Draft Large Whale Take Reduction Plan

Submitted to
The National Marine Fisheries Service

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THE KEYSTONE CENTER, BOX 8606, KEYSTONE, COLORADO 80435-7998 303 • 468 • 5822
1001 G STREET, N.W., SUITE 430 WEST, WASHINGTON, D.C. 20001 202 • 783 • 0248

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EXECUTIVE SUMMARY

The Large Whale Take Reduction Team (LWTRT) was tasked with developing recommendations to reduce incidental take of four large whale species, including northern right, humpback, minke, and fin whales, in the course of commercial fishing operations in the Gulf of Maine sink-gillnet fishery, the Gulf of Maine/US mid-Atlantic lobster trap/pot fishery, the mid-Atlantic coastal gillnet fishery, and the southeastern US Atlantic shark gillnet fishery. The short-term goal is to reduce incidental takes to below the potential biological removal levels established for each whale stock within six months of the Take Reduction Plan's (TRP's) implementation. The long-term goal is to reduce, within five years of implementation of the TRP, the incidental mortality and serious injury of these large whales to insignificant levels approaching zero (Zero Mortality Rate Goal or ZMRG).

This draft TRP recommends an array of approaches to achieve these short- and long-term goals through a combination of reduction in the incidence and severity of entanglements, and the increase of disentanglements. These recommendations include gear modifications, area restrictions, alteration of fishing operations, reduction of inactive or "ghost" gear, and increased disentanglement effort. To supplement these initiatives, the TRT members also recommend actions such as fishermen education and outreach; data collection and monitoring measures; joint initiatives with Canada; and exploration of market incentives.

The LWTRT did reach agreement on many, but not on all portions, of this draft TRP. Several key issues and areas are left unresolved, preventing submission of a consensus TRP. Where disagreement was most notable, options are identified. However, given that this draft Plan was still under discussion, additional areas and issues also are the sources of disagreement. This draft TRP represents the status of discussions when the deadline required its submission. In the time allotted, the TRT made its best good-faith effort, based on best available information, to identify the problem, mitigate the effects, and put in place the best methods for monitoring the success of a Plan. Unfortunately, the time frame was not adequate for the development of a consensus TRP that meets all of the established objectives.

Given the constraints of time and complexity of the issues, the TRT also has not provided a full analysis of the strategies proposed to meet the short- and long-term goals. In addition, discussion focused primarily on northern right whales. Right whales and, to a degree, humpback whales were considered in developing the recommendations. To a significantly smaller degree, minke and fin whales were discussed and considered. A more fully developed TRP that could be supported by all TRT members, including a comprehensive analysis of the impact of final recommendations for all four whale stocks, would require more time than was allowed.

The predominant focus of the draft Plan to reduce the risk of serious injury and mortality is **gear modification research, development, evaluation, and application**. It is generally agreed that risk of entanglement, serious injury, or death of whales in fishing gear may be reduced through a vigorous research and development program to design and implement new and better techniques and technologies. The TRT recommends an aggressive gear research and development program

begin immediately. The purpose or goal of these efforts is to research and ultimately develop gear that will not entangle whales and thereby eliminate serious injury and mortality.

Gear modification recommendations for immediate or near-term actions are focused on right whale critical habitat, some areas of which are closed until gear modifications meet a standard of posing minimal risk to whales (meaning gear that poses reduced risk to whales of serious injury or mortality to levels approaching zero). Other areas outside of critical habitat are proposed to have gear modifications required that have not been tested, but are meant either to reduce the incidence of entanglement or, if entanglement occurs, reduce the risk of serious injury or mortality from these entanglements.

Gear modifications judged to further reduce the risk of entanglement, serious injury, and mortality should be incorporated as they become feasible according to engineering standards, and tested by incorporation in designated gear modification areas for further risk reduction. Success will be judged by TRT consensus at future meetings as specified by the draft TRP.

The draft Plan does focus on some **closures and gear restrictions** in critical habitat. However, these closures are mostly in areas where little or no fishing effort currently is taking place, and therefore are proposed primarily as a preventive measure to ensure that effort, and associated risk, will not increase in the future.

Additional strategies proposed in the draft Plan are directed toward fostering collaboration among all interested and affected groups to enhance efforts to achieve the short- and long-term goals. Recommendations for **fishermen education and outreach** are intended to encourage the fishing community to become a partner in efforts to reduce incidental takes of large whales. The cornerstone of effective implementation of the bycatch mitigation measures requires outreach, training, feedback, and the active participation of the entire fishing industry. The latter is essential; fishermen must feel that they are a vital part of the plan to reduce entanglement. Recommendations include conducting a fishing fleet census, convening fishermen outreach workshops and a public outreach and TRP implementation advisory group, and improving reporting of entangled large whales and other marine mammals.

The TRT also recommends strategies to **improve and increase the disentanglement network** efforts in order to mitigate serious injury and mortality of whales if they do become entangled. The effectiveness of the current New England Disentanglement Network could be improved primarily through increased reporting and response capabilities. Expansion of large whale disentanglement efforts along the East Coast of the US (and Canada) could largely follow the model of the New England effort. Specific recommendations include continuing the authorization and support of the current Disentanglement Network; training dedicated disentanglement and response/support teams; outreach, education, and provision of incentives for fishermen, whale watchers, and others to increase identification and reporting of entangled whales; and increasing monitoring efforts around areas of high whale concentration.

Data collection and monitoring measures also are recommended by the TRT. In addition to gear modification research, development, evaluation, and application, other important pieces of

information are essential to improving efforts and assessing the impact of measures to reach the goals of reduced serious injury and mortality of large whales. The TRT recognizes the need to create a TRP based on best available information, much of which currently is incomplete. In particular, the time, place, and condition under which entanglements occur, and the true number of mortalities for all four of these species is unclear. The long-term success of a TRP depends on the ability to monitor whales, fisheries, and interactions. Successful real-time monitoring of whale distribution could lead to a better "dynamic management" system of benefit to both the whales and the fishing industry. Improved monitoring of whale mortalities and their causes, and of fisheries activities are necessary to assess the performance of a TRP and help direct future management decisions.

A strategy for **reducing inactive or "ghost" gear** also is recommended by the TRT. Entanglement events are seldom witnessed, so the actual mechanisms of entanglements are poorly documented. Some entanglements likely involve drift or "ghost" gear. This persistent debris not only poses a threat to marine mammals, but also may endanger the safety of fishermen and recreational boaters, since their vessels can be disabled by entangling this gear in their rudder and propulsion systems. Recommendations include discouraging discarding gear at sea; encouraging pick-up and bringing to shore any drift gear or debris (without increasing gear conflicts); requiring commercial fishing vessels that inadvertently tow up gear to bring it ashore; reducing gear conflicts between gear types; encouraging the use of biodegradable components in gear; and providing receptacles for inactive gear brought to shore.

Other longer term initiatives discussed by the TRT include **actions by Canada**, both independently and in conjunction with the US, and the **exploration of market incentives**.

An additional challenge of the TRT was the degree to which activities and regulations by other groups or authorities could or should be taken into account in developing a TRP. The draft Plan does build on some actions, such as the closure of the Great South Channel Critical Habitat east of the 13710 loran line by NMFS in their section 7 action, and the gear restrictions and closures as proposed by the Conservation Plan for Massachusetts Waters to Minimize Entanglement Risk of Right Whales. However, the TRT was reluctant to base decisions on actions proposed or implemented by other groups over which the TRT has no control. Once a final TRP is completed and is being implemented, the TRT believes that when groups outside of the TRT take actions affecting the TRP, the TRT should be reconvened to review these changes and assess whether subsequent modifications to the TRP are necessary or appropriate. Over the course of implementation of a Plan, modifications prompted by these activities, information gathered from the TRP's implementation and other sources, and/or entanglements resulting in serious injury or mortality, will be taken into account.

I. INTRODUCTION

This Take Reduction Plan (TRP) is recommended by the Atlantic Large Whale Take Reduction Team (LWTRT) to reduce the incidental take of the following strategic large whale species:

Northern Right Whale (*Eubalaena glacialis*)
Humpback Whale (*Megaptera novaeangliae*)
Fin Whale (*Balaenoptera physalus*)

While not listed as a strategic stock, the Minke Whale (*Balaenoptera acutorostrata*) also was targeted for reduction in incidental takes.

The purpose of this TRP is to reduce, within six months of its implementation, the incidental mortality or serious injury of these stocks taken in the course of commercial fishing operations of the Gulf of Maine sink-gillnet fishery, the Gulf of Maine/US mid-Atlantic lobster trap/pot fishery, the mid-Atlantic coastal gillnet fishery, and the southeastern US Atlantic shark gillnet fishery to levels below the potential biological removal level (PBR) established for each stock. These fisheries were identified from large whale entanglement information. The long-term goal of this TRP is to reduce, within five years of its implementation, the incidental mortality and serious injury of the large whales listed incidentally taken during these commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate; the Zero Mortality Rate Goal (ZMRG).

II. BACKGROUND

A. Requirements of the Marine Mammal Protection Act, Sections 117 and 118

Section 118 of the 1994 amendments to the Marine Mammal Protection Act (MMPA), established the immediate goal of reducing the incidental mortality or serious injury of marine mammals, occurring in the course of commercial fishing operations, to below PBR within six months of the implementation of a TRP, and to ZMRG within seven years of its enactment (i.e. April 30, 2001), or five years from implementation of a TRP.

1. Three-Part Strategy

Section 118 established the following three-part strategy to reduce the occurrence of interactions between marine mammals and commercial fishing operations:

- preparation of marine mammal stock assessment reports;
- registration and marine mammal mortality monitoring program for Category I and II commercial fisheries; and
- preparation and implementation of TRPs.

Section 117 of the MMPA requires that the National Oceanic Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), complete stock assessment reports for all marine mammal stocks within US waters. Each stock assessment report is required to:

(1) describe the geographic range of the affected stock, including any seasonal or temporal variation in such range;

(2) provide for such stock the minimum population estimate, current and maximum net productivity rates, and current population trend, including a description of the information upon which these are based;

(3) estimate the annual human-caused mortality and serious injury of the stock by source and, for a strategic stock, other factors that may be causing a decline or impeding recovery of the stock, including effects on marine mammal habitat and prey;

(4) describe commercial fisheries that interact with the stock, including:

(A) the approximate number of vessels actively participating in each such fishery;

(B) the estimated level of incidental mortality and serious injury of the stock by each fishery on an annual basis;

(C) seasonal or area differences in such incidental mortality or serious injury; and

(D) the rate based on the appropriate standard unit of fishing effort, of such incidental mortality and serious injury, and an analysis stating whether such level is insignificant and is approaching a zero mortality and serious injury rate;

(5) categorize the status of the stock as one that either-

(A) has a level of human-caused mortality and serious injury that is not likely to cause the stock to be reduced below its optimum sustainable population (OSP); or

(B) is a strategic stock, with a description of the reasons therefore; and

(6) estimate the PBR for the stock, describing the information used to calculate it, including the recovery factor.

Section 3(19) of the MMPA defines a "strategic stock" as a marine mammal stock-

(A) for which the level of direct human-caused mortality exceeds the PBR;

(B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the Endangered Species Act of 1973 (ESA) within the foreseeable future; or

(C) which is listed as a threatened species or endangered species under the ESA (16 U.S.C. 1531 et seq.), or is designated as depleted under the Act.

Section 118(f) requires that the NMFS develop and implement TRPs to assist in the recovery and/or prevent the depletion of strategic marine mammal stock(s) which interact with Category I or II fisheries.

2. Required TRTs as a Result of Stock Assessment Reviews

As a result of stock assessment reviews developed under Section 117 of the MMPA, NMFS recognized the need to establish the following TRTs:

- A TRT focusing on reducing bycatch of harbor porpoise in the Gulf of Maine sink gillnet fishery;
- A TRT focusing on reducing bycatch of harbor porpoise in several coastal gillnet fisheries of the mid-Atlantic states;
- A TRT for several stocks of pelagic dolphins and beaked whales in the North Atlantic and the Atlantic pelagic pair-trawl fishery, longline fishery, and driftnet fishery for highly migratory finfish species;
- A TRT for several stocks of pelagic dolphins and beaked whales in the North Pacific offshore driftnet fishery; and
- A TRT for baleen whales in the North Atlantic, specifically the humpback, northern right, minke and fin whales.

TRT Composition:
Section 118(f) of the MMPA requires NMFS to establish a TRT to prepare a draft TRP designed to assist in the recovery or prevent the depletion of each strategic marine mammal stock that interacts with fisheries. Section 118(f)(6)(C) requires that members of the TRTs have expertise regarding the conservation or biology of the marine mammal species that the TRP will address, or the fishing practices that result in the incidental mortality and serious injury of such species. The MMPA further specifies that members of the TRT shall include representatives of Federal agencies, each coastal state with fisheries that interact with the species or stock, appropriate regional fishery management councils, interstate fisheries commissions, academic and scientific organizations, environmental groups, all commercial and recreational fisheries groups and gear types which incidentally take the species or stock, Alaska Native organizations, or Indian tribal organizations, and others as deemed appropriate.

TRTs shall, to the maximum extent practicable, consist of an equitable balance among representatives of resource user interests and nonuser interests.

TRTs are not subject to the Federal Advisory Committee Act (5 App. U.S.C.). Meetings are to be open to the public, and prior notice of meetings shall be made public. Members of teams shall serve without compensation, but may be reimbursed for reasonable travel costs and expenses incurred in performing their duties as members of the team.

3. Development of Take Reduction Plans by the Take Reduction Teams

Section 118 (f)(2) of the MMPA states that the immediate goal of a TRP for a strategic stock shall be to reduce, within six months of its implementation, the incidental mortality or serious injury of marine mammals incidentally taken in the course of commercial fishing operations to levels less than the PBR established for that stock under Section 117.

Section 118(f)(4) states that each TRP shall include:

(A) a review of the information in the final stock assessment published under section 117(b) and any substantial new information;

(B) an estimate of the total number and, if possible, age and gender, of animals from the stock that are being incidentally lethally taken or seriously injured each year during the course of commercial fishing operations, by fishery;

(C) recommended regulatory or voluntary measures for the reduction of incidental mortality and serious injury; and

(D) recommended dates for achieving the specific objectives of the plan.

4. Submittal of TRP Recommendations to NMFS

Once an agreement is reached and a final TRP is prepared, it will be submitted to NMFS. The law requires that 60 days after submittal of the TRP to NMFS, the Secretary must publish in the Federal Register the plan proposed by the Team, any changes proposed by the Secretary with an explanation of the reasons and proposed regulations to implement the plan.

The MMPA requires that once the TRP is published in the Federal Register there is a 90 day review and comment period. Sixty days after close of the comment period, the Secretary is required to issue a final TRP and implementing regulations. In the 30 days after publication, section 118 (8)(D) of the MMPA states that the final plan is to be published in newspapers, fishery trade association publications, electronic media, and other means of advising commercial fishermen of the requirements of the plan and how to comply with them.

Section 118(7) of the MMPA specifies that the draft TRP shall be developed by consensus. In the event consensus cannot be reached, the team shall advise the Secretary in writing on the range of possibilities considered by the team, and the views of both the majority and minority.

If the TRT does not submit a draft TRP, then NMFS will develop and propose a draft TRP and implementing regulations eight months from the date of the TRT's establishment and then complete the rest of the schedule for finalization of a TRP.

In implementing a TRP developed pursuant to this subsection, section 118(9) states that the Secretary may, where necessary to implement a TRP to protect or restore a marine mammal stock or species covered by such plan, promulgate regulations which include, but are not limited to, measures to:

(A) establish fishery-specific limits on incidental mortality and serious injury of marine mammals in commercial fisheries or restrict commercial fisheries by time or area;

(B) require the use of alternative commercial fishing gear or techniques and new technologies, encourage the development of such gear or technology, or convene expert skippers' panels;

(C) educate commercial fishermen, through workshops and other means, on the importance of reducing the incidental mortality and serious injury of marine mammals in affected commercial fisheries; and

(D) monitor, in accordance with subsection (d), the effectiveness of measures taken to reduce the level of incidental mortality and serious injury of marine mammals in the course of commercial fishing operations.

5. Team Review of TRP Implementation

The MMPA amendments suggest that the TRT will review implementation of the recommendation on a twice annual basis, or whenever the Secretary of Commerce feels it is necessary.

B. Formation of the Large Whale Take Reduction Team

As a result of stock assessment reports developed under section 117 of the MMPA, and an extended interview process conducted by a NMFS-contracted facilitator, NMFS asked the following individuals to serve as members of the LWTRT.

Members of the Large Whale Take Reduction Team:
Bill Adler, Massachusetts Lobstermen's Association
Richard (Dick) Allen, Independent Fisheries Consultant
Mike Baker, Southeast Shark Gillnet Association
Brad Barr, Stellwagen Bank National Marine Sanctuary
David Bower, Virginia Marine Resources Commission
Bill Brooks, Florida Department of Environmental Protection
Christopher Croft, Environmental Solutions International
Eleanor (Ellie) Dorsey, Conservation Law Foundation

Chris Finlayson, Maine Department of Marine Resources
Jack Finn, University of Massachusetts - Amherst
Patricia Fiorelli, New England Fishery Management Council
Bill Foster, Mid-Atlantic Coastal Gillnet Industry
Jeff Goodyear, University of British Columbia
Chris Hickman, Mid-Atlantic Fishery Management
Ron Houck Jr., Florida Shark Gillnetters Association
Robert (Bob) Kenney, University of Rhode Island
Amy Knowlton, New England Aquarium; Edgerton Research Laboratory
David Laist, Marine Mammal Commission
Robert (Bob) MacKinnon, Massachusetts Netters Association
David Mattila, Center for Coastal Studies
Charles "Stormy" Mayo, Center for Coastal Studies
Dan McKiernan, Massachusetts Division of Marine Fisheries
Hans Neuhauser, Georgia Land Trust Service Center
John Our Jr., Cape Cod Gillnetter's Association
William Outten, Maryland Department of Natural Resources
P. Michael Payne, NMFS, Office of Protected Resources
Terry Stockwell, Maine Department of Marine Resources
Mike Street, North Carolina Division of Marine Fisheries
W. Mark Swingle, Virginia Marine Science Museum
Salvatore (Sal) Testaverde, National Marine Fisheries Service, NER
April Valliere, Rhode Island Division of Fish and Wildlife
Kathy Wang, National Marine Fisheries Service/Southeast Region
Patten (Pat) White, Maine Lobstermen's Association
David N. Wiley, Whale and Dolphin Conservation Society
Nina Young, Center for Marine Conservation
Sharon Young, The Humane Society of the United States
Barbara Zoodsma, Nongame-Endangered Wildlife Program

Advisors:
Kevin Chu, National Marine Fisheries Service
Jeremy Conway, Canadian Department of Fisheries and Oceans
James (Jim) Hain, National Marine Fisheries Service
Kim Thounhurst, National Marine Fisheries Service
Mason Weinrich, Cetacean Research Unit

Other individuals from NMFS, state and Federal agencies were present as observers, or for their scientific expertise. The LWTRT was facilitated by Abby Dilley, The Keystone Center, Washington, DC.

