Method 2). This is an overestimate of the loss since it is based on the assumption that no vessel is equipped with pingers and also that there is no revenue replacement by fishing in other areas. The next section will evaluate how the use of pingers can mitigate the loss in producer benefits with the closures.

### 3.2. Impacts of The Closures if Vessels Are Equipped With Pingers

According to the estimates provided by NEFSC staff, during the year 1993, 98 gillnet vessels fished in the closed areas, but only 52 of them fished between the dates September 15 and October 31. Some of these vessels will probably outfit their nets with pingers to continue fishing under Framework Adjustment 15, however, the actual number of vessels that will do so cannot be predicted at this time. For this reason, the costs and benefits of pingers will be evaluated using a scenario analysis, based on various assumptions about the percentage of vessels using pingers. For example, approximately 15 vessels (about 25 percent of vessels) used pingers in the past --during the November-December 1995 experimental fishery conducted by NMFS-- and it may be reasonable to assume that at least a similar number of vessels will use them again. Pingers are estimated to cost roughly $50 a piece, and for an average vessel in the gillnet fleet, outfitting the nets with pingers is expected to require approximately a $4,000 investment.

**Table 3. Impacts of Closures and Pingers**

| | Percentage of Vessels Using Pingers | | | | |
|---|---|---|---|---|---|
| | 0% | 25% | 50% | 75% | 100% |
| Change in Gross Stock | -1,853,917 | -1,390,438 | -926,959 | -463,479 | 0 |
| Number of vessels using pingers | 0 | 13 | 26 | 39 | 52 |
| Cost of Pingers | 0 | 52,000 | 104,000 | 156,000 | 208,000 |
| Variable Cost Savings | 426,401 | 319,801 | 213,200 | 106,600 | 0 |
| Change in Producer Surplus | -1,427,516 | -1,122,637 | -817,758 | -512,879 | -208,000 |
| Change in Vessels Profits | -964,037 | -775,028 | -586,018 | -397,009 | -208,000 |
| Reduction in the Crew Share | -463,479 | -347,609 | -231,740 | -115,870 | 0 |

Table 3 compares the cost of pingers with the reduction in gross stock and variable costs under various scenarios of pinger usage. The estimates refer to the total of mid-coast area including the Jeffreys Ledge. It is assumed that the vessels either fish with pingers or do not fish at all during the closures, i.e., there will no effort displacement. It is also assumed that reduction in gross stock is proportional to the percentage of vessels not using pingers. In other words, if only 25 percent of the vessels use pingers, the reduction in gross stock is assumed to be 75 percent--reflecting the revenue loss of the remaining vessels not fishing. According to the estimates, the loss of gross stock from not fishing during the closures exceeds the cost of pingers. Therefore, it is reasonable to assume that some vessels will choose to fish by equipping their nets with pingers. For example, if 50 percent of the vessels fish by pingers, the reduction in profits will be $586,018 instead of $964,037 (for the fleet as a whole). Similarly, use of pingers will lower the reduction in crew shares and the producer surplus compared to not fishing in the protected areas.

### 3.3 Effort Displacement and Use of Pingers Combined

The figures shown in Table 3 were based on the assumption that there will be no effort displacement during the closures. If it is possible to catch fish in other areas and recover some part of the lost income resulting from the closures, the reduction

in producer surplus will be less than predicted in Table 3. [3] Although the degree of actual revenue replacement from other fisheries cannot be estimated, the chances of recovering a small percentage of revenues (such as 25 percent) are higher than recovering a higher proportion of revenues (such as 75 or 100 percent). Table 4 shows the net reduction in producer surplus under various assumptions about the proportion of revenue recovered by fishing in other areas and the percentage of vessels fishing in the closed areas by pingers. Some entries in the table do not have any figures because the sum of percentage revenue recovered by fishing with pingers and by fishing in other areas cannot exceed 100 percent. An inspection of Table 4 shows that in all circumstances there will be a reduction in producer surplus due to the cost of using pingers although this reduction will be negligible compared to the loss if fishing ceases completely during the closures.