For the Large Whale Take Reduction Team and Take Reduction Plan, the following schedule applies:

1) LWTRT is formed (August 6, 1996)
2) Draft TRP is submitted to NMFS (February 1, 1997)
3) NMFS shall publish draft TRP and proposed implementing regulations (April 1, 1997)
4) Comment Period of 45 days (until May 16, 1997)
5) NMFS shall publish final TRP and final implementing regulations 60 days after comment period closes (July 15, 1997)
6) Every 6 months, beginning January 15, 1998, NMFS and the TRT shall meet to monitor implementation of the plan.

If the TRT does not submit a draft TRP, then NMFS will develop and propose a draft TRP and implementing regulations eight months from the date of the TRT's establishment (April 6, 1997) and then complete the rest of the schedule for finalization of a TRP.

III. OVERVIEW OF WHALE STOCKS, FISHERIES, INTERACTIONS, AND OTHER RELEVANT EFFORTS

A. Stock Assessment Summaries

1. Northern Right Whale (*Eubalaena glacialis*)

a. Biology

Right whales of the western North Atlantic population range from wintering and calving grounds in coastal waters of the southeastern United States to summer feeding grounds in New England waters and northward to the Bay of Fundy and the Scotian Shelf. Five major habitats or congregation areas are currently known: the calving ground in southeastern United States coastal waters and feeding grounds in Cape Cod Bay, Great South Channel, Bay of Fundy, and Nova Scotian Shelf. There are scattered sightings well beyond this range, including as far north as Newfoundland, the Labrador Basin, and southeast of Greenland (Knowlton et al., 1992) and the Gulf of Mexico (Moore and Clark, 1963; Schmidly et al., 1972). In addition, the location of the majority of the population during the winter remains unknown.

Right whales in the North Atlantic appear to feed primarily on calanoid copepods. Research suggests that right whales must locate and exploit dense patches of zooplankton to feed efficiently. These dense zooplankton patches are likely a primary characteristic of the spring, summer, and fall right whale habitat (Kenney et al., 1986).

Genetic analyses of tissue samples are providing insights to stock definition. Schaeff et al. (1993) have suggested that western North Atlantic right whales represent a single breeding population that includes only three mitochondrial DNA matrilines. Tissue analysis has also aided in sex identification: the sex ratio of the photo-identified and catalogued population (357

through December of 1995, of which approximately 300 are thought to be alive) is 137 females and 132 males (1.04:1), not significantly different from unity ($P<0.001$) (M.W. Brown, pers. comm.). Analyses based on sighting histories of photographically identified individuals also suggest that, in addition to the Bay of Fundy, there exists an additional and undescribed summer nursery area.

b. Abundance and PBR

The western North Atlantic population size was estimated to be 295 individuals in 1992 (Knowlton et al. 1994), based on a census of individual whales identified using photo-identification techniques. A bias that might result from including catalogued whales that had not been seen for an extended period of time, and therefore might be dead, was addressed by presuming that an individual whale not sighted for five years was dead in the sixth year. It is assumed that the census of identified whales represents a minimum population size estimate.

The annual population growth rate during 1986-1992 was estimated to be 2.5% (coefficient of variation (CV) = 0.12) using photo-identification techniques (Knowlton et al., 1994). The relatively small population size suggests that this stock is well below its optimum sustainable population (OSP); therefore, the current population growth rate should reflect the maximum net productivity rate for this stock. The estimate of 2.5% was used in the PBR calculation rather than the default value of 4%.

PBR was specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to OSP (Barlow, et al., 1995). The recovery factor was 0.10 because this species is listed as endangered under the ESA. PBR for the northern right whale is 0.4 whales per year (four whales per decade).

c. Annual Human-Caused Serious Injury and Mortality

For the period 1991 through September 1996, the total estimated human-caused mortality and serious injury to right whales is estimated as 2.7 per year. This is derived from three components: 1) the observed fishery, 0.4; 2) additional fishery impact records, 0.7; and 3) ship strike records, 1.6.

Approximately one-third of all right whale mortality can definitely be attributed to human activities (Kraus, 1990; Kenney and Kraus, 1993). Further, the small population size and low annual reproductive rate suggest that human sources of mortality may have a greater effect relative to population growth rates than for other whales. The principal sources of human related mortality are ship strikes and entanglement with fishing gear. Since 1970, fourteen right whales are known to have been killed by ship strikes, and seven killed or injured by entanglements. In addition, marks or scars from entanglement were reported from 57% of living right whales, and 7% had major wounds probably due to collisions with ship propellers (Kraus, 1990). Young

animals, ages 0-4 years, are apparently the most impacted segment of the population (Kraus 1990). These mortality and serious injury rates are minimums, since the totals cannot be verified.

Total estimated average annual fishery-related mortality and serious injury in fisheries monitored by NMFS during 1991-1995 was 0.4 right whales annually (CV=0.57). This estimate is based on the entanglement and serious injury of a one year-old female in a pelagic driftnet on southern Georges Bank in July 1993. This whale was partially disentangled then seen again the following month in Massachusetts Bay, when the remaining gear was removed. The gear removed included driftnet gear and presumed lobster line which already was entangled around the whale before the whale became entangled with the driftnet. The presumed lobster line had become embedded in the skin, which caused the whale to bleed when the line was removed. This whale was seen again a few weeks later near Montauk Point, New York, looking unhealthy. The whale has not been sighted again. The estimated annual fishery-related mortalities (CV in parentheses) were 2.2 in 1989 (2.43), 3.4 in 1990 (2.37), 0.5 (1.49) in 1991, 0.4 in 1992 (1.44), 1.3 in 1993 (0.63), 0 in 1994 (0), and 0 in 1995 (0).

Large whale entanglement records from sources other than the observer program show that during 1991-96 (1996 incomplete), there were thirteen records (including Canadian entanglements as well as US) of mortality or serious injury, where entanglement was involved. In four of them, entanglement was judged as the primary mortality factor. The reports often do not contain the detail necessary to assign the entanglements to a particular fishery or location. A two year-old dead male right whale beached in Rhode Island in July 1995 with lobster-type line through the mouth and deeply embedded at the base of the right flipper. This individual had been sighted previously, entangled, east of Georgia in December 1993, and again in August 1994 in Cape Cod Bay. As time passed and the animal grew, an entanglement became a serious injury, and directly or indirectly, the probable cause of a mortality. Lobster-type gear was also reported to be present in the July 1993 pelagic driftnet entanglement described above. The four records where entanglement was a primary cause of mortality result in an estimate of an additional 0.7 mortalities or serious injuries to right whales per year (based on 4 records in 5.8 years).
See **Appendix 1** for right whale entanglement information.

In January 1997, NMFS changed the classification of the Gulf of Maine/US Mid-Atlantic lobster pot fisheries from Category III to Category I based on examination of stranding and entanglement records of large whales from 1990 to 1994 (including the December 1993 to 17 July 1995 record as well as the July 1993 record) (FR 96-33308 62(1) 33-47.).

Stranding records from 1991 through 1996 include nine right whale mortalities caused by ship strikes. The average reported mortality and serious injury to right whales due to ship strikes was 1.6 whales per year (9 ship strike events in 5.8 years) during 1991-96.

d. Status of Stock

The size of this stock is considered to be low relative to OSP and this species is listed as endangered under the ESA. A Recovery Plan has been published (NMFS, 1991) and its implementation is being overseen by two teams, a Northeastern and a Southeastern Implementation Team . The total level of human-caused mortality and serious injury is unknown, but reported human-caused mortality and serious injury has been a minimum of two right whales per year since 1990. The northern right whale is a strategic stock because the average annual fishery-related mortality and serious injury (1.1) exceeds PBR (0.4), and because the northern right whale is an endangered species. In addition, there is an average annual mortality and serious injury due to non-fishery causes of at least 1.6.

2. Humpback Whale (*Megaptera novaeangliae*):

a. Biology

During summer there are at least five geographically distinct humpback whale feeding aggregations occurring between latitudes 42°N and 78°N. These feeding areas are (with approximate number of humpback whales in parentheses): Gulf of Maine (400); Gulf of St. Lawrence (200); Newfoundland and Labrador (2,500); western Greenland (350); and the Iceland-Denmark strait (up to 2,000) (Katona and Beard, 1990). The western North Atlantic stock is considered to include all humpback whales from these five feeding areas.

Humpback whales from all of the western North Atlantic feeding areas migrate to the Caribbean in winter, where courtship, breeding (suspected), and calving occur. The majority are found on Silver and Navidad Banks off the north coast of the Dominican Republic. The remainder are scattered in Samana Bay (Dominican Republic), along the northwest coast of Puerto Rico, through the Virgin Islands, and along the eastern Antilles chain south to Venezuela (Katona and Beard, 1990). Courtship groups on the wintering ground contain whales from different feeding aggregations, so that humpbacks from the western North Atlantic probably interbreed (Katona et al., 1994). Apparently, not all humpback whales from this stock winter in the West Indies, as there are winter reports from Bermuda, the Gulf of Maine, Newfoundland, Greenland, and Norway (Katona et al., 1994).

An increased number of sightings of young humpback whales in the vicinity of the Chesapeake and Delaware Bays occurred in 1992 (Swingle et al., 1993). Wiley et al. (1995) reported 38 humpback whale stranding records which occurred during 1985-1992 in the US mid-Atlantic and southeastern states. Swingle (pers. comm., 1996) has documented an additional 15 from Delaware to North Carolina since that time. An effort by the Cetacean Research Unit in 1994 found aggregations of up to 20 humpback whales per day northeast of Cape Hatteras, indicating this may be another important area for whales in the Mid-Atlantic (Cetacean Research Unit, unpub. data). Humpback whale strandings increased, particularly along the Virginia and North Carolina coasts, and most stranded animals were sexually immature. Wiley et al. (1995)

concluded that these areas are becoming an increasingly important habitat for juvenile humpback whales and that anthropogenic factors may negatively impact whales in this area. There have also been a number of wintertime humpback sightings in coastal waters of the southeastern US (NMFS, unpublished data; New England Aquarium, unpublished data; Florida DEP, unpublished data). Whether the increased sightings represent a distributional change, or are simply due to an increase in sighting effort, is presently unknown.

Feeding is the principal activity of humpback whales in New England waters, and their distribution in this area has been largely correlated to prey species and abundance, although behavior and bottom topography are factors in foraging strategy (Payne et al., 1986, 1990; Goodyear, 1989). Humpback whales are believed to be largely piscivorous when in these waters, feeding on herring (*Clupea harengus*), sand lance *(Ammodytes americanus*), and other small fishes (Hain et al., 1982; Goodyear, 1989). Humpback whale distributions have been observed to change dramatically following changes in the distribution and abundance of their prey species (Payne et al., 1986, 1990; Center for Coastal Studies, unpublished data; College of the Atlantic, unpublished data).

b. Abundance and PBR

Katona et al. (1994), using photo-identification techniques and Bailey's modification of the Chapman capture-recapture method, estimated that the total humpback whale population in the North Atlantic Ocean west of Iceland during the years 1979-1990 averaged 5,543 humpback whales (CV = 0.16). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate of 5,543 whales and is 4,848 humpback whales. This is equivalent to the 20th percentile of the log-normal distribution as specified by NMFS (Anon, 1994).

There are insufficient data with which to determine trends. Katona and Beard (1990) suggest an annual rate of increase of 9%; however, the lower 95% confidence level was less than zero. The mean birth rate for identified humpbacks in the southwestern Gulf of Maine during 1979-87 was 8% (CV = 0.25), with no significant inter-annual differences, and the calving interval was 2.35 years (CV = 0.30) (Clapham and Mayo, 1990; Clapham, 1992).

PBR was specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to OSP (Barlow et al., 1995). The recovery factor was set at 0.10 because this stock is listed as an endangered species under the ESA. PBR for the western North Atlantic humpback whale stock is 9.7 whales.

c. Annual Human-Caused Serious Injury and Mortality

The assessment of these impacts is based on two principal data sources: 1) the fishery observer data in the NEFSC Sea Sampling database, and 2) collected records maintained by NMFS and

contributed by collaborating researchers. These collected records include reports of both fishery and vessel interactions. The estimated annual serious injury and mortality from the observed pelagic driftnet fishery is 0.7. The additional records cannot provide a quantitative estimate, but do suggest that a number of additional serious injuries and mortalities occur.

The total average annual estimated fishery-related mortality and serious injury in fisheries monitored by NMFS between 1991-1995 was 0.7 humpback whale (CV = 0.45). Two mortalities were observed in the pelagic driftnet fishery since 1989. In winter 1993, a juvenile humpback was observed entangled dead in a pelagic driftnet along the 200 m isobath northeast of Cape Hatteras. In early summer 1995, a humpback was entangled and dead in a pelagic driftnet on southwestern Georges Bank. Estimated annual mortality (CV in parentheses), extrapolated from fishery observer data, was 0.7 (7.0) in 1989, 1.7 (2.65) in 1990, 0.7 (2.00) in 1991, 0.4 (1.25) in 1992, 1.5 in 1993 (0.45), 0 in 1994 (0), and 1.0 in 1995 (0).

In January 1997, NMFS changed the classification of the Gulf of Maine and US Mid-Atlantic lobster pot fisheries from Category III to Category I based on examination of stranding and entanglement records of large whales from 1990 to 1994 (including 11 serious injuries or mortalities of humpback whales) (FR 96-33308 62(1) 33-47.). Additional data are being examined.

Three additional records of stranded or floating (dead or injured) humpbacks from the period 1992 to mid-1996 included line entangling the animal, or notes on rope marks. In these records it is often not possible to assign cause of death, frequently due to the advanced state of decomposition of the carcass when recovered. These and other records do, however, suggest entanglements in addition to those reported by fishery observers.

Humpback whale entanglements also occur in Canadian waters. Numbers of entanglements have been reduced since the Canadian limitations on fishing for cod went into effect. Reports of collisions with fixed fishing gear set for groundfish around Newfoundland averaged 365 annually from 1979 to 1987 (range 174-813). An average of 50 humpback whale entanglements (range 26-66) were reported annually between 1979 and 1988 and 12 of 66 humpback whales that were entangled in 1988 died (Lien et al., 1988). Volgenau et al. (1995) also summarized existing data and concluded that in Newfoundland and Labrador, cod traps caused the most entanglements and entanglement mortalities (21%) of humpbacks between 1979 and 1992. They also reported that gillnets are the gear that was the primary cause of entanglements and entanglement mortalities (20%) of humpbacks in the Gulf of Maine between 1975 and 1990.

A list of humpback entanglements reported to NMFS can be found in **Appendix 2**. There are an average of four to six reports of entangled humpback whales each year in waters of the southern Gulf of Maine and additional reports of ship collisions (Center for Coastal Studies, unpublished data). This number represents a minimum of entanglements; the total number can not be estimated. Of twenty dead humpback whales, principally in the mid-Atlantic, where decomposition state did not preclude examination for human impacts, Wiley et al. (1995)

reported that six (30%) had major injuries possibly attributable to ship strikes, and five (25%) had injuries consistent with possible entanglement in fishing gear. One whale displayed scars that may have been caused by both ship strike and entanglement. Thus, 60% of the whale carcasses which were suitable for examination showed signs that anthropogenic factors may have contributed to, or been responsible for, their death. Wiley et al. (1995) further reported that all stranded animals were sexually immature, suggesting a winter or migratory segregation and/or that juvenile animals are more susceptible to human impacts. In the 25 records examined by NMFS, seven contained notes about wounds or probable/possible ship strike. While researchers often tend to attribute strikes to large vessels, on 7 October 1993 off Atlantic City, NJ, there was a collision between a 33 foot sport-fishing vessel and a humpback whale, causing subsequent injury.

d. Status of Stock

The size of this stock is considered to be low relative to OSP, and this species is listed as endangered under the ESA. There are insufficient data to determine the population trends for humpback whales. The total level of human-caused mortality and serious injury is unknown, but current data indicate that it is significant. This is a strategic stock because the humpback whale is listed as an endangered species under the ESA.

3. Fin Whale (*Balaenoptera physalus*):

a. Biology

Fin whales off the eastern US, north to Nova Scotia and on to the southeast coast of Newfoundland are believed to constitute a single stock under the present IWC scheme (Donovan, 1991). Fin whales are common in waters of the US Atlantic Exclusive Economic Zone (EEZ), principally from Cape Hatteras northward. Fin whales accounted for 46% of the large whales and 24% of all cetaceans sighted over the continental shelf during aerial surveys (CETAP, 1982) between Cape Hatteras and Nova Scotia during 1978-82. While a great deal remains unknown, the magnitude of the ecological role of the fin whale is impressive. In this region fin whales are the dominant cetacean species in all seasons, with the largest standing stock, the largest food requirements, and therefore the largest impact on the ecosystem of any cetacean species (Hain et al., 1992).

There is little doubt that New England waters constitute a major feeding grounds for the fin whale. There is evidence of site fidelity by females, and perhaps some substock separation on the feeding range (Agler et al., 1993). Seipt et al. (1990) reported that 49% of identified fin whales on Massachusetts Bay area feeding grounds were resighted within years, and 45% were sighted between years. While recognizing localized as well as more extensive movements, these authors suggested that fin whales on these grounds exhibited patterns of seasonal occurrence and annual return that are in some respects similar to those shown for humpback whales.

Hain et al. (1992), based on an analysis of neonate stranding data, suggested that calving takes place during approximately four months from October-January in latitudes of the US mid-Atlantic region; however, it is unknown where calving, mating, and wintering for most of the population occurs. Preliminary results from the Navy's IUSS program (C. Clark, unpublished data) suggest a deep-ocean component to fin whale distribution. It is likely that fin whales occurring in the US Atlantic EEZ undergo migrations into Canadian waters, open-ocean areas, and perhaps more equatorial regions.

b. Abundance and PBR

A population estimate based on an inverse variance weighted pooling of CETAP (1982) spring and summer data is 4,680 fin whales (CV = 0.23) which includes a dive-time correction factor of 4.85. However, this estimate is highly uncertain because the data are a decade old, and values were estimated just after cessation of extensive foreign fishing operations in the region.

More recent abundance estimates were based on NMFS shipboard line transect sighting surveys designed to estimate abundance of harbor porpoises (Palka, 1995) conducted during the summer in 1991 and 1992. These estimates are for a portion of the northeastern US Atlantic EEZ during one or two seasons. From these surveys, a weighted-average abundance for the northern Gulf of Maine-lower Bay of Fundy region is 2,700 fin whales (CV = 0.59), where each annual estimate is weighted by the inverse of its variance (NMFS, unpublished data). The abundance estimate includes an estimate of g(0), probability of detection, for both teams combined, of 0.52 (CV = 0.19). This estimate has not explicitly accounted for dive times and ship avoidance; both factors are expected to influence the abundance estimate for this species. The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distribution as specified by NMFS (Barlow et al., 1995), and was 1,704 fin whales.

There are insufficient data to determine the population trends for this species. Current and maximum net productivity rates are not known. Based on photographically identified fin whales, Agler et al. (1993) estimated that the gross annual reproduction rate was at 8%, with a mean calving interval of 2.7 years.

PBR was specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to OSP (Barlow et al., 1995). The recovery factor was set at 0.10 because the fin whale is listed as endangered under the ESA. PBR for this stock is 3.4 whales.

c. Annual Human-Caused Mortality and Serious Injury

There was no reported fishery-related mortality or serious injury to fin whales in US fisheries observed by NMFS during 1991-95. The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and can be considered insignificant and

approaching ZMRG; unknown serious injury rates are assumed to be small. Potential for under-reporting of mortality of fin whales could be significant as both fin and minke whales sink when dead and therefore may never be observed. In addition, because of their size, speed, and power, fin whales are likely to break through and/or carry off entangling gear and would therefore be less likely to be observed.

There are nine records of ship collisions, boat strikes, and propeller scars between 1980-1994 in the Smithsonian Institution's Marine Mammal database. This is a small number of individuals relative to the size of the population. A review of 15 records of stranded or floating, dead or injured fin whales on file at NEFSC/NMFS showed that four noted propeller marks, wounds, or possible ship/boat collision. For both types of human impacts, ship strikes or net entanglement, carcasses in advanced states of decomposition, unrecovered, and/or not necropsied represent 'lost data'.

Because of the large role of fin whales in their ecosystem (Hain et al., 1992), there is likely a link between the abundance of fin whales and the fishery resources. Foreign fishing activities in the 1960s and 70s may have been more important ecologically to the fin whale, as compared to direct interactions, since these activities over-exploited several fish stocks (i.e., herring, mackerel, etc.) that are known fin whale prey. On the other hand, Sissenwine et al. (1984) speculated that fin whales contributed to the demise of the already overfished Georges Bank herring stock in the mid- and late 1970s.

d. Status of Stock

The status of this stock relative to OSP is unknown, but the species is listed as endangered under the ESA. There are insufficient data to determine the population trends for fin whales. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant. Any fishery-related mortality would be illegal because a negligible impact determination under MMPA subsection 101 (a)(5)(E) could not be made. This is a strategic stock because the fin whale is listed as an endangered species under the ESA.

4. Minke Whale (*Balaenoptera acutorostrata*):

a. Biology

Minke whales have a cosmopolitan distribution in polar, temperate and tropical waters. In the North Atlantic there are four recognized populations: Canadian east coast, west Greenland, central North Atlantic, and northeastern North Atlantic (Donovan, 1991). Minke whales off the eastern coast of the United States are considered to be part of the Canadian east coast population, which inhabits the area from the eastern half of the Davis Strait out to 45°W and south to the Gulf of Mexico. The relationship between this and the other three populations is uncertain.

The minke whale is the third most abundant large whale in the US Atlantic EEZ. It is common and widely distributed (CETAP, 1982); however, because of its smaller size, more rapid movements, and less observable behavior, there is more uncertainty about abundance, distribution, and behavior than for other large cetaceans. There appears to be a strong seasonal component to minke whale distribution. Spring and summer are times of relatively widespread and common occurrence, and they are most abundant in New England waters during this time. The number of minke whales and the area occupied by them is reduced in the fall. In winter, the species appears to be largely absent from the area. Like most other baleen whales, the minke whale generally occupies the continental shelf proper, rather than the continental shelf edge region. Records summarized by Mitchell (1991) hint at a possible winter distribution in the West Indies and in mid-ocean south and east of Bermuda. As with several other cetacean species, the possibility of a deep-ocean component to distribution exists but remains unconfirmed.

b. Abundance and PBR

The total number of minke whales in the Canadian East Coast population is unknown, since there are no estimates of abundance for this species in Canadian waters. An estimate for a portion of the habitat is available based on NMFS shipboard line transect sighting surveys designed to estimate abundance of harbor porpoises (Palka, 1995) from the summers of 1991 and 1992. Minke whale abundance in the northern Gulf of Maine-lower Bay of Fundy region during the summers of 1991 and 1992 was estimated to be 2,650 minke whales (CV = 0.31). This is a weighted-average abundance estimate where each annual estimate is weighted by the inverse of its variance (NMFS, unpublished data). The abundance estimate includes an estimate of g(0), probability of detection, for both teams of 0.60 (CV = 0.12). This estimate has not accounted for dive times and ship avoidance. The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance average estimate of 2,650 whales (CV = 0.31) (NMFS, unpublished data), which is equivalent to the 20th percentile of the log-normal distribution as specified by NMFS (Barlow et al., 1995), and was 2,053 minke whales.

There are insufficient data to determine the population trends for this species. Current and maximum net productivity rates are not known for this stock. The maximum net productivity rate was assumed to be the default value of 0.04 (Barlow et al., 1995), based on theoretical calculations showing that cetacean populations may not generally grow at rates much greater than 4% given the constraints of their reproductive life history (Barlow et al., 1995).

PBR was specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to OSP (Barlow et al., 1995). The recovery factor was set at 0.50 because of the stock's status relative to its OSP level is unknown. PBR for this stock is 21 whales.

c. Annual Human-Caused Mortality and Injury

Accurate estimates of human-caused mortality are not available because it is likely that many entanglements, injuries, and mortalities go unobserved and/or unrecorded partly due to minke whales becoming trapped, drowning, and sinking without being observed (Goodyear, pers. obs.). Total annual estimated average fishery-related mortality and serious injury to this stock in the Atlantic in fisheries observed by NMFS during 1990-1995 was 2.5 minke whales (CV = 0.97). Other sources of mortality data are available which indicate the total human-caused mortality is higher. The total fishery-related mortality and serious injury for this stock is greater than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate.

One mortality was observed in the Gulf of Maine sink gillnet fishery in 1991, south of Penobscot Bay, Maine. Another minke whale was entangled, but released alive, in October 1992 off the coast of New Hampshire near Jeffreys Ledge. Another minke whale was seen carrying gear and was disentangled by the Northeast Disentanglement Network. Estimated fishery-related mortality and serious injury attributable to this fishery was 10 minke whales (CV = 0.96) in 1991 (NMFS unpublished data). Annual estimated average fishery-related mortality and serious injury to this stock in the Atlantic during 1990-1995 attributable to the sink gillnet fishery was 1.7 minke whales (CV = 0.97).

Minke whales were observed entangled in the pelagic driftnet fishery only in 1995. Estimated annual fishery-related mortality and serious injury was 0 for 1989 to 1994 and 4 (CV = 0) for 1995; estimated average annual mortality and serious injury related to this fishery during 1991-1995 was 0.8 minke whales (CV=0.00).

In US waters, an entanglement database maintained by NMFS for 1975-1992 includes 36 records of minke whales. The gear includes unspecified fishing net, unspecified cable or line, fish trap, weirs, seines, gillnets, and lobster gear. In a review of cetaceans and fishery interactions, Read (1994) reported that a minke whale was found dead in a Rhode Island fish trap in 1976, and that a minke whale was trapped and released alive in a herring weir off northern Maine in 1990. One minke whale was reported caught in a bluefin tuna purse seine off Stellwagen Bank in 1991 and released uninjured (D. Beach, NMFS northeast Regional Office, personal communication). A minke whale was caught and released alive in the Japanese tuna longline fishery in 3,000 m of water, south of Lydonia Canyon on Georges Bank, in September 1986 (Waring et al., 1990). An immature female minke whale, entangled with line around the tail stock, stranded on the Jacksonville, Florida, jetty on 31 January 1990 (R. Bonde, USFWS, Gainesville, FL, personal communication).

Information about minke whale interactions with fishing gear is not well quantified or recorded in most parts of Canada.

d. Status of Stock

The status of minke whales relative to OSP in the US Atlantic EEZ is unknown. The level of human-caused mortality and serious injury is unknown, but is not likely to be high relative to stock size. This is not a strategic stock because estimated fishery-related mortality and serious injury does not exceed PBR, and the minke whale is not listed as a threatened or endangered species under the ESA.

B. Fisheries Identified as Focus of LWTRT Recommendations

As a result of stock assessments for the four large whale species of concern, including northern right, humpback, minke, and fin, and the classification of commercial fisheries considered to interact with these species, four primary fisheries were identified as the focus of this TRP. These include the Gulf of Maine/US mid-Atlantic lobster trap/pot fishery, the Gulf of Maine sink-gillnet fishery, the mid-Atlantic coastal gillnet fishery, and the southeastern US Atlantic shark gillnet fishery. Additional fisheries have the potential for interactions with these species, but were not a part of the development of this Plan.

The following information was gathered from a variety of sources and may not be presented in a consistent format. In particular, there are often significant differences in the way that fishermen report effort information in each state. These differences can make effort comparisons between states difficult.

1. Gulf of Maine/US Mid-Atlantic Lobster Pot/Trap

a. History of the Gulf of Maine Fishery

Commercial lobster fishing goes back to pre-Revolutionary days, but expanded rapidly during the latter half of the 19th century. In 1880 total landings in the US were 9.2 metric tons (metric tons in 1,000's). By the turn of the century, Maine had become the leading lobster-producing state.

The fishery has predominately been conducted with traps. Although the fishery fluctuated the first half of this century, the number of traps being fished remained fairly constant from 250,000 to 300,000. However, in the post World War II era, and particularly the 20 year period from the late 1950's to the late 1970's, the fishery again expanded rapidly. The number of traps fished in the inshore fishery reached about 2.2 million in 1990.

In addition, a new fishery developed offshore. Although offshore trawlers were known to harvest some lobsters in earlier times, the fishery remained essentially a shoal-water, coastal trap fishery well into the 1950's. Increased demand for lobster and improvement in the technology of mobile gear stimulated rapid development of an otter trawl fishery for lobster, principally around the canyon areas located in deep water along the continental margin off southern New England. Reported landings of trawl-caught lobsters grew from 0.1 metric tons to 2.5 metric tons between

1950 and 1965. The new fishery rapidly expanded to offshore areas ranging from Corsair Canyon on the eastern margin of George's Bank to Norfolk Canyon off the Virginia coast. However, after peaking at almost 3.2 metric tons in 1970, the trawl landings declined to about 0.6 metric tons in 1976, as effort was shifted to the offshore trap fishery.

Success of the offshore trawl fishery and the advent of the hydraulic trap haulers during the 1960's stimulated the development of deep water trap fishing technology. During the mid-1970's, the deep water trap fishery extended across the continental shelf in the area from Massachusetts to New Jersey and along the shelf edge from Lydonia Canyon to Norfolk Canyon. Annual total landings from the offshore fishery fluctuated between 2.0 metric tons and 4.0 metric tons through the mid-1980's, peaking at 5.0 metric tons in 1990.

Inshore and offshore landings of American lobster. (also in 1,000 metric tons)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Offshore	2.4	4.2	2.6	3.4	3.3	3.0	3.3	5.0	4.7	4.4	3.5	*	4.6
Inshore	17.6	16.4	18.0	17.8	17.3	19.2	20.7	22.6	24.0	21.0	22.1	*	25.6

(*Breakdown not available for 1994, but total is 30.1)
Source: NOAA/NMFS, 1992

NMFS inshore and offshore landings are reported as inshore being caught within three miles of shore, and offshore outside of three miles. Therefore, the above figures do not represent accurate measure of inshore versus offshore effort as described by the LWTRT, where inshore extends out to 30 miles from shore.

b. Commercial Fishery

The Gulf of Maine/US mid-Atlantic fishery is very diverse, and includes commercial and recreational fisheries, as well as an inshore and offshore fishery. As a result, the techniques of, and patterns for, lobster trap/pot fishing vary widely. The fishery extends from Delaware to the Canadian border in state waters, and from Cape Hatteras to the Canadian boundary along the outer edge of the continental shelf. Maine produces approximately 50% of the total US lobster catch, and Maine and Massachusetts together account for about 85% of the catch.

In southern New England, the inshore fishery extends from the shoreline out to thirty or more miles from shore, overlapping the area of operation of the offshore lobster fleet. North of Cape Cod, the Massachusetts inshore lobster fishery generally operates out to seven or more miles from the shore. In Maine, it is estimated that 80% of the lobster fishery takes place within 20 miles from shore, 75% of the fishery takes place in state waters (0-3 miles), and 70% of the license holders are legally confined to state waters because they do not have the required federal lobster permit.

The lobster fishery is the most valuable fishery on the Atlantic coast in both the US and Canada. The US lobster catch of 66.4 million pounds in 1995 was valued at $214.8 million (NMFS, 1996). Over half (37 million pounds) of the US lobster catch was exported in 1995 (NMFS,

1996), and much of the remainder was exported out of the northeastern coastal states, increasing the net value of the lobster catch to the region and the nation. The lobster fishery is particularly important in "Downeast" Maine because it is the primary source of income in that area

Landings have risen steadily from 1970 reaching 30.1 metric tons (66.4 million lb.) in both 1994 and 1995. The lobster fishery is one of the few fisheries on the Atlantic coast that has experienced a significant increase in landings, making possible the large export market. Fishing effort has shown a similar trend. Numbers of lobster pots in the trap fishery exceeded one million for the first time in 1969, rising steadily to over three million in 1984. No significant trend in numbers of traps has been observed in more recent years, although total effort reached a record level of 3.2 million traps in 1990. Catch rate data are more difficult to interpret because of the influences of temperature, seasonal effort patterns, and the frequency with which traps are hauled. However, a relatively continuous increase in landings per trap since the mid-1980's has been observed. Despite the increased landings, there are concerns that the lobster stock in some areas may be overfished.

The increase in commercial landings and effort is a manifestation of the trap fishery. Other gear types do not exhibit similar increases. The offshore lobster fishery using otter trawls has been in decline from a record high of 3.2 metric tons (7 million pounds) in 1970 to an average of about 0.6 metric tons (1.2 million pounds) for the period from 1988 to 1992. This trend might be reversed if restrictions on fishing effort and landings in the New England groundfish (Multispecies), Atlantic sea scallop, and summer flounder fisheries cause otter trawl vessels to redirect fishing effort to the lobster fishery.

Inshore Lobster Trap Fishery

Total participation in the lobster pot fishery is estimated at 25,000 (Bill Adler, pers. comm.) In 1993 there were approximately 14,600 state lobster license and federal lobster permit holders. Prior to the implementation of Amendment 5 to the federal Lobster Fishery Management Plan, the only jurisdictional distinction in the US lobster fishery was between state and federal (>3 miles) waters. Approximately 4,000 federal permits or state permits endorsed for fishing in federal waters were issued in 1993. Amendment 5 created four lobster management zones from Cape Hatteras to the Canadian border. Zones 1,2, and 4 are adjacent to state waters and are generally considered to be "inshore" fisheries, although they are in federal waters. Zone 3 is the "offshore" lobster management zone which generally extends from the mid-continental shelf out to the shelf-break. See **Appendix 3** for a map of the Lobster Management Zones.

The boats used in the inshore, state-waters fishery are generally between 16 and 45 feet in length and have a crew of one to three persons. The boats used in the inshore, federal waters fishery generally range from 30-50 feet in length and have a crew of one to four persons. The vessels used in the offshore lobster fishery are generally from 50-100 feet in length and have a crew of three to five.

Lobster fishing businesses, even the largest offshore operations, are small businesses with a high degree of hands-on management by the owners, who usually are also the operators of the vessels.

As small, independent businesses, each lobster fishing operation is unique in its style of operation, from the size of the boat to the number of traps, the size and style of traps, the rigging of traps, the frequency with which the traps are hauled, the specific locations in which the traps are set, and a myriad other factors which are determined by the preferences of the owner, the socio-economic setting, and local environmental, and hydrographic conditions. Industry practices are constantly evolving as independent businessmen and women do their best to improve their businesses.

Until recently, anyone could obtain a state lobster license or a federal lobster fishing permit and enter the lobster trap fishery. Amendment 5 to the federal Lobster Fishery Management Plan limited federal lobster permits to those vessels that had landed lobster prior to 1991. The Commonwealth of Massachusetts also limits the number of state lobster licenses and the State of Maine now has an apprenticeship program that will restrict the entry into the lobster fishery. Massachusetts also has an 800 trap per fisherman limit, and Maine has a 1200 trap limit, with the likelihood that recently organized state-waters lobster management councils will further restrict the number of traps that can be fished.

Because of the extreme variability of individual fishing styles, little can be said about "typical" lobster fishing operations. Depending on the area and the individual, lobstermen may fish single traps, each with its own buoy, "pairs" of traps on a single buoy, or "trawls" of multiple traps with a buoy on each end.

Offshore lobster trap fishery (Lobster Management Area 3)

Lobster Management Area 3 was created by Amendment 5 to the federal Lobster Management Plan for stock assessment purposes and management based on a combination of operational and lobster resource factors. While no data were provided, accounts by industry indicate that approximately 100 vessels fish lobster traps in Lobster Management Area 3, on either a seasonal or year-round basis. The lobster trap fishery extends out to depths of 200 fathoms (fm) or more along the edge of the continental shelf from the US/Canada boundary to Cape Hatteras. While inshore lobster boats may fish either singles, pairs, or trawls, offshore lobster boats use trawls, generally from 40 to 60 traps in length. The trawls are required by law to have a "high-flyer" with a radar reflector on each end. In addition to the high-flyer, an inflatable buoy is fastened to the buoy line adjacent to the high-flyer to take the strain of the current and allow the high-flyer to remain upright. The buoys and traps must be marked with ownership identification.

Offshore lobster fishing is a year-round business, although some boats have concentrated on crab trapping during winter months in recent years. Some offshore lobster boats bring their traps ashore during the winter, some concentrate their fishing on the narrow edge of the continental shelf, and some fish for crabs in the mid-shelf region. Offshore boats generally have from 1,500 to 3,000 traps in the water, with some boats fishing 5,000 or more. Traps are hauled once per week or more when the lobsters are potting well, and somewhat less during the winter when the weather controls their ability to haul the traps. In the early days of the offshore lobster trap fishery (the 1970s and 1980s), some boats left their traps untended for a month or two during the winter because the boats tended to be smaller than they currently are, because the offshore

lobster fishery was formerly more productive than it currently is during the summer months, and because there was no real market for crabs, which is now the alternative fishing opportunity during the winter months. The practice of "storing" traps in certain "safe" areas for a period of time in the winter has diminished as the fishery has become more competitive and the crab market has provided an additional opportunity for vessel owners to continue to make use of their capital through the winter months.