**Table 4. Loss in Producer Surplus under Various Assumptions of Revenue Replacement and Pinger Use**

| Percentage Revenue Replacement From Other Areas During Closures | Percentage of Revenue Recovered by Vessels Using Pingers | | | | |
|---|---|---|---|---|---|
| | 0% | 25% | 50% | 75% | 100% |
| 0% | -1,427,516 | -1,122,637 | -817,758 | -512,879 | -208,000 |
| 25% | -1,070,637 | -765,758 | -460,879 | -156,000 | NA |
| 50% | -713,758 | -408,879 | -104,000 | NA | NA |
| 75% | -356,879 | -52,000 | NA | NA | NA |
| 100% | 0 | NA | NA | NA | NA |

* NA: Not applicable

## 4. Net Benefits

The consumer benefits (Table 1) are combined with the changes in producer surplus (Table 4) to estimate the range of net benefits associated with Framework Adjustment 15. Again, because of the uncertainties about harbor porpoise mortality,

[3] When vessels fish in other areas during closures instead of tying at the dock, their operating costs will increase, thus cost savings attributable to closures will decrease. For this reason, the numbers given in Table 3 represent the change in producer surplus, i.e., in this case net revenue including crew shares, after taking into account the increase in operating costs due to fishing in other areas.

pinger usage, and revenue replacement from alternative fisheries, it is not possible to determine precisely the net economic benefits of this framework adjustment. Instead, Table 5 shows a range of values given different assumptions about reductions in bycatch, pinger usage and the extent of revenue replacement. The rows indicate the percent reductions in harbor porpoise mortality and the percentage of revenue recovered by fishing in other areas. The columns show the percentage of vessels using pingers. Each cell in the table represents the net benefits given a reduction in bycatch and the degree to which vessels can offset losses either by fishing in other areas or by fishing in the same area with pingers.

**Table 5. Net Benefits of the Proposed Action Given Different Levels of Revenue Replacement, Pinger Usage and Reductions in Harbor Porpoise Mortality**

| Decrease in Harbor Porpoise Mortality | Percentage Revenue Replace-ment from other Areas | Percentage of Vessels Using Pingers | | | | |
|---|---|---|---|---|---|---|
| | | 0% | 25% | 50% | 75% | 100% |
| 1% | 0% | -1,141,516 | -836,637 | -531,758 | -226,879 | 78,000 |
| | 25% | -784,637 | -479,758 | -174,879 | 130,000 | NA |
| | 50% | -427,758 | -122,879 | 182,000 | NA | NA |
| 5% | 0% | 2,484 | 307,363 | 612,242 | 917,121 | 1,222,000 |
| | 25% | 359,363 | 664,242 | 969,121 | 1,274,000 | NA |
| | 50% | 716,242 | 1,021,121 | 1,326,000 | NA | NA |

* NA : Not applicable.

Table 5 demonstrates that the net economic impacts, as measured by the sum of consumer and producer surpluses, can be negative or positive depending on the actual values of mortality reduction, pinger usage and revenue replacement. For example, given a one percent reduction in mortality, a 25 percent revenue recovery and pinger usage by 50 percent of vessels, there will be a small loss of $174,879 in benefits under the proposed action (column 5, row 3, Table 5). A five percent reduction in harbor porpoise mortality, however, would generate a $1,3 million in net benefits if 25 percent of the revenue is obtained by switching to other fisheries and if 75 percent of the vessels use pingers (column 6, row 7, Table 5).

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# Appendix III
# Public Comments

NEW ENGLAND FISHERY MANAGEMENT COUNCIL

FRAMEWORK ADJUSTMENT #15 COMMENTS

**Holiday Inn, Peabody, MA**
**July 17, 1996**

**Wednesday, July 17, 1996**

**Marine Mammal Committee Report**

Mr. Nelson: Under Tab 11 is the marine mammal information and we have two items to deal with today. One is the extension of the timing of the Mid-coast Closure Area and the other one addresses bait nets fishing in the harbor porpoise closure. I would like to take the Mid-coast Closure Area first. Just to recap, the Marine Mammal Committee meeting took place on May 21 and we had the presentation on what should be done for the Mid-coast Closure based on the information that the National Marine Fisheries (NMFS) had on the presence of harbor porpoise in that area during that time frame. Based on that type of information, we initiated a framework at the last Council meeting to deal with extending the Mid-coast Closure from September 15 to October 31. Rather than go into any more detail on that, I will just reiterate the motion for the second meeting of the framework consideration.

Mr. Nelson moved and Mr. Coates seconded:

**that the Council initiate a framework adjustment to the Multispecies FMP to modify the current Mid-coast Closure as described in Framework 14 (this incorporates the Jeffreys Ledge or Z-band but excludes the region defined as Tillies Bank). This action would extend the timing of the closure from September 15 to December 31. Also the committee recommends that additional fishing opportunities in the closure area be allowed with the use of pingers to mitigate the harbor porpoise bycatch (either through an experimental or operational fishery) the timing and area to be considered for pinger use is predicated on restrictions associated with Amendment 7 to the Multispecies FMP.**

Mr. Brancaleone: This is the final meeting, correct?

Mr. Nelson: This will be the second and hopefully the final meeting.

Mr. Brancaleone: Discussion?

Mr. Anderson: I would just be curious and I know it is in there as a recommendation to have the acoustic devices incorporated into the motion, but does Andy feel confident that this can be rolled into the existing use of the devices in November and December