A few years ago it would have been possible to state that offshore lobster boats generally used somewhat larger traps than inshore boats, but recent years have seen an increase in the average size of traps in the inshore fishery and a comparable shift to smaller traps in the offshore fishery. Offshore lobster boats generally set their trawls in the same direction as the current is flowing, which stretches the trawls out and keeps the line between the traps tight and low.

The lobster trap fishing effort in Lobster Management Area 3 has been increasing slowly but steadily over the years. Although the total number of federal lobster permits is now limited, there are many inactive permits that can be turned into active offshore lobster vessels. The offshore lobster industry has been working for ten years to develop a management plan that would control the fishing mortality on the offshore lobster resource, however no plan is currently in place.

c. Recreational Fishery

Information on the number of recreational lobster fishermen is available only for New Hampshire, Massachusetts, Rhode Island, Connecticut, and New York, where licenses are required to fish lobsters for recreational purposes. Recreational fisheries are conducted with a number of techniques, which include traps and diving with SCUBA equipment. While diving for lobsters is prohibited in Maine and New Hampshire, it can be an important component of the fishery in other areas. In Maine, where a license is required to fish lobster for any purpose, all licensed lobster fishermen are classified as "commercial". However, a number of those fishermen are known to fish for lobsters only for recreational purposes. Recreational lobster fishing occurs in New Jersey, but its importance is not known, since the state does not currently issue licenses except for pot gear.

It is unlikely that a recreational trap fishery of any magnitude exists beyond three miles from shore. Similarly, recreational fisheries in areas south of New Jersey are unlikely due to low availability of lobsters in the near shore waters of the states concerned.

d. Justification for Inclusion in the TRP

Based on a review of 1990-1994 large whale entanglement reports received by the agency, the inshore and offshore fisheries were combined into a single fishery, the Gulf of Maine/US. mid-Atlantic lobster trap/pot fishery, and proposed to be placed in Category I in the 1997 List of

Fisheries (LOF) (see 61 FR 37035, July 16, 1996). Serious injuries and/or mortalities to large whales are known to occur in this fishery. An examination of large whale entanglement records were reviewed at 61 FR 37035, July 16, 1996. Based on this analysis, the annual serious injury and mortality across all fisheries for humpback, northern right whale, and minke whale stocks interacting with this fishery exceeded 10 percent of the PBR for all of these species. Further, one record of serious injury and/or mortality of a northern right whale, and 11 records of serious injury and/or mortality of humpback whales, were reported for this fishery from 1990-1994.

These records cannot be extrapolated to a total kill estimate and therefore represent a minimum serious injury and/or mortality rate (from a 5-year average) of 0.2 per year for northern right whales, and 2.2 per year for humpback whales. This rate is greater than 1 percent but less than 50 percent of the PBR for humpback whales, but equal to 50 percent of the PBR for northern right whales. Therefore this fishery was placed in Category I in the 1997 LOF.

In addition to the one right whale entanglement used in the above analysis, the agency has received several reports of right whale entanglements prior to 1990 and after 1994 as well as during the 1990-1994 period which are or may be attributable to the lobster fishery.

2. Northeast Sink-Gillnet Fishery

a. General Description

The Northeast Sink Gillnet Fishery includes components targeting several species of groundfish (the multispecies fishery), as well as monkfish and dogfish. In the early 1990's, there were approximately 349 vessels (full and part time) in the New England multispecies sink gillnet fishery (Walden, in review). NMFS Sea Sampling observer coverage in trips has been 1%, 6%, 7.5%, 5%, 7% and 5% for years 1990 to 1995. The fishery has been observed in the Gulf of Maine and in Southern New England.

A gillnet is designed as an upright barrier of monofilament netting in which the fish are caught in the meshes of the net. Gillnets can also be tied down or lay down, depending on varying fishing practices. Fish, of a size for which the net is designed, swimming into the net can pass only part way through a single mesh, thereby becoming "gilled." Various mesh sizes are used depending upon the species and size of the fish to be caught. Gillnets can be suspended at the surface, in midwater, or close to the bottom by controlling the number of buoy lines, the size and number of floats on the top or cork line, and the weights on the lead line. The New England sink-gillnet fishery sets nets on the bottom, where they are fixed by anchors. There, nets are known as sink gillnets and are primarily used to catch groundfish (cod, haddock, hake, pollock, and flounders), monkfish and dogfish. The LWTRT focused on the sink gillnet fishery that comprises 99% of the fishery in New England.

Gillnetting is a traditional New England fishery, originally introduced in 1880. This small boat/owner-operated fishery has provided employment in New England, including captains and crew, dealers, gear manufacturers, net makers, dock workers, truck drivers, fuel companies, fish

processors, etc. Because vessels are small owner-operated boats, they remain cost effective and the fishery has remained an important contributor to many New England coastal communities. See **Appendix 4**.

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 other groundfish, many gillnet vessels have now switched to targeting monkfish and dogfish. According to industry representatives, there are less than 150 sink-gillnet operators fishing in the Gulf of Maine and Great South Channel areas. This number is more than a 50% reduction in the fleet since the early 90's. The number of operators may decline further with the implementation of new regulations.

The fishery consists mostly of small vessels, (about 30-50 feet or 10-17 meters in length) that operate from numerous ports throughout New England. Gillnets are a "passive" gear meaning that nets do not actively pursue any target species but set up to intercept the fish in the gear. 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. Soak time variabilities exist within the fishery depending on the target species. Other vessels, such as those 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, making trips that last from 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, which are also caught with gillnets, or to using lobster traps.

A vessel may fish between 40 and 200 nets depending on target species. Nets are 50 fathoms (91.5 meters) long and are tied together in strings of 1-30 nets; the highest portion of the net may extend nearly four meters above the seabed. The average net extends only about 8 feet off the seabed and only during periods of slack tides. During periods when the tides are running, the net is pushed over in the direction of the tide, resulting in a 50% reduction in height. 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.

b. Monkfish

Two methods of using gillnets to target monkfish are commonly used by fishermen. Different methods are used in the two geographic areas (Gulf of Maine and Mid-Atlantic), partly as a result of the way fishermen use gillnets to target other species and also because of the amount of bycatch of undesirable species. Although monkfish are more resistant to predation by parasitic amphipods while they are in the net, the abundance of parasites also plays a part in the frequency that gillnet fishermen tend their monkfish nets.

Most gillnet fishermen who target monkfish in the Gulf of Maine set more panels of shorter nets and tend their gear more frequently than do fishermen in the Mid-Atlantic. An average fisherman sets 20 net-strings, having a total of 170 nets, each net 300 feet long. This pattern translates into approximately 51,000 linear feet of net. Most use 12-inch mesh, but use lighter twine than do fishermen in the Mid-Atlantic. Except for periods of exceptionally inclement weather, these gillnets are hauled and reset daily.

Gillnet fishermen in the Mid-Atlantic, on the other hand, set fewer nets and tend their gear less often. An average fisherman sets 12 nets every other day, each 1,000 yards long. By alternating sets, the fishermen fish a total of 72,000 linear feet of net, while using net reels that can hold about 48,000 feet of net. The frequency that they haul nets varies seasonally. During the spring run, the mid-Atlantic gillnet vessels try to fish every other day, but during the winter the fishermen haul their gear every two to three days. Because they tend their gear in alternating sets (12 nets one day and 12 other nets the next fishing day), each net is hauled every two days to a week interval. The longer interval between hauls is possible because the heavier twine used in the Mid-Atlantic has less bycatch of undesirable species, although it does not fish as well for monkfish.

Nearly all landings by fishermen using gillnets to target monkfish occurs in Massachusetts, Rhode Island, New York, and New Jersey. Landings have a distinct seasonal pattern that corresponds to the monkfish spawning activity. Directed monkfish landings peak mainly in May and June. A secondary peak in Rhode Island and New Jersey landings occurs in November and December, partly in response to higher liver prices during the winter months. Although a spring season for monkfish occurs in Massachusetts, there appears to be a trend of increasing landings in all seasons, especially during 1994.

Gillnet fishermen that target monkfish rely on the spring season because of the higher catch rate caused by greater availability of fish to the gear. Gillnets are stationary and work by capturing fish that are moving, either for extensive migrations or for localized redistribution. Although extensive migrations of monkfish have not been documented, it appears that they migrate at least short distances to spawn during May and June. The timing of spawning for monkfish in the southern area has been documented by Armstrong (1992). Additional evidence comes from fishermen that have reported, during scoping hearings, that during the springtime near ledges they often catch monkfish that are emitting their egg veils on deck.

c. Dogfish

Most gillnetters fish part-time for dogfish. Dogfish season typically extends from June through November in the Gulf of Maine, and September through December in the southern Northeast. Dogfish nets are standup gear, and have a smaller mesh size than monkfish nets, generally 6-7", and shorter soak times than monkfish nets, approximately 10-24 hours. Soak times are shorter due to rapid deterioration of the fish. The dogfish fishery is extremely limited north of Portland, Maine. In Maine, dogfish fishermen set approximately 60-80 nets. In the rest of the Northeast,

dogfish fishermen set approximately 80-120 nets. Occasionally, boats from the Northeast fish for dogfish in the Mid-Atlantic and land in the north. In the Mid-Atlantic, fishermen targeting dogfish tend to set approximately 60 nets or fewer.

d. Justification for Inclusion in the TRP

While the sink gillnet fishery generally has a low bycatch of non-target fish species, the fishery interacts with several species of marine mammals, including both small and large cetaceans and pinnipeds. This fishery is currently listed as a Category I fishery due to takes of harbor porpoise and Atlantic white-sided dolphins. (A Category I fishery is one which in which serious injury or mortality to a marine mammal stock at a level of greater than or equal to 50% of the PBR has been documented.) The NMFS Sea Sampling program has recorded takes of minke whales incidental to this fishery. In addition to sea sampling reports, NMFS has received opportunistic reports from the public which record entanglements of humpback, minke, and possibly finback whales in this fishery. Takes of right whales in gillnets (and other unidentified gear which may have been gillnets) have been recorded historically for US waters, but NMFS does not currently have information that conclusively identifies those gillnets as groundfish sink gillnets. However, the gear type has been documented to take right whales in Canadian waters. Therefore the LWTRT is addressing the potential for takes of right whales in the US sink gillnet fishery.

In the 1997 List of Fisheries (LOF), monkfish, and dogfish species in addition to spiny dogfish, were added as target species for the Mid-Atlantic coastal gillnet fishery. Prior to the 1997 LOF, both monkfish and dogfish were already included as target species for the Northeast sink gillnet fishery. (These listings are from the LOF and do not necessarily represent species groupings under fishery management plans.) The boundary between the Northeast Multispecies sink gillnet fishery and Mid-Atlantic coastal gillnet fishery was changed from 71 degrees, 40' West Longitude to 72 degrees, 30' West Longitude in the 1997 List of Fisheries in order to accommodate a change in the Multispecies Fishery Management Plan and to eliminate an overlap with the Mid-Atlantic coastal gillnet fishery.

3. Mid-Atlantic Gillnet Fisheries

(The New York , New Jersey, and Delaware fishing information was provided by Joe DiAlteris of the University of Rhode Island Fisheries Center.)

a. New York

The ocean gillnet fishery in New York is concentrated around Shinnecock and extends mostly through the southern half of the state. Between 1989 and 1991 about 60-70% of New York commercial vessels operated out of Suffolk County (Salz, 1991). An extensive gillnet fishery exists in Long Island Sound, in addition to the gillnet bait fishery. This bait fishery is allowed only in Long Island Sound, Monday through Friday from April 1 through November 15, targeting menhaden. Gillnets could be used only with a permit issued by the New York Department of Environmental Conservation. A permittee is allowed to fish only one gillnet of a maximum length of 300 ft and mesh size no less than 3.5 in.

The ocean gillnet fishery targets bluefish, monkfish, weakfish, and dogfish. The vast majority of the fishery occurs in state waters with the exception of dogfish and monkfish fisheries. In general, gillnet effort increases in March and reaches a maximum in July, when fishing for bluefish and weakfish and continues until December. The size of a typical net is about 900 to 1,800 ft with mesh size generally between 5 and 10 in. The licensing system in New York does not separate commercial fishing vessels by gear category, thus there is difficulty accounting for total gillnet effort in New York. The most recent survey (1991) conducted by the Department of Environment Conservation, indicated that 293 licenses were issued to gillnet operations. Most of these licenses were bait fishers in Long Island Sound.

b. New Jersey

The major gillnet fisheries in New Jersey are: 1) small mesh (3-5 in) gillnet targeting bluefish, weakfish, and striped bass; and 2) large mesh gillnet targeting sturgeon and monkfish. The latter covers wider grounds along the New Jersey coast from Beach Haven north to Bradley Beach and from one-half mile to 25 miles offshore. The nets used are anchored gillnets with mesh sizes ranging from 11 to 13 in. stretched. Net dimensions range from 8-15 ft. in depth and the amount of net lifted per day per fisher varies from 900 to 9,000 ft. in length with an average soaktime of 24 to 48 hours (weather permitting). Hydraulic net reels are frequently used on small vessels. The fishery is centered around Barnegat Light, Pt. Pleasant, and Delaware Bay. The vast majority of gillnets are in the water from March to November, with the peak of fishing activity in the spring when most species are migrating along the shore to the north. There were about 885 New Jersey licensed commercial vessels in 1995, including all gear types, from which the number of gillnetters is not identifiable. In Delaware Bay, there are as many as 100 gillnet vessels mostly active in the springtime in the Bay. Outside of the Delaware Bay there are roughly 14 to 25 active fishers concentrated mainly in Barnegat Light.

c. Delaware

There are two major gillnet fisheries in Delaware; anchor and drift gillnet fisheries. Drift gillnets are deployed and retrieved in the same day, targeting weakfish, bluefish, spot and menhaden. This fishery is active from April to December, operating mostly in the Delaware Bay. Anchor (or fixed) gillnets targeting primarily shad are set for days but tended daily (weather permitting), fishing mostly (80% of total effort) in Delaware Bay. In 1995 about 126 vessels (51 anchor gillnets and 75 drift gillnets) fished either in Delaware Bay or the Atlantic Ocean, and used about 1.9 million yd. of nets (Whitmore and Cole, 1995). The maximum effort is generally reached in April-May. In 1995, the gillnet fishery contributed almost 80% of the total landings valued at a little over $1.2 million.

The number of licensed commercial fishers has been increasing in recent years. A total of 255 commercial fishing licenses were issued in 1994, which include 126 commercial gillnetters (Whitmore and Cole, 1995). There is hardly ever any gillnet activity outside of Delaware Bay, with the exception of one vessel that operates out of Indian River in the spring. A moratorium on

gillnet licenses was put in place in 1984 which restricted new entrants into the gillnet fishery. Recent management measures are calling for an effort reduction to 40 licenses by 1997.

d. Maryland

Maryland has had 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 10 participants in this fishery, who reported fishing a total of 53,900 yards of net, with landings 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 3 and 12 miles. It is an anchor gillnet fishery and fished an estimated 110,600 yards of net in 1996 (including dogfish nets). Most fishermen let their nets soak from one to three days. The fishery is carried out from December through May.

Spiny and smooth dogfish sharks 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 move 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.

e. Virginia

Coastal gillnet fisheries use both anchored and drift gillnets to harvest anadromous as well as coastal pelagic and nearshore species. The fisheries are opportunistic, targeting various species throughout the year. Large mesh gillnet fisheries are more prevalent during spring and early summer months, for harvesting dogfish, other sharks, and black drum. The fishery for sciaenids is mostly a small mesh fishery. Gillnetters are limited to one 1,200' net per gear license and can purchase multiple gear licenses. On average, for both mesh-size types of fisheries, fishermen are setting from six to eight 1,200-foot anchor gillnets. Regulated mesh sizes and seasons are species-specific.

In coastal Virginia waters, there is a moderate harvest of dogfish during winter. This fishery mainly takes place in winter and spring months in both state and adjacent federal waters. Smooth dogfish landings peak in the spring while spiny dogfish peak in winter. In 1995, smooth

dogfish landings peaked in May with approximately 250,000 pounds, while spiny dogfish landings peaked in January with approximately 183,000 pounds. It is important to note that unclassified dogfish landings peak in January with approximately 305,000 pounds. Sharks of various species are typically harvested from state and federal waters during this same time period.

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.

Most of the large-mesh black drum fishery takes place from April to June in state coastal waters. This fishery is a limited entry, quota-controlled fishery. In 1995, these landings peaked in May with approximately 21,500 pounds.

Summer through late fall fisheries are principally for sciaenids, with the majority of harvest from state waters. By far, a majority of harvests of most species mentioned above are from state waters. Harvests of dogfish and sharks are fairly evenly distributed between the two areas.

In an effort to describe fisheries effort information, 1993-June, 1996 Marine Resources Program (MRP) data were analyzed on a trip basis by month fished. For presentation purposes, trip level information is described in six broad fishing areas. Fishing areas are broken into upper and lower Eastern Shore bays and tributaries, lower bay, ocean Eastern Shore, ocean Virginia Beach and unclassified coastal rivers and bays. See **Appendix 5** for Virginia fishing charts referred to in this description.

Based upon available data for large whale distribution in the Mid-Atlantic, the months of December through March have been identified as potential "high risk" months. For all areas, March is the only month with moderate gillnet trips from 1993-June 1996. Average percent of yearly trips (1993-1995), for the "high risk" months with respect to whale presence, for the upper Eastern Shore is 2.8% (less than 20 trips/year; Chart 1) while the lower bay is 2.4% (less than 100 trips/year; Chart 3). The lower Eastern Shore averaged 11.8% (usually less than 20 trips/year; Chart 2), the ocean Virginia Beach area averaged 14% (approximately 75 trips/year; Chart 5). Unclassified coastal rivers and bays averaged 12% (approximately 80 trips/year; Chart 6). The ocean Eastern Shore averaged 20.5% (approximately 47 trips/year for February and 291 trips/year for March; Chart 4).

f. North Carolina

Gillnets are used to harvest a wide variety of finfishes in the Atlantic Ocean off North Carolina throughout the year. Fishing occurs from the surf zone out to depths of 20-30 fm. Different species are targeted seasonally in different areas, and the fisheries vary greatly each year according to variations in migratory patterns of target species. These are major fisheries, providing most of the Atlantic coast commercial landings for at least two species, bluefish and

weakfish. Total ocean gillnet landings in North Carolina are in the range of 16.5-19 million pounds annually with an ex-vessel value of $6 million.

Because of changes in North Carolina's commercial fisheries reporting system, landings data collected prior to January 1994 may not be directly comparable to landings data since that time. Landings and effort data (trips) since January 1994 are considered to be more accurate than previously, so only data for 1994 to the present will be considered in this description of the fisheries. See **Appendix 6** for referenced tables and figures.

Figure 1 shows North Carolina's coastal counties and principle features. Table 1 provides annual ocean gillnet landings data by county for the major species. Figure 2 shows total gillnet landings by month; winter landing are dominated. For examination of possible gillnet interactions with protected species, fisheries landings are not very important; fishing effort information is of primary importance, and monthly trips by county are shown in the Appendix. However, landings data are important for estimating potential impacts on fishermen of management actions which might be taken to benefit protected species.

Table 2 provides a general description of North Carolina's ocean gillnet fisheries, including target species, seasons, and gear specifications.

Overall, Dare County dominates the ocean gillnet fishery, taking 70% of the trips and 80% of the catch, followed by Hyde County (11% of the catch), and Carteret County (5% of the catch). Sink gillnets dominate the total fishery, accounting for almost 97% of the total gillnet trips in the ocean off North Carolina during January 1994 - June 1996.

The principle ocean gillnet fishery in North Carolina is the sink gillnet fishery off Dare County. The principle season is December - April, which accounts for about 80% of the annual sink net trips in that area. For the January 1994 - June 1996 period, Dare County sink net trips accounted for 69% of total state gillnet effort. Landings are dominated by dogfish sharks which are taken mostly with 6 - 6.5 in stretched mesh nets. Striped bass, monkfish, bluefish, and a few king mackerel, are also taken with large mesh gillnets. Smaller mesh nets (3.125 - 4.5 in stretched mesh) are used for the very important winter fishery for weakfish and croaker. At the beginning and the end of the season, many boats fish out of the port of Wanchese using Oregon inlet, while during the season's peak (January - March), the Dare County fleet is concentrated in the Hatteras area. In practice, most sink nets are fished without anchors. 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 and taken in for maintenance and repair. On overnight trips, nets are left out overnight and fished at dawn.

The Hyde County ocean gillnet fishery is closely related to the Dare County fishery based at Hatteras, with fishermen from both counties sharing fishing grounds. Principle target species are the same: dogfish, croaker, weakfish, and bluefish. Gear and fishing practices are also very similar. Hyde County fishermen take about 7% of the total ocean gillnet trips, harvesting 11% of the catch.

The Carteret County ocean gillnet fishery is also concentrated during the cooler months, but with most effort taking place in the fall and early winter. About 80% of the annual ocean gillnet effort off Carteret County occurs during October - January, in contrast to Dare County where extensive gillnetting occurs during February and March. However, data for 1996 indicate greatly increased sink net fishing in Carteret County during February - April. The species mix in this area is quite different than farther north. The major target species, (croaker, weakfish, spot, and kingfish) are generally smaller than in Dare County, so smaller mesh nets are used (2.5 -3.125 in stretched mesh). Ocean gillnet fishing trips from Carteret County ports (principally Harkers Island and Beaufort) accounted for about 11% of the state total. As in Dare County, well over 90% of the county's gillnet trips involve sink nets. These gillnets are generally not anchored. Vessels stay in the general vicinity of their nets, fishing them periodically, retrieving them at the end of the day.

Ocean gillnet fisheries south of Carteret County are much smaller in scope, accounting for only 12% of the total trips taken during January 1994 - June 1996 and less than 4% of the harvest.

The fishing seasons in the southern area (Onslow, Pender, New Hanover, and Brunswick counties) also differ from the central and northern areas. The fall (September - November) and spring (March and April) account for most of the effort (67% of trips) in this area, with greatly reduced fishing during December - February. Except for the American shad fishery, all of the fisheries in this area use small mesh sizes (2.5 - 4 in stretched mesh).

g. Justification for Inclusion in the TRP

Between 1989 and 1992, 28 humpback whales stranded from New Jersey through North Carolina (Wiley et al., 1995). Significantly more strandings occurred between Chesapeake Bay and Cape Hatteras, North Carolina. Strandings increased from February through April, and 25 percent had scars consistent with net entanglement. Between 1993 and 1996, 15 humpbacks stranded from Delaware to North Carolina.

This fishery includes, but is not limited to, Atlantic croaker, Atlantic mackerel, Atlantic sturgeon, black drum, bluefish, herring, menhaden, scup, shad, striped bass, sturgeon, weakfish, white perch, yellow perch, dogfish, and monkfish (see 61 FR 37035, July 16, 1996). NMFS defined the mid-Atlantic coastal gillnet fishery as bounded on the east by the 72°/30' W. longitude. line, running south from the southern Long Island shoreline, and on the south by a line drawn from the North Carolina-South Carolina border east to the 72°/30' line (62 FR 33, January 2, 1997)). This fishery has been classified by NMFS as a Category II fishery.

4. Southeast Shark Gillnet Fishery

a. General Description

The Shark Drift Gillnet Fishery occurs outside of state waters from Port Salerno, Florida to Savannah, Georgia. The number of boats known to be fishing in the fishery increased from 5 in

1993 to 11 in 1995, but total trips decreased from 1994 to 1995, when trips per boat dropped from 30.8 to 13.5. The number of boats participating in the fishery today is estimated at 16. Boats in the fishery average 12.2 to 19.8 m long and are used in other fisheries, including king and Spanish mackerels, and pompano. Fishing trips typically last less than 18 hr and usually occur within 30 mi. of port. Crew size ranges from 3 to 6.

Due to a net ban in state waters of Florida, and the prohibition of gillnetting east of beaches in Georgia, nets are set at least 3 miles offshore in water depths ranging from 4.6 to 21.0 m. Net soak times range from approximately 6.7 to 7.7 hr. Nets used are 275 to 1800 m long (limited to 2,700 m), 3.2 to 4.1 m deep, and are usually composed of several sections. Stretched mesh sizes range from approximately 5 in to 11 in. Nets are weighted with 0.6 to 0.8 kg/m of leadline and have floats that are 7.6 to 15.2 cm long by 7.6 to 15.2 cm diameter every 0.6 to 1.1 m. These weights and floats decrease the looseness of the webbing.

Nets typically are set and fished at night. Battery operated strobe lights usually are attached to each end of the net, and sometimes in the middle, to allow fishermen to keep track of their net. Nets are usually set in an east to west or west to east direction, depending on currents and wind direction. Using a spotlight, Captains normally inspect the entire length of their net at the conclusion of setting and every 0.5 to 2 hr thereafter to assess the catch and ensure the net is fishing properly.

The shark drift gillnet fishery is managed under the Fishery Management Plan for Sharks. This fishery targets both Large Coastal and Small Coastal sharks, and operates under a quota which opens on January 1.

b. Justification for Inclusion in the TRP

A right whale calf was observed in February, 1994, about ten miles off of Jacksonville, with cuts nearly severing each fluke from the leading edge, back. Additional injuries across the blowhole and head area were similar to injuries observed on right whales entangled in gillnet gear in New England. Researchers from the New England Aquarium believe that the calf was entangled in gillnet gear, and then hauled back into the fishing vessel's props as the gear was being retrieved. Trent and Parshley's (1995) description of net retrieval in the shark gillnet fishery over the stern of gillnet vessels is consistent with this theory. The gillnets are set and retrieved at night, they are set in an east-west direction crossing whale pathways, and the vessels are large enough to tow a small calf. Additionally, this fishery was determined to be the only fishery operating in the area at the time. Given these data, and the precarious status of the northern right whale, this fishery will be reviewed by this THE LWTRT. This fishery has been classified as a Category II fishery.

5. Other Fisheries

There are a number of other Atlantic fisheries which are known to have taken whales from the stocks which are the focus of this TRP. In addition, other fixed gear fisheries may have the

potential to take these stocks because they use similar gear types and may therefore represent an entanglement threat similar to that of the fisheries included in this TRP. Of particular concern are those fisheries which use vertical buoy lines. These fisheries are not addressed specifically in this TRP because: 1) the fishery is the subject of a different TRP, 2) the fishery is no longer active, 3) the fishery is listed in Category III or is unclassified and not required by the MMPA to have a TRP developed, 4) the fishery has no known takes of these whale species, 5) the fishery has takes but they were so long ago (i.e., prior to 1990) that they are not counted against PBR in the current stock assessment, 6) the fishery has taken marine mammals, but the animals were released unharmed (i.e., did not incur serious injury), and/or 7) the fishery occurs in foreign waters beyond the legal scope of this TRP. These fisheries include the following:

- large pelagics driftnet fishery (takes of humpback, right, and minke whales; covered in Atlantic Offshore Cetacean TRP)
- large pelagics longline fishery (no known takes; covered in Atlantic Offshore Cetacean TRP)
- Japanese tuna longline fishery (at least one minke whale taken; no longer an active fishery)
- bluefin tuna hand gear (hand line/hook-and-line/harpoon) fishery (historical takes of humpback and possibly right, minke, and finback whales; currently listed as a Category III fishery)
- tuna purse seine fishery (humpback and minke whales taken but released unharmed; Category III fishery)
- Northeast small pelagics surface gillnet fishery (at least one humpback take; currently Category III or unclassified)
- groundfish bottom trawl fishery (may take humpback whales; Category III fishery)
- groundfish bottom hook-and-line (historical humpback takes; Category III)
- scallop dredge fishery (may have taken humpback whales historically; Category III)
- pot fisheries (finfish and shellfish other than lobster; no known whale takes; Category III)
- U.S. and Canadian finfish trap fishery (historical take of right, humpback and minke whales; U.S. fishery classified as Category III)
- U.S. and Canadian weir/stop seine fisheries (historical takes of right, minke, and humpback whales; U.S. fishery classified as Category III)
- Canadian sink gillnet fishery (takes of right, humpback, finback, and minke whales)
- Canadian lobster fishery (takes of right whales)
- Canadian/Greenland salmon gillnet fishery (takes of minke whales; ended in 1993)

C. Overlaps of Whale Distribution and Fishing Effort

1. Humpback Whales

Appendix 7 (NMFS, unpub. data) provides detailed distribution data for humpback whales. These data have not been effort-corrected and may not include all humpback whale sightings. Also attached is a CETAP chart, which provides more comprehensive data that were systematically collected from 1979 to 1981. While variation both within and between seasonal usage may occur, the principal high use habitats for this species does not appear to have changed significantly since the CETAP study (Mattila, pers. comm.). In the Mid-Atlantic however,

sightings have increased in the 1990's (Swingle, pers. comm.). See **Appendix 8** for maps of large whale sightings in Virginia See also Stock Assessment information in Section III.

2. Right Whales

Appendix 9 (NMFS, unpub. data) provides distribution data for right whales in the Northeast and portions of the Mid-Atlantic. These data also are not effort-corrected, but include all recorded sightings. Distribution in the southeast is mapped in **Appendix 10** (Final Recovery Plan for the Right Whale, 1991, and FDEP, unpub. data). See also Stock Assessment information in Section III.

3. Minke and Fin Whales

Minke and fin whale distribution is discussed briefly in the stock assessment information in Section III.A.

4. Potential Areas of Interaction with Fishing Gear

Appendix 11 (NMFS, unpub. data) maps out areas of potential interaction between sink gillnet gear and both right and humpback whales by month in the Northeast. Similar information is unavailable for the northeast lobster fishery and for the other fisheries of concern to the LWTRT.

D. Entanglement Information

Appendices 1 and 2 (NMFS, unpub. data) provide the most complete set of entanglement information available to the LWTRT. **Appendix 12** (NMFS, unpub. data) provides an analysis of serious injury and mortality entanglements relative to PBR for both right whales and humpback whales. These analyses provide average annual take information for each of the fisheries of concern to this Team.

E. Other Activities/Issues

1. Other Causes of Mortality (see Stock Assessment information, Section III.A.)

2. Other Efforts Focused on these Marine Mammals.

a. ESA NE and SE Implementation Teams

The northern right whale and humpback whale were listed as endangered species in 1970 (see 35 FR 8495; June 2, 1970) under the authority of the ESA. Final Recovery Plans under the ESA have been published by NMFS for both species (NMFS, 1991a, 1991b). To facilitate the implementation of recovery tasks identified in the Recovery Plans, two teams have been constituted. These are the Southeast Right Whale Recovery Plan Implementation Team (SE Team) and New England Whale Recovery Plan Implementation Team (NE Team). The SE

Team is concerned only with right whales, while the NE Team is concerned with both right and humpback whales. Members of the Teams are appointed by the Assistant Administrator for Fisheries. They include representatives of the key federal and state agencies and private organizations with responsibilities identified in the Recovery Plans. The Teams are charged with focusing recovery task priorities and coordinating their completion. The Teams have no legal authority, but are advisory in nature and serving at the request of NMFS. The Teams are responsible for:

- working with and advising NMFS on any and all issues related to the recovery of right and humpback whales, and the implementation or revision of the Recovery Plans;
- working through their memberships to coordinate the implementation, by member and other agencies and organizations, of tasks identified in the Recovery Plans; and
- identifying priority tasks that could be undertaken by Team members and their organizations, with measurable goals and schedules.

b. Massachusetts State Right Whale Team

In Strahan vs. Coxe, an alleged whale preservationist sought injunctive relief by prohibiting the Commonwealth of Massachusetts from licensing gillnet and lobster pot fishing in Massachusetts coastal waters on the ground that such fishing constitutes a "taking" of northern right whales in violation of the federal ESA.

On September 24, 1996, US District Judge Douglas Woodlock declined to enjoin the Commonwealth licensing of such fishing, but ordered the Commonwealth to, among other things, submit a plan to the court to restrict, modify, or eliminate the use of fixed gear in coastal waters of Massachusetts known as critical habitat for northern right whales. Also, the Commonwealth was ordered to convene an Endangered Whale Working Group to address "modifications of fixed fishing gear and other measures to minimize actual harm to northern right whales." Seven of the ten members of the Working Group were also members of the LWTRT.

After five meetings, the Commonwealth officials prepared the Conservation Plan for Massachusetts Waters to Minimize Entanglement Risk of Right Whales, a list of preferred solutions to mitigate the identified problems. Also a report describing the problems and range of potential solutions was submitted to the court.

On December 16, 1996, the Commonwealth without raising any defenses or waiving rights of appeal, submitted the Conservation Plan to the court. Then on January 7, 1997, the presiding judge conducted a status conference hearing on the plan. The Commonwealth officials advised the court that it intended to adopt pursuant to the Commonwealth's regulatory authority, the measures proposed in the plan. In response, the court declined to issue any further orders but made clear that it would continue to exercise oversight over the matter. Further elaboration on the Massachusetts Conservation Plan is planned with the court in April.

c. Stellwagen Bank National Marine Sanctuary

Overlying the essential marine mammal habitats of Stellwagen Bank and the southern portion of Jeffreys Ledge is the Stellwagen Bank National Marine Sanctuary (the Sanctuary). Managed by the NOAA/National Ocean Service's Marine Sanctuary, this 638 square nautical mile area was designated by Congress in November of 1993 to protect these critical areas of the marine environment. While designated to protect all the resources that use these habitats, the designation was particularly focused on the protection of marine mammals, which by the designation are determined to be a resource of special national significance. According to the Sanctuary Designation Document, the Sanctuary, "provides feeding and nursery areas for humpback, fin, and northern right whales, the latter being the most critically endangered of all the large cetacean species. The photo-identification at Stellwagen Bank of 100 or more individual right whales from a total North American population estimated in 1990 at approximately 300 to 350 indicates the importance of the Bank to this species."

Because of the critical nature of the habitat, a considerable portion of the management activity of the Sanctuary is focused on marine mammals targeted in the TRP. The Sanctuary has regulations that parallel the ESA prohibiting the take of marine mammals, and works collaboratively with NMFS to insure that activities occurring in the Sanctuary do no harm to these endangered species.

Considerable effort is directed at enforcement of marine mammal laws through an interagency agreement between the Sanctuary and the US Coast Guard (USCG). The Sanctuary sponsors research targeted at better understanding the habitat, and the Sanctuary resources that use it, to better understand and thereby better manage activities that may affect the sustainability of these resources. The Sanctuary also engages the public and user groups through outreach and education efforts. One relevant example of this is the recent publication, with the Gray's Reed National Marine Sanctuary, of a "Right Whale Handbook," which provides detailed information about the northern right whale for middle and high school students. Sanctuary staff participate in a number of regional, multi-agency whale conservation efforts, including the NE Implementation Team and the LWTRT.

3. Other Efforts Focused on Fishing Effort

a. New England Fishery Management Council

The New England Fishery Management Council has responsibility for managing and conserving fishery resources in both New England and mid-Atlantic federal waters. Sink gillnets are among the fishing gear types regulated by the Council's Northeast Multispecies Fishery Management Plan (FMP).

The Council has proposed, and will finalize on January 29, 1997, a fishing effort reduction program for the gillnet vessels that will be equivalent to the reductions in effort required by the other harvesting sectors fishing for the species regulated by the FMP. The principal mechanism to accomplish this is an overall 50 percent reduction in the number of days available to fish for

groundfish and a cap on the number of nets per vessel used in the day boat fleet. Other management measures which affect the gillnet fleet and are already in place include area closures to protect spawning fish and seasonal harbor porpoise area closures. The Council also is proposing to close most of right whale critical habitat in the Great South Channel area and in the federal waters portion of the Cape Cod Bay Critical Habitat to sink gillnet gear during periods when the whales are most abundant.

b. Lobster

i. The Atlantic States Marine Fisheries Commission

Primary responsibility for the management of the northeast lobster fishery is shifting from the New England Fishery Management Council to the Atlantic States Marine Fisheries Commission (ASMFC), which is an organization of Atlantic coastal states. This shift is occurring because of the predominance of lobster landings in state waters and the management flexibility offered by the Atlantic Coastal Fisheries Cooperative Management Act (ASMFC, 1996). Under the Atlantic Coastal Fisheries Cooperative Management Act, each state will be required to implement state regulations in support of a lobster management plan which will be developed by the ASMFC. Also under the Act, the Secretary of Commerce (NMFS) will implement complementary regulations for the federal waters lobster fishery.

Scientific advice for the lobster fishery indicates that it is overfished and that fishing mortality should be reduced. One of the primary tools under consideration for reducing fishing mortality is some form of trap limit.

ii. The National Marine Fisheries Service

The National Marine Fisheries Service has a responsibility to eliminate overfishing in the federal waters lobster fishery. The declared intent is to withdraw the current federal lobster management plan and replace it with secretarial regulations in support of the plan that is under development by the ASMFC. NMFS scientists have provided scientific advice concerning overfishing and the need to reduce the mortality rate of lobsters.

iii. Individual States

Each of the lobster producing states has a long tradition of management of its lobster fishery. Concern about the continued sustainability of the lobster fishery at current levels of exploitation have caused the states to review their lobster management programs and to work within the New England Fishery Management Council and the ASMFC to explore the need for management measures that would reduce the fishing mortality rate of the lobster resource. The states of Massachusetts and Maine have implemented trap limits and have placed controls on entry into the lobster fishery. Massachusetts has a strict license limitation system, while Maine has an apprenticeship requirement. It is likely that each lobster producing state will be required to place additional restrictions on its lobster fishermen as a result of the ASMFC lobster management plan currently under development.

gear type specific.

A. Measures/ Strategies: General

1. Gear Research, Development, Evaluation, and Application

It is generally agreed that risk of entanglement, serious injury, or death of whales in fishing gear may be reduced through a vigorous research and development program to design and implement new and better fishing techniques and technologies. The LWTRT recommends an aggressive gear research and development program begin immediately and be carried out in full partnership with industry and gear technologists. Efforts by other groups, such as the International Wildlife Coalition, to explore gear modifications could be reviewed. NMFS should work collaboratively with these groups to the extent possible. The LWTRT's expectation is that NMFS commit to pursuing research and development recommendations in a timely manner and either provide or recommend sources of funding. The purpose or goal of these gear research and development efforts is to research and ultimately develop gear that will not entangle whales, thereby eliminating serious injury and mortality of whales from fishing gear interactions.

The LWTRT recommends the following gear modifications and procedures be investigated:

1) Development of tag lines (a lightweight line that would pose no risk to whales yet would hold the buoy at the surface);
2) Development of a biodegradable or weak link at the bottom of the buoy line;
3) Improvement of the weak link design at the top of the buoy line;
4) Development of a gear coding system by region and gear type;
5) Development of smooth or non-snagging float line;
6) Development of methods either to sink floating line between traps or phase-in sinking line;
7) Evaluation of breaking strength of weak links;
8) Evaluation of performance of weak links in the float line both between and within net panels;
9) Development of biodegradable gear and gear components (i.e., lashing, line, webbing);
10) Investigation of gear more easily detectable by whales, including "noisy" ropes and low output acoustic devices such as pingers and clangers.

The LWTRT recognizes that the minimum breaking strength of the above features may need to be adjusted for different fishing areas due to tide, current, and setting protocols. The TRT agreed that the link must be the weakest link possible that is consistent with practical fishing gear handling and whale safety. Further, the LWTRT acknowledges that certain gear modifications may not be amenable for use or sufficiently protective.

Gear Certification Process

During the first year of implementation, the restrictions or modifications recommended in the TRP will be used until the above gear designs can be researched, refined, and evaluated. Additional or alternative modifications potentially will be adopted as appropriate and deemed useful.

A gear certification process builds upon the research conducted in response to the research recommendations. There are at least two sources of suggestions for gear modifications: 1) fishermen, and 2) gear technologists. First, gear technologists have the facilities to produce and test through various models several different prototypes of gear modification. They also have the experience and expertise to translate these ideas into well-engineered and cost effective production hardware. Second, drawing from their considerable experience in using a wide variety of gears and materials in harsh environments, fishermen are the logical source of creative ideas for effective and practical modifications to fishing techniques and technologies. Finally, fishermen and gear technologists must work together at sea during normal fishing operations to test prototypes and evaluate the long-term performance of production modifications, as some technologies and techniques may need to be adjusted for fishing areas and gear type. Conservationists, whale biologists and others also should be included at all levels of research, certification, and field testing.

Gear modifications would then undergo a certification process. Currently, NMFS has five or six technologists working through the University of Rhode Island as well as a gear technology laboratory in Pascagoula, MS. Both MIT and University of Maine at Orono have faculty with expertise in gear design and testing. Further research may identify other qualified individuals and institutional facilities. NMFS should develop criteria for certifying individuals and institutions as qualified to design, evaluate, and approve modifications for use consistent with the TRP. The basis for approval of any given technique or technology should be that it is judged to be equal or superior to current practice.

The equivalency criterion is important and will require that any preliminary certified gear modification or technology undergo field testing prior to final certification. A technique or technology that works well for one group of fishermen under their particular set of conditions may work less well or not at all under different circumstances. Even fishermen using the same gear in the same place may have personal fishing styles that result in different experiences with the same modifications.

Once field testing has been completed, a final certification of the gear may be possible. This certification will be the basis of the TRT to decide whether to: 1) require the new or refined gear

modification in areas that are already required to have some type of modification; 2) require the modifications in an area where there are currently no gear modifications; and/or 3) accept gear modifications into currently restricted areas, such as critical habitats. The standards and process for these decisions are discussed below.

Long-Term Evaluation

In the long term, the use of gear modifications is contingent upon continued field studies of large whales to collect adequate photographic data, to evaluate the incidence of new entanglement scarring. This photographic data will be reviewed annually. NMFS should assist with funding or identify sources of funding for this evaluation. A reduction in the severity and presence of entanglement scarring may suggest that gear modifications and fishing effort reduction have reduced the incidence of entanglement resulting in scars (it is assumed that if an animal can break away before getting wrapped in the gear, there should be little to no evidence of scarring).

Presumed mortality numbers will also be tallied (CCS and NEAq consider a whale deceased if not seen in the sixth year from the last sighting) to determine if there is a reduction. However, these figures will not be useful unless field survey effort is expanded and maintained, and until a minimum of six years after implementation of gear modifications.

Effectiveness of gear modifications may also be evaluated based upon witnessed entanglement events. Effort should be made by all potential witnesses to videotape or photograph the event and/or describe in detail the sequence of events which occurred, including in what part of the gear the whale was entangled, whether the animal was last seen carrying line, if there was gear still attached to the line (i.e., pots or netting), and where on the animal the gear was found (i.e., through the mouth, around the tail, or elsewhere). Knowing how and if the entangled gear was modified is essential for evaluating whether the gear modification was effective.

Imposing Additional or Changing Existing Gear Modifications and Lifting Gear Restrictions for Critical Habitat Areas:

Gear modifications judged to further reduce the risk of entanglement, serious injury, and mortality should be incorporated as they become feasible according to engineering standards, and tested by incorporation in designated gear modification areas. If successful, these modifications should be considered for incorporation into additional areas for further risk reduction. Success will be judged by LWTRT consensus at future meetings as specified by the TRP.

After the first full year of implementation of the TRP, closed areas may be opened only in the event that fishing gear has been demonstrated to pose minimal risk to whales. It is understood that the goal of gear modification is to develop gear that reduces the risk of serious injury or mortality to whales to levels approaching zero. The evaluation of, and decision to, open closed areas will be judged by LWTRT consensus at future meetings based on the information collected under the certification process, the TRP evaluation process, and whale research.

In both cases, the decision of the LWTRT will be forwarded to NMFS with recommendations to modify existing regulations as necessary to implement the LWTRT decision.

2. Fishermen Education/Outreach

Recognizing that all of the TRPs submitted to NMFS to date include recommendations for implementation of fishermen outreach and education programs to achieve their stated goals, the LWTRT recommends that NMFS initiate a series of contracts, to accomplish this objective in a way that takes into account differences in regions, areas of expertise, and the timetable required by law.

Background

The success of the TRP depends on effective implementation of the Plan's management proposal. The cornerstone of effective implementation of the bycatch mitigation measures requires outreach, training, feedback, and the active participation of the entire fishing industry. The latter is essential; fishermen must feel that they are a vital part of the Plan to reduce entanglement. The TRP will also require concurrent research into the long-term effectiveness of any proposed gear modifications as well as further research and development of gear modifications to reduce the bycatch of large whales. In addition, the continued long-term success of the TRP will require data gathering to assess the annual performance of the management plan and permit adaptive management and further refinement of the TRP to meet the goals and objectives of the MMPA and the TRP.

Fishing fleet census

Cooperation and coordination between NMFS, state regulators, and fishermen will help to achieve long-term compliance with large whale bycatch mitigation measures. To undertake effective outreach to the fishing industry, NMFS must first identify leaders, both formal and informal, in the fishing community and work with these leaders to identify and conduct outreach to individuals that actively fish in each of the fisheries identified to interact with mammals. Therefore, the TRT recommends that an interim program be initiated and coordinated in consultation with the states, using state and federal fishing permits, USCG registrations, and MMPA authorizations to develop a phone and mailing list of fishermen for purposes of public outreach.

Outreach workshops and programs

The success of a management proposal relies, in part, on effective gear modification to reduce large whale entanglement. In the Gulf of Maine sink-gillnet fishery, fishermen demonstrated, through experimental fisheries, that segments of the fishing industry can effectively use gear modification (e.g. pingers) in endeavors to deter marine mammal interactions. For example, in these programs, fishermen took responsibility, organized themselves, and established procedures to facilitate pinger maintenance, communication and data collection. The TRT believes that similar cooperative programs are absolutely necessary to reduce large whale entanglements.

Therefore, the TRT recommends that NMFS and state regulators, using existing state fishery management frameworks, conduct fishermen outreach workshops, and make use of the Internet and other means to:

- inform fishermen of the ESA, MMPA, and any provisions relating to law enforcement, including requirements for reporting, and indemnification resulting from issuance of incidental take permits, and the mandates of the TRT process;
- introduce fishermen to the proposed gear modifications developed by each TRP, share the experiences of fishermen who have worked with the technology, and train fishermen in the deployment, use, and maintenance of proposed gear modifications.
- inform fishermen of the intent, mechanisms, and requirements of each TRP and how regulations are implemented;
- provide fact sheets for identifying whales and describing their general seasonal distribution patterns;
- include coordination with established disentanglement teams for training in guidelines for release and disentanglement of entangled whales;
- further develop incentive measures, including market-based and other voluntary incentives, to effectively implement the TRP and regulations;
- supply observer, stranding, and disentanglement data to fishermen in a timely fashion; and
- work with fishermen to develop a code of "Responsible Fishing Practices" which would include, but not be limited to, many of the measures proposed in the TRP. This proactive approach would allow for many good ideas to be promoted and implemented without the need for regulations and/or restrictions.

In addition, the TRT recommends that NMFS, with assistance from the fishing industry and the conservation community, develop materials such as fact sheets, newsletters (e.g. Marine Mammal Protection Act Bulletin) and brochures to inform the fishing industry and the interested public about the MMPA, the ESA, related laws, and the requirements and status of individual TRPs.

Public outreach and TRP implementation advisory group

The LWTRT recommends that NMFS form an ad hoc advisory group to assist in the implementation of education and outreach strategies, engage in ongoing discussions of strategies to reduce the entanglement of large whales, and identify additional gear and technique modifications. This group will include industry representatives, scientists, conservationists, academics, state regulators, and other specialists as necessary. In addition, this group may also develop both a set of recommendations that could become a voluntary standard for fishing practices and gear modification, and a means to educate fishermen about these practices. Finally, the LWTRT recommends that this ad hoc advisory group work with NMFS to develop and distribute public relation materials to the interested public, newspapers, radio and TV news concerning the requirements of the TRP, implementation efforts and the efforts of the fishing industry to reduce the entanglement of large whales.

Improve reporting of entangled large whales and other marine mammals

The LWTRT recommends that NMFS undertake actions to educate fishermen about incentives that may be available to encourage the timely reporting of large whales, marine mammals, and other protected species entangled in fishing gear, and other take reduction measures.

3. Disentanglement Network and Efforts

Introduction

Several species of large whales have, on occasion, become entangled in fishing gear along the east coast of North America. Some of these entanglements eventually result in death or serious injury. In most gear, other than extremely heavy or anchored gear (weirs, etc.), whales swim off with some or all of the gear. Many whales eventually free themselves or survive for long periods of time (months) while trailing this gear. Although each entanglement is different and can present unique problems, under the right conditions, many whales can be successfully disentangled. These general conditions are:

1. Reporting
    - Extensive monitoring of whale populations at risk
    - Accurate and timely reporting of entangled whales

2. Support
    - Willingness of reporter to stand by until response team arrives
    - Local response teams with ability to respond rapidly to reports (e.g. USCG, whale watch vessels, dedicated disentanglement team, etc.) in order to stand by, provide support and possibly tag animal

3. Disentanglement
    - In some less severe or risky cases the animal may be disentangled by the person(s) reporting (with authorization from NMFS for that specific attempt)
    - A trained disentanglement team responds to the site with the proper equipment, support, and weather conditions to successfully disentangle the animal
    - If the conditions are not right, a radio or satellite tag can be fixed to the gear, to await suitable conditions

In 1984 the Center for Coastal Studies (CCS) developed an approach to disentangling free-swimming large whales. While the details of each event are often different, the basic concept is to attach a line to the gear on the whale, to which a drag (buoys, boat, anchor...etc.) can be attached which tires and/or stops the whale and keeps it at the surface. This "technique" requires very close approaches to often panicked animals and can be dangerous for both the whale and the disentanglers. CCS is currently the only organization with standing authorization to attempt such disentanglements on the US Atlantic coast.

Recently NMFS contracted CCS to perform this service for whales in the New England area through the support of CCS's ongoing efforts and through the establishment of a Disentanglement Network throughout the region. Establishing this Network entailed defining the criteria and needs for dedicated disentanglement teams; finding, training and outfitting the teams; and developing the awareness, cooperation and protocols for reporting within key interest groups in the region (i.e. USCG, whale watch companies, Harbormasters...etc.). The following are the criteria developed for designating the teams:

1. Experience with whale behavior
2. Experience with handling small boats around whales
3. Knowledge of local fishing gear
4. Support personnel on hand
5. Access to appropriate vessels (inflatables and larger support vessel)
6. Objectivity in the face of occasionally intense public pressure
7. Confidence of NMFS

In New England waters, the current dedicated team leaders and their regional responsibilities are as follows:

1. Block Island to Portland, ME. Lyman, Mattila, Mayo (CCS)
2. Southwest and mid-Maine. Bowman, Marine Wildlife Assoc. & (COA)
3. Northeast Maine and Bay of Fundy. Kraus, (NEA)
4. Bay of Fundy and SW Nova Scotia. Carl Haycock (BIOS)
5. Offshore Rapid Response. Lyman, Mattila, Mayo (CCS)

Because entanglements can vary widely in their severity and complexity, species and gear involved, the specific details of the disentanglement attempt can also vary. It was therefore decided that the best approach to the training of new teams is to attempt to have experienced members of the CCS team participate with them in difficult disentanglements. This can be accomplished through the placement of radio or satellite tag buoys onto the gear trailing behind the whale, so that the circumstances of the disentanglement attempt can be somewhat controlled. This allows time for a team, with an experienced member, to be placed on site, with the appropriate equipment to find and approach the entangled whale when the conditions are favorable (i.e. weather and support). The availability of tag buoys have the added benefit of acting as a back up, allowing the disentanglement team to keep track of an entangled whale if conditions do not allow the completion of a disentanglement.

In addition to the regional New England network, CCS has developed, in cooperation with the USCG, the Stellwagen Sanctuary and the International Fund for Animal Welfare, a rapid response capability. This consists of a compact, containerized inflatable and associated equipment which can be trailered or airlifted (by USCG helicopter) to the site of an entanglement, whether along a remote coast or at sea (with the appropriate support vessel standing by). Given the resources that the offshore component of this capability entails, it was primarily developed for responding to entangled right whales. Additionally, the New England

network and the rapid response team have worked with DFO in Canada to develop a swift and efficient cooperative plan, in order to respond to and assist entanglement events in Canadian waters of the Gulf of Maine.

Improvements to existing network

The effectiveness of the current New England Disentanglement Network could be improved primarily through increased reporting and increased response capabilities. This could be accomplished in the following ways:

1. The ability of the Network to mitigate the impact of entanglement on large whales would be greatly enhanced by the increased involvement and cooperation of local fishermen. Through increased awareness, fishermen could receive training to deal appropriately with entanglements of certain species and complexities, while reporting and assisting local dedicated teams with disentanglements of special concern (i.e. right whales) or difficulty. This can be accomplished through meetings between the disentanglement team coordinators and regional fishermen's associations geared toward developing the materials and activities which could best accomplish the job. This could entail: training seminars, production of whale identification and entanglement protocol brochures, training videos, etc.

2. Through discussions with members of the disentanglement team coordinators and regional fishermen's associations, areas of concern which do not currently have sufficient dedicated coverage could be identified and additional teams could be designated, outfitted and trained. Given the dangers and other issues involved (see below), if appropriate dedicated disentanglement teams can not be identified, it is possible that a second type of team could be developed which would have the capability to respond rapidly to entanglement reports, assess the situation and place tag buoys onto the trailing gear if the entanglement is deemed life-threatening. This would allow the tracking of the whale until a dedicated team could reach the site.

3. Increased monitoring of populations at risk, by both dedicated surveys (research and enforcement) and opportunistic platforms (i.e. USCG) could increase the chances of entangled whales being sighted, reported and disentangled.

Expansion of the Disentanglement Network

Expansion of large whale disentanglement efforts along the East Coast of the US (and Canada), could largely follow the model of the New England effort. The TRT identifies the following areas of concern: The area surrounding the mouth of the Chesapeake Bay, the Outer Banks of North Carolina, and the Southeast Critical Habitat for right whales. The TRT recommends that, CCS, NMFS, state and local government officials, stranding network personnel, and local fishermen's associations meet and identify particular fisheries within these regions for training, and discuss the relative merits and possibilities of identifying potential dedicated disentanglement or local response and support teams. In addition, the CCS rapid response team

should work with the above to identify and develop the support resources and protocols which would allow for the successful rapid deployment in each area for right whales and, potentially, for on site training with other entanglement events.

Needs

The needs of each area of concern would depend on the level of risk and local involvement decided upon, after the consultations described above. This would probably include the following: The development of a local response and support team in the Georgia/Florida region. There is a lower number of entanglement events in this region, however those reported will most probably be right whales. The best approach to disentanglement attempts in the Georgia/Florida region should be discussed between the existing disentanglement network, NMFS, local and state agencies, and the Southeast Implementation Team for the Recovery of the Northern Right Whale (the Implementation Team has initiated the development of a contingency plan for responding to entangled right whales). In Virginia and North Carolina, which would predictably have a greater number of reports, especially of humpback whales, the training of local fishermen and dedicated teams, with on sight equipment and support, would seem to be the best approach.

The USCG, in the Mid-Atlantic and the Southeast, should be approached by CCS, NMFS, and local agencies involved to seek their support for disentanglement efforts at levels similar to that in the northeast.

The successful disentanglement of large whales is an important component of the "three pronged" approach discussed by the TRT (minimize contact between whales and gear, minimize serious injury or mortality from entanglement, and maximize disentanglements), but it is dangerous and variable, and can not be approached with a cavalier or one-approach-fits-all attitude. The injury of whales or people during the process could undermine its potential for positive mitigation. Each attempt should be approached cautiously, and with a careful consideration of the situation and the resources which should be brought to bear, to insure the greatest likelihood for success.

Recommendations

The TRT recommends that the following actions be undertaken to improve and expand the effort to disentangle large whales along the East coast of the US, and therefore mitigate the incidence of serious injury or mortality due to interactions with the fisheries concerned (and, incidentally from other fisheries as well). The TRT recognizes that an important action in this regard is the involvement of the affected fishermen, through increased awareness, training in reporting and disentangling protocols, and through the removal of obstacles to and the development of positive incentives for reporting.

1. Continue the authorization and support for the current Disentanglement Network.
2. Train and outfit the identified dedicated disentanglement and response/support teams in the Virginia Capes, Outer Banks, and southeast right whale critical habitat regions and to work with these teams to develop decision-making protocols appropriate to each region.

3. Support the education and training of fishermen in the identification, reporting, and disentangling of large whales, where appropriate, in all risk areas.
4. Increase the monitoring of at risk whales in the region through both opportunistic and dedicated surveys. NMFS should encourage and train their own and USCG personnel to be aware of the problem and reporting procedures. In addition, NMFS should support dedicated research and/or surveillance cruises to high risk areas.
5. NMFS should request a level of support from the USCG in the SE region similar to that currently committed by the NE region. The Disentanglement Network should work with the appropriate USCG representatives to insure a seamless, coordinated effort.
6. NMFS and the Disentanglement Network should investigate the possibility of support and coordination with other agencies with similar or overlapping responsibilities. For example: the US Navy and regional oil spill response groups.
7. Increased reporting, including by fishermen, is vital to disentanglement of whales. NMFS and industry groups should ensure that fishermen are informed of requirements for reporting and indemnification resulting from the issuance of incidental take permits, and should further explore mechanisms to provide incentives for reporting entangled whales..
8. Permit the Disentanglement Network to authorize standing by or following an entangled whale at distances necessary to maintain contact as instructed by NMFS, and to authorize the attachment of tracking equipment to the entangling gear..
9. In addition, the TRT recommends that NMFS consider all ways in which the 500 yard approach regulation may affect right whale protection.
10. Reimburse vessel operators for real expenses or loss of regulated fishing days when standing by a whale confirmed by authorized group as entangled.
11. NMFS should work with the Disentanglement Network, the USCG, fishermen, and other involved parties to assure accurate, thorough, and standardized reporting of entanglements and their outcome, to be maintained in a central database.
12. Develop an analytical approach for future entanglement and disentanglement reports which takes into consideration the certain increase in reporting due to the actions above, and which counts successful future disentanglements favorably in assessments of take reduction.

4. Data Collection/Monitoring Measures

The TRT recognizes the need to create a TRP based on best available information, much of which is incomplete. In particular, the time, place, and condition under which entanglements occur, and the true number of mortalities for all species is unclear. This may be compounded in the case of smaller (minke) and negatively buoyant whales which may be more likely to sink and not be reported.

The long-term success of the TRP depends on the ability to monitor whales, fisheries, and interactions. Improving knowledge of whale distribution and movement is essential to understanding how to manage for reducing potential interactions. Successful real-time monitoring of whale distribution could lead to a better "dynamic management" system of benefit to both the whales and the fishing industry. Because of these concerns, we recognize the need to fill these gaps and periodically revisit the TRP after better information is available. Financial

commitments must be made for these data collection/monitoring programs to be created or improved.

The following questions, highlighting data gaps, apply to the whole range of all species of large whales and the fishing techniques which are the consideration of the TRT. This is particularly important considering the present and potential effects of Canadian (and possible other countries) waters and fisheries on these large whale species.

Improved monitoring of whale mortalities and their causes, and of fisheries activities are necessary to assess the performance of the TRP and help direct future management decisions. The following data gaps represent significant concerns of the TRT with respect to the completeness of the TRP:

1) Gear Modifications and Additions:
Due to the TRP's focus on gear modifications, emphasis should be placed on gear modification research and development. (See section IV.A.1)

2) Whale Distribution:
- What is the distribution of whales?
- What are their movement patterns?
- How stable is the distribution in high-use areas and/or critical habitat?
    a) Establish long-term (and real time) monitoring of whale distribution via aerial surveys, vessel surveys, telemetry and photo-documentation.
    b) Identify primary whale prey for species throughout their range.
    c) Explore observer training/education for non-traditional sources of information such as the fishing industry, federal, state, and private aircraft and vessel operators.

3) Whale Entanglements and Mortalities:
- What are the mechanisms for entanglement of a whale?
- Where (geographically, within the water column, etc.) are whales getting entangled?
- In what gear are whales getting entangled (gear type, inactive or active, etc.)? This assessment should include peer review of photographs of injured and entangled whales to increase the probability of properly grouping scar/entanglement origins.
- What is the rate of entanglement, serious injury, and mortality?
    a) Train personnel to recognize signs, such as scarring, of entanglement-related injuries.
- What is the effect on population size and recovery?
    a) Improve stranding report consistency and accuracy by providing improved observer training and expert assistance for large whale examinations.
    b) Establish repository for gear removed from stranded and/or entangled whales and develop a process for examination and identification.
    c) Develop entanglement/interaction reporting protocols which encourage fisher participation in monitoring and disentanglement efforts.
- What is the survivorship of entangled whales?

- What is the survivorship of disentangled whales?

4) Fishing Effort:
- What is the current information (occurrence and distribution) regarding effort and gear type?
- Identify how much information is needed for effective monitoring.
    a) Improve reporting of fishing effort to determine area fished, amount of gear, and species targeted by day.
    b) Develop improved methods of gear identification and reporting of gear loss.
    c) Examine fishery practices and techniques other than those central to this TRT for potential impacts to large whale species.
    d) Establish continuing outreach/education programs for fishing industry and individual fishers to facilitate data collection needs.

5) Dynamic Management
- LWTRT members believe that surveillance-based management is a useful subject for research and eventual support in implementing this TRP.
- Research in this area could echo the Massachusetts Plan as follows:
    a) Work with multiple agencies such as NMFS, private research groups (e.g., NE Aquarium, Center for Coastal Studies), the USCG, and the Navy to develop a surveillance-based management plan to protect right whales.
    b) Establish a more narrowly, and appropriately focused efficient system of management and regulation (than static time/area closures).

5. Reduction of Inactive Gear and Other Persistent Marine Debris

Background and Justification

Entanglement in fixed fishing gear poses a significant threat of serious injury and mortality to whales and other marine mammals, as well as sea turtles and marine birds. Entanglement events are seldom witnessed, so the actual mechanisms of entanglements are poorly documented. Some entanglements likely involve actively fishing gear, however some proportion of entanglements may involve inactive or 'ghost' gear. Many Gulf of Maine gillnetters believe that many entanglements of marine mammals in sink- gillnet gear actually involve gear that has been damaged and set adrift after being towed up by draggers. Observers conducting aerial surveys off the Northeast coast have seen sections of netting and lengths of line among debris floating at the surface. This persistent debris not only poses a threat to marine animals, but also may endanger the safety of fishermen and recreational boaters, since their vessels can be disabled by picking entanglements of this gear in their rudder and propulsion systems. It is therefore in the best interest of all fisheries, whether they interact with marine mammals or not, to minimize the amount of inactive gear in the ocean.

Strategy

The Large Whale TRT recommends the following:

- All fisheries and all other users of the EEZ should be encouraged to avoid discarding gear at sea. The provisions of all relevant existing laws and regulations should be enforced in this regard. The necessity of avoiding gear discards should be included in any fishermen's education and outreach programs.
- All vessel operators should be encouraged to pick up and bring ashore any inactive gear or other debris that they encounter at sea. Any penalties which would tend to discourage this, such as prohibitions on possessing someone else's gear, should be eliminated to make this feasible, with appropriate safeguards to avoid any increase in gear conflict.
- All commercial fishing vessels that inadvertently tow up fixed fishing gear or otherwise cause a situation where fixed gear would be set adrift should be required to pick up all of the gear involved and bring it ashore. The removal of legal penalties for possession of another's gear would apply here also, and with appropriate safeguards to avoid an increase in gear conflicts.
- Gear which is brought back ashore and which carries any identification markings, including trap or net tags, identification numbers, or color-coded lines, should be reported to the appropriate authorities. Presuming that a system, such as an 800 number, has been established for reporting and tracking lost gear, it should also be able to include found gear. In addition, the owner of the gear would be able to retrieve it.
- A reduction in the problem of inactive fishing gear can also be achieved by minimizing the gear conflicts which are the root cause of much drifting gear. NMFS should take all appropriate measures to reduce conflicts between different gear types which can result in lost and inactive gear. One measure would be the approval and implementation of the pending Gear Conflict Regulations for Offshore Southern New England. Another would be the implementation of pending regulations requiring Vessel Tracking Systems, which would encourage both avoidance of known fixed gear fishing areas and compliance with requirements to pick up damaged and inactive gear.
- Another way to reduce the amount of inactive gear would be to use materials in gear components that will break down readily in the marine environment. The fishing gear modification research which will be conducted as part of this plan (see section IV.A.1) should include research on economically feasible, biodegradable, corrosible, or other rapidly degrading components of fishing gear. This would have the additional benefit of increasing the probability that any gear or lines which are entangled on a whale or other animal would break down and come off before causing serious injury. The use of biodegradable materials for weak links or other points in gear modifications should also be considered.
- In order to increase the feasibility of recommendations for reducing discarded gear and returning inactive gear, a dockside disposal/recycling facility should be made available and convenient at all port facilities used by commercial fisheries.

There is an existing body of information and expertise in dealing with the problem of inactive fishing gear and other persistent marine debris. The Marine Mammal Commission has proposed to NMFS, the establishment of a program to reduce inactive fishing gear in the Northeast. Other

existing programs can be utilized as possible models. Canada has a "bring it back ashore" policy for inactive gear, as well as a program of reporting by their fishery observers. Programs for disposal and recycling of discarded fishing gear also exist - Maine and Oregon are two examples. The experience in the Oregon program was that discarded gear rarely accumulated to any great extent at the dockside dumping points, because fishermen and boaters scavenged and recycled everything almost as fast as it was dumped.

6. Take Reduction in Canadian Waters

Background

Large whales are taken in gillnet and weir fisheries in Canadian waters. The LWTRT recognizes that both regulatory and management regimes differ between Canada and the U.S. and agrees with the position of Canada that there is a need to develop similar and complementary management strategies to reduce the incidental take of large whales in fishing gear in the waters of Atlantic Canada.

It is the understanding of the LWTRT that Canada shares the goals of the LWTRT, including the PBR levels, for the various species of large whales in areas of mutual concern.

On November 1, Canada tabled an Endangered Species Act. Under this Act the Committee on the Status of Endangered Wildlife in Canada will develop a list of endangered, threatened, and vulnerable species and recovery plans for listed species. The proposed Act contains provisions for civil enforcement, a petition process, and transparent review of proposed listings. The proposed Act will require the implementation of Recovery Plans for species of whales identified as either, endangered, threatened, or vulnerable by the Committee on the Status of Wildlife in Canada (COSEWIC) and a timeline of 150 days to implement these recovery plans. The proposed Act also permits the preparation of joint recovery plans for highly migratory species.

It is the understanding of the LWTRT that until the legislation is passed, Canada will establish a consultative program such as that of the LWTRT to develop within the existing regulatory and management framework, programs that are compatible with and complementary to the recommendations of the LWTRT TRP.

This program will include, but is not limited to, the exchange and collaboration of research programs and scientific information; consultation with fishing industry interests and other interested parties; the education of fishers; and the development of a disentanglement response ability in cooperation with interests in the U.S.

To that end the TRT provides the following recommendations.

Recommendations

Once the Take Reduction Plan (TRP) is in draft form and open to public comment, NMFS should initiate consultations with the Canadian Department of Fisheries and Oceans to:

- Obtain comments on the TRP;
- Urge Canada to develop a joint recovery plan under its endangered species act;

- Institute clear mechanisms to potentially reduce large whale entanglement and a means to evaluate the effectiveness of any proposed mechanisms; and
- Outline a timetable for meetings between NMFS officials and representatives of the Take Reduction Team and DFO to review the progress toward reducing the entanglements of large whales in U.S. and Canadian waters.

7. Other

a. Market and Other Incentives to Encourage Whale Conservation Efforts

The LWTRT recommends that shortly after submission of the TRP, a subgroup of the LWTRT and other interested parties, form a committee to recommend incentives, including market and other voluntary incentives, and develop a process for developing and incorporating those incentives into the take reduction effort, with the consensus of the TRT. The committee should include persons with experience or expertise in conservation, market-based incentives, seafood processing and distribution, and various fishing strategies.

b. Recommendations Unrelated to Fisheries

The TRT should be informed regularly of all non-fishery related efforts to reduce take and increase recovery of large whales.

B. Measures/Strategies by Fishery and Area

As mentioned previously, strategies for reducing risk of serious injury and mortality can vary by region, fishery, gear type, and fishing techniques. The TRT, therefore, developed recommendations that take these and other considerations into account.

All groups have concerns with a number of consensus portions of the TRP. These concerns range from uncertainty over whether measures and strategies are likely to result in immediate and sufficient whale protection, to whether protective measures are needed in particular areas. Nevertheless, below are recommendations proposed by the TRT. Where agreement was not reached, options are presented.

Gear modifications judged to further reduce the risk of entanglement, serious injury, and mortality should be incorporated as they become feasible according to engineering standards and tested by incorporation in designated gear modification areas for further risk reduction. Success will be judged by TRT consensus at future meetings as specified by the TRP.

Additional measures to reduce entanglement, serious injury, or mortality may be recommended by the TRT following annual review of the TRP, as required by the MMPA. Possible modifications to be considered might include adding or subtracting areas for gear modification, specific gear modification requirements as developed through the Research, Development, Evaluation, and Application program, and any other management options to be determined by the TRT in the future.

Any future warp tagging should be based on discussions with researchers, fishermen, and gear modification experts. The information that is gained by tagging should not be used for the purposes of prosecution if gear is found to be in compliance with the regulations. Missing tags must be replaced immediately in the normal course of tending gear. NMFS should establish a clearing house for gear collected from entangled whales and periodically bring fishermen in to review and analyze the gear, and discuss lessons learned as information is accumulated from collected gear and tagged gear.

1. New England Multispecies Sink-Gillnet Fishery and North American Lobster Trap/Pot Fishery

The TRT acknowledges that the 50% reduction in groundfish gillnet fishing effort required by the New England Fishery Management Council (NEFMC) Actions, could likely result in some reduction in Atlantic large whale entanglements, serious injuries, and/or mortalities, but that the level of this reduction could range from none or insignificant to 50%, and cannot be determined from the information presently provided.

The LWTRT recommends that beginning in 1997, all fishing warps be required to have gear markings deployed within one fathom of the buoy. These markings will be color coded to determine the gear type and region of the gear. Examples of these tags might be color metal or plastic tags crimped onto the rope, lengths of colored rope laid into the line, or any other clear marking to be determined by the fishermen and approved by the TRT. Missing tags must be replaced immediately in the normal course of tending gear

Cape Cod Bay Area

State Waters

Sink-Gillnet and Lobster Trap/Pot

Recommendations for actions in state waters of Cape Cod Bay echo the Conservation Plan for Massachusetts Waters to Minimize Entanglement Risk for Right Whales as submitted *to* federal district court on December 16, 1996. TRT members agreed to the actions proposed for Massachusetts state waters as outlined by this plan. Specifically, TRT members propose the following for sink-gillnet and lobster gear, as well as other fixed gear:

"1.) Restrict the use of certain gear types to reduce risk of entanglement in Critical Habitat during times of expected whale occurrences.

A. **Prohibit use of floating line in lobster trawl groundlines and all buoy lines** during January 1- May 15, 1997 in all of Cape Cod Bay including the area west (outside) of the defined critical habitat. For 1998, prohibit floating line year-round in waters of Cape Cod Bay and Massachusetts Bay north to the New Hampshire Border. Consider exempting certain coastal embayments and other shallow-water habitats where endangered whales are not expected to occur.

B. **Reduce the number of vertical lines in the Critical Habitat,** by prohibiting the setting of lobster pots as "single pots" during January 1- May 15, and mandate the use of multi-trap trawls (at least 4 traps per trawl). Do not mandate the use of (multi-trap) trawls the remainder of the year because such a rule would likely increase the amount of traps fished alongshore by small-scale commercial and recreational fishermen. For example, those fishermen who are currently placing a few traps on optimal lobster (rocky) habitat would then be forced to set strings of pots which could result in more traps, more lines and more user group conflicts alongshore.

C. Regulate the use of surface gillnets, currently an unregulated activity. By establishing this fishery as a regulated fishery, any fisherman deploying this gear in any waters of the state will be required to obtain a special permit. Furthermore, deployment of such gear will be prohibited in the critical habitat during periods of expected whale occurrences and during other times and areas identified by surveillance with right whale aggregations.

2) Modify certain fixed fishing gear, including the following:

A. **Break-away buoy lines.** Develop and require a break-away link at- or just below-the buoy on vertical buoy lines. This modification would be required on all fixed gear in Critical Habitat for 1997, and other waters where large whales are expected to occur in 1998. A recommended breaking strength approaching 150 lb. was recommended by the whale researchers to maximize likelihood of the line parting if encountered by a swimming whale. Target date: **February 1, 1997.**

B. **Weak surface-to-bottom buoy line.** Develop in the months ahead, and require by 1998, a weak buoy line that would easily break and pose no risk to whales if encountered. This radical buoy line will probably not be strong enough to retrieve a trawl or gillnet if sufficiently weak to pose no threat to whales. This line type would be required throughout Critical Habitat during winter/early spring or in smaller areas and times of known right whale aggregations identified by surveillance, under a so-called dynamic management plan. Target date: **January 1, 1998.**

One example is a so-called "tag line," a line that could be used to mark the presence of the trawl but could be attached to a heavier line that would be sufficiently strong to retrieve the trawl or net.

C. Gillnets with features to improve the chances that a whale encountering a gillnet has the best chance of breaking the nets and lines before becoming entangled. All gillnets employed in Massachusetts state coastal waters to be modified to enhance the likelihood of parting when encountered by a whale. The following modifications are likely:

1. Secure nets with anchors (instead of weights) to increase likelihood of the weak links parting;
2. Increase the bridles and groundline-to-anchor both to 15 fathoms (90 ft.);
3. Use "weak links" between bridles on a set of nets (top line only);
4. Use all sinking line (except on the headrope);
5. Use lighter line (5/16" or less)/ by 1998 on the headrope (commonly called the "floatline").

Target date: **May 1, 1997.**

3) Control Future Increases in Fishing Effort

Prevent increases in entanglement risk by preventing increases in fishing effort in the Critical Habitat with gear that poses risk to right whales.

A) Prohibit future sink-gillnet fishing in Critical Habitat during January through May 15. Since no sink-gillnet fishing currently occurs in this area during January - April, this preemption on future gillnetting in this area would have no immediate impact on the industry, nor will it reduce entanglement risk from current levels (since there is no fishing during these months).

B) Do not prohibit lobstering in the Critical Habitat, instead devise gear modifications to prevent entanglements. The current level of fishing during whales' high use time is extremely low and researchers rarely see gear in aggregations of whales during winter/spring. Closures, if enacted, would disenfranchise fishermen, reduce fishermen's contributions to the much-needed reporting network, and delay development of "benign" buoy lines.

C) Monitor fixed gear fishing effort levels (of all types) at all times of the year and allow increases only if the specific gear types can be modified to ensure the lowest possible entanglement risk and if that gear's target species (e.g. lobster, dogfish) can withstand increased fishing mortality and if increases in fixed gear would not cause increased gear - and user group - conflicts.

D) Consider enacting a cap on the number of nets individual sink-gillnet fishermen may fish by allowing no more than 80 nets, and a maximum number of buoys deployed to 20. A net cap is being considered by the New England Fishery Management Council for federally permitted netters.

4) Support future gear research and modification of fixed gear for future deployment in Critical Habitat.

A) **Break-away or weak link at bottom of buoy line**. The TRT agreed that the link must be the weakest link possible that is consistent with practical fishing gear handling and whale safety.

B) **Investigate and refine other gear modifications** to make fixed gear whale-safe, especially gillnet construction and buoy lines for all fixed gear."

Federal Waters

All gear would be marked/color coded for identification by gear type and region (See gear marking discussion).

Sink-Gillnet Fishery:

The TRT members did not reach consensus concerning sink-gillnets in the portion of Critical Habitat in federal waters of Cape Cod Bay. Some members thought that the requirements listed above for Critical Habitat in state waters for sink-gillnets should be extended to Critical Habitat in federal waters, including closures for 1997 and subsequent gear modifications in 1998. Other TRT members thought that different requirements should apply. The two proposals capturing these views are listed below:

Proposal A:

The federal waters portion of Cape Cod Bay Critical Habitat should have the same requirements for restrictions and modifications as in the state waters portion of Cape Cod Bay Critical Habitat. As such, gillnetting will be prohibited from January 1 - May 15. Subsequent to that time, gillnet gear must be modified as follows:

A) Weak link (break-away) at the buoy in all buoy lines;
B) Sinking line for buoy line except for last 10 fathoms which may be up to 1/2" polypropylene spliced in to prevent formation of a knot. The polypropylene is to be used with the intention of tying in the anchors and weights so that there is no more than 2 fathoms of vertical lift, and in order to prevent chafing and any subsequent loss of gear;
C) Danforth-like anchors in water less than 40 fathoms in depth;
D) Weak link within and between net panels;
E) Marking of gear to help provide data on interactions.
F) Use of line that is 5/16" or less on the headrope (per Massachusetts state waters plan).

The industry proposal (Proposal B below) differentiates between right whale critical habitat inside and outside of state waters, providing less restriction within federal waters. The

Commonwealth of Massachusetts closed Critical Habitat in state waters to gillnetting from January 1 through May 15. The Fishery Management Council has proposed a framework adjustment to the groundfish plan which would close the federal waters portion of critical habitat in which an extremely high proportion of sightings have been documented. Critical Habitat in both areas should be treated similarly unless it can be shown that some portion of the Critical Habitat does not require the same degree of protection, and this has not been demonstrated for Cape Cod Bay. No biological rationale is provided by the industry for the differing protection between state and federal waters. Since there is little biological difference between the two areas (the separation is a political accident), providing different levels of protection is inappropriate. This result is a strange irony. The industry proposal will prohibit gillnetting in Critical Habitat at a time when no one actually gillnets in state waters portion, and thus no reduction of risk is achieved. However, they propose to permit gillnetting in federal waters, where it DOES occur, thereby again providing no risk reduction. If, as has been presented, gillnetting poses a threat to whales, then it should be restricted where it does occur, not only where it does not.

Proposal B:

Federal waters should be treated differently than state waters because gillnetters historically have fished in this section. Therefore, the following proposal for this area is suggested. Critical Habitat in federal waters in Cape Cod Bay will be open year-round only to gillnet gear that has been modified as follows:

A) Weak links at or near the surface buoy;
B) Sinking line on all vertical buoy lines;
C) 15 fathom bridle and ground lines to anchors;
D) Danforth-style anchors to anchor the net instead of weights to increase likelihood of the weak links parting;
E) Weak links on bridles between the net panels;
F) 5/16" float line (minimum 1 year phase-in period);
G) Cap deployment of buoys at 20 per boat.

Lobster Trap/Pot

The TRT agreed that the requirements listed above for Critical Habitat in state waters for the lobster trap/pot fishery should be extended to Critical Habitat in federal waters. These modifications include:

A) Weak link (break-away) at or just below the buoy in all buoy lines;
B) Floating line in lobster trap groundlines and buoy lines prohibited from January 1-May 15;
C) Setting of single pots is also prohibited during this time (January 1-May 15).

Furthermore, as stated in the plan for state waters Critical Habitat submitted to the court by the Commonwealth of Massachusetts, in 1998, use of floating line will be prohibited year-round, and, a weak surface-to-bottom buoy line will be required "during winter and early spring or in

smaller areas and times of known right whale aggregations identified by surveillance, under a so-called dynamic management plan."

Waters West of Critical Habitat

Sink-Gillnet Fishery in State Waters:

For waters west of the critical habitat in state waters for sink-gillnet gear, year-round gear modifications, beginning January 1, 1998, will be required, including the following:

A) Weak link at or near the surface buoy;
B) Sinking line for buoy line except for last 10 fathoms which may be up to 1/2" polypropylene spliced in to prevent formation of a knot. The polypropylene to be used with the intention of tying in the anchors and weights so that there is no more than 2 fathoms of vertical lift, and in order to prevent chafing and any subsequent possible loss of gear;
C) Weak links in the bridles between net panels;
D) Danforth-style anchors up to 40 fathoms. Over 40 fathoms, the anchors are optional;
E) Net cap of 80 and buoy cap of 20; (NOTE: There is disagreement among the TRT as to the interpretation of this gillnet gear requirement. Some interpret this statement to refer to the net cap as proposed in Amendment #7 Gillnet Proposal which distinguishes between a net cap of 80 groundfish nets and 160 for flounder nets. Others interpret this gillnet gear requirement to be a net cap of 80 total nets, regardless of target fish species.)
F) Size of float line is 5/16" to 3/8" and poly foam core of 1/2".

Lobster Trap/Pot Fishery:

For waters west of the Critical Habitat in both state and federal waters, beginning in 1997, floating line will be prohibited in lobster trap trawl groundlines and all buoy lines during January 1- May 15.

For waters west of the Critical Habitat in state waters, by 1998, break-away buoy lines at, or just below, the buoy on vertical buoy lines, will be required. For federal waters, break-away buoy lines will not be required in this Plan, but may be considered in the future, after testing.

Great South Channel

All gear to be marked/color coded for identification by gear types and region (see gear marking discussion, page).

Sink-Gillnet Fishery:

The Critical Habitat area east of Loran Line 13710\43940 (northwest boundary) and 13710\43650 (southwest boundary) will be closed to gillnet gear from April 1- June 30, 1997. In 1998, from April 1 - June 30, this same portion of Critical Habitat will only be opened to gillnet

gear that has been modified, tested, and demonstrated to pose minimal risk to whales. It is understood that the goal of gear modifications is to develop gear that reduces the risk of serious injury or mortality to whales to levels approaching zero. The process and standard by which acceptable gear will be determined is outlined in the Gear Research, Development, Evaluation, and Application section of this plan, specifically the Imposing Additional or Changing Existing Gear Modifications and Lifting Gear Restrictions for Critical Habitat (page).

For the rest of the year (July 1- November 1), and in 1998 for July 1 - November 1, gillnet gear in this portion of the Critical Habitat area east of Loran Line 13710\43940 (northwest boundary) and 13710\43650 (southwest boundary), as well as for Critical Habitat area west of Loran Line 13710\43940 (northwest boundary) and 13710\43650 (southwest boundary) from April 1 - November 1, must have the following modifications:

A) Weak link at or near the surface buoy;
B) Sinking line for buoy line except for last 10 fathoms which may be up to 1/2" polypropylene spliced in to prevent formation of a knot. The polypropylene to be used with the intention of tying in the anchors and weights so that there is no more than 2 fathoms of vertical lift, to prevent chafing and subsequent loss of gear;
C) Weak links in the bridles between net panels;
D) Anchored gear to increase the likelihood of the weak links in parting;
E) Net cap of 80 and buoy/vertical line cap of 20;
F) Size of float line is 5/16" to 3/8" and poly foam core of 1/2".

Lobster Trap/Pot Fishery:

In the Great South Channel, all Critical Habitat and Closed Area 1 (for groundfish), will be closed from April 1 - June 30 in 1997. In 1998, this area will only be opened to lobster gear that has been developed, tested, and demonstrated to pose minimal risk to whales. It is understood that the goal of gear modifications is to develop gear that reduces the risk of serious injury or mortality to whales to levels approaching zero.

Stellwagen and Jeffrey's Ledge Area

All gear to be marked/color coded for identification by gear type and region (See gear marking discussion, page).

Sink-Gillnet Fishery:

The TRT defined the focus of their recommendations to federal waters not already addressed in other portions of this Plan and within the area defined from the state/federal water boundary at 43° 15" east to 70° 0" longitude, and 70° 0" longitude to 42° 0" latitude lines, then west to the state/federal water boundary. The TRT did not create this area for closures, but rather for year-

round gear modifications for gillnet gear. The required gillnet gear modifications in this defined area will include the following:

A) Weak link at or near the surface buoy;

B) Sinking line for buoy line except for last 10 fathoms which may be up to 1/2" polypropylene spliced in to prevent formation of a knot. The polypropylene to be used with the intention of tying in the anchors and weights so that there is no more than 2 fathoms of vertical lift, and in order to prevent chafing and any subsequent loss of gear;

C) Weak links in the bridles between net panels;

D) Nets must be securely anchored;

E) Net cap of 80 and buoy/vertical line cap of 20; (NOTE: There is disagreement among the TRT as to the interpretation of this gillnet gear requirement. Some interpret this statement to refer to the net cap as proposed in Amendment #7 Gillnet Proposal which distinguishes between a net cap of 80 groundfish nets and 160 for flounder nets. Others interpret this gillnet gear requirement to be a net cap of 80 total nets, regardless of target fish species.)

F) Size of float line is 5/16" to 3/8" and poly foam core of 1/2".

Lobster Trap/Pot Fishery:

The TRT did not agree on how to address the area around Stellwagen Bank and Jeffreys Ledge. Two proposals are outlined below.

Proposal A

Gear modification area for Jeffreys/Stellwagen should be defined as:

43 degrees latitude east from the boundary of New Hampshire state waters to the western boundary of the Jeffreys Ledge Juvenile Protection Area [a.k.a. The Square Mesh Area] following this line north and west to the 70 degree longitude line and then south to the 42 degree latitude line and west to the state waters boundary of Massachusetts.

Within this area, lobster gear will be required to incorporate a weak link directly below the buoy and to have a color-coded marking six feet below the buoy.

Proposal B

Within the blocks described above under "Sink-Gillnet Fishery," lobster gear must be modified year-round as follows:

A) Weak link at or near the surface buoy;

B) Use of sinking groundline or weights (sinkers) attached between traps on floating groundline;

C) Color coding of line.

In the second year of the Plan's implementation:

A) Weak link at or near the bottom buoy line, or use of a "tag" line;
B) Use of sinking line for the buoy line, except for the last 3 fathoms from the bottom, which may be of 1/2" polypropylene to provide vertical lift.

This schedule of implementation affects lobster gear in federal waters within these management area blocks. State waters (with the possible exception of bays and harbors where whales are not expected) will implement these modifications one year after the time line for federal waters.

The Stellwagen Bank and Jeffreys Ledge areas represent two of the highest use areas for whales outside of critical habitat. Right whales feed in these areas, often in the basins around their edges. They transit the areas as they swim into and out of critical habitat. The critical habitats are closed at the times of highest usage, and gear is modified as described above at most other times. By 1998, all of the above described gear modifications are also required in the state of Massachusetts. The modifications should also apply to the Stellwagen Bank and Jeffreys Ledge areas, within the larger management blocks, as these waters contain large numbers of sightings. Any proposal to require gear modification in the "square mesh areas" (as designated by the New England Fisheries Management Council) will leave large, well-used portions of right whale and humpback whale habitat with insufficient protection. For example, according to data supplied to the TRT by the Northeast Fisheries Science Center, large numbers of sightings of right whales occur in the basin areas to the west of the Jeffreys Ledge square mesh area, including an area to the west of the so-called "fingers" area. The Center estimated that only 58% of right whale sightings are within the square mesh areas of Stellwagen Bank and Jeffreys Ledge.

Not only does the alternative proposal define an area too small to provide adequate protection, it proposes insufficient risk reduction in the areas that are designated as gear modification areas. The alternative proposal would require only gear marking and the use of break-away buoys. It does not restrict the use of floating line. Floating line is not permitted in critical habitat (adjacent to these areas) after approximately 1998. Slack, floating line presents an entanglement risk to whales feeding on the bottom, or swimming through the water near "baggy" loops of line. Any proposal to reduce risk in high use areas surrounding the Jeffreys Ledge and Stellwagen Bank areas must contain measures that are designed to minimize this risk to a degree that simple use of break-away buoys and color coded line do not.

All Other Areas in the Gulf of Maine

All gear in federal waters will be marked/color coded by gear type and region (see gear marking discussion, page). Tagging of gear will not be conducted in state waters. If the TRT determines that the goals of the MMPA are not being met, then the TRT will re-evaluate and consider additional informational and management actions in this area.
In areas in the Gulf of Maine not otherwise addressed in this TRP, gear modifications judged to further reduce the risk of entanglement, serious injury, and/or mortality should be incorporated as become feasible by engineering standards, and tested by incorporation in designated gear modification areas and approved by the TRT. If successful, they should be considered for

incorporation into additional areas for further risk reduction. Success will be judged by TRT consensus at future meetings as specified by the TRP.

Lobster Management Area 3

The TRT did not reach agreement on recommendations for portions of the area of the Gulf of Maine/Mid-Atlantic Lobster Trap/Pot Fishery designated as Lobster Management Area 3. Below are two proposals presenting the different views on these issues for this area.

Proposal A:

Offshore Lobster Industry Proposal

The offshore lobster industry proposal is intended to apply to Lobster Management Area 3, exclusive of the southern New England overlap area between Lobster Management Areas 2 and 3, as defined by Amendment #5 to the American Lobster Fishery Management Plan (NEFMC January 24, 1994) and modified by the Draft Public Hearing Document dated May 16, 1995 (NEFMC 1995). The boundaries of the management areas are defined as follows:

> Area 1: Near-shore EEZ Waters of the Gulf of Maine. Beginning at the seaward boundary of the territorial waters of the state of Maine at the intersection with the international boundary between the US and Canada; thence southerly along the boundary to the LORAN C 9960-Y-44400 line; thence southwesterly along the 44400 line to 70 degrees W. Longitude; thence south along the 70 degree meridian to the LORAN C 9960-W-13700 line; thence southeasterly to the LORAN C 9960-Y-44100; thence southwesterly to the intersection of the 44100 line and the seaward boundary of the territorial waters to the state of Massachusetts; thence northerly along the seaward boundary of the territorial waters of the states of Massachusetts, New Hampshire, and Maine to the beginning point.
>
> Area 2: Near-shore EEZ Waters of southern New England. Beginning at the intersection of the LORAN C 9960-Y-43780 line with the seaward boundary of the territorial waters of the state of Massachusetts; thence easterly along the 43780 line to LORAN C 9960-W-13700; thence southerly along the 13700 line to LORAN C 9960-Y-13700; thence westerly along the 43700 line to the intersection with LORAN C 9960-W-14610; thence northerly along the 14610 line to an intersection with a line running from Montauk Point on Long Island to Lewis Point on Block Island; thence westerly along said line to the intersection with the seaward boundary of the territorial waters of the state of New York; thence north to the intersection with the seaward boundary of the territorial waters of the state of Rhode Island; thence easterly along the seaward boundary of the territorial waters of the states of Rhode Island and Massachusetts to the beginning point, excepting the territorial waters of the state of Rhode Island contiguous to Block Island.

In the southern New England area, there shall be an overlap between Lobster Management Area 2 and Area 3 defined as follows:

Beginning at the intersection of LORAN C 9960-W-13700 with LORAN C 9960-Y-43700; thence westerly along the 43700 line to the intersection with LORAN C 9960-W-14610; thence southwesterly along a line whose extension reaches the intersection of LORAN C 9960-Y-43500 with LORAN C 9960-X- 26400 to the LORAN C 9960-Y-43600 line; thence easterly along the 43600 line to LORAN C 9960-W-13700; thence northwesterly along the 13700 line to the beginning point.

Area 3: EEZ Offshore Waters. Beginning at the intersection of LORAN C 9960-Y-44400 with the international boundary between the US and Canada; thence southwesterly along the 44400 line to 70° W Long.; thence south along the 70° meridian to LORAN C 9960-W-13700; thence southeasterly along the 13700 line to LORAN C 9960-Y-43700; thence westerly along the 43700 line to the intersection of LORAN C 9960-W-14610; thence southwesterly to the intersection of LORAN C 9960-Y-43500 with LORAN C 9960-X-26400; thence southerly to the intersection of LORAN C 9960-Y-42600 with LORAN C 9960-X-26550; thence southerly to the intersection of LORAN C 9960-X-42300 with LORAN C 9960-X-26700; thence southerly to the intersection of LORAN C 9960-Y-41600 with LORAN C 9960-X-26875; thence southerly to the intersection of LORAN C 9960-Y-40600 with LORAN C 9960-X-26800; thence southerly to a point directly east of Cape Hatteras at the seaward boundary of the territorial waters of the state of North Carolina; thence east to the seaward boundary of the EEZ; thence northeasterly along said boundary to the international boundary between the US and Canada; thence northerly along said boundary to the beginning point.

In the southern New England area, there shall be an area of overlap between Lobster Management Area 2 and Area 3 defined as follows:

Beginning at the intersection of LORAN C 9960-W-13700 with LORAN C 9960-Y-43700; thence westerly along the 43700 line to the intersection with LORAN C 9960-W-14610; thence southwesterly along a line whose extension reaches the intersection of LORAN C 9960-43500 with LORAN C 9960-X-26400 to the LORAN C 9960-Y-43600 line; thence easterly along the 43600 line to LORAN C 9960-W-13700; thence northwesterly along the 13700 line to the beginning point.

Area 4: Near-shore Waters of the Middle Atlantic. Beginning at the intersection of a line between Montauk Point and Lewis Point on Block Island with the seaward boundary of the territorial waters of the state of New York east of Montauk Point; thence easterly along said line to the intersection with the LORAN C 9960-W-14610 line; thence southerly along the 14610 line to the intersection with the LORAN C 9960-Y-43700 line; thence southwesterly to the intersection of the LORAN C lines 9960-Y-43500 and 9960-X-26400; thence southerly to the intersection of the LORAN C lines 9960-Y-42600 and 9960-X-26550; thence southerly to the intersection of the LORAN C lines 9960-Y-42300 and 9960-X-26700; thence southerly to the intersection of the LORAN C lines 9960-Y-

- The offshore lobster industry recommends that a Take Reduction Plan for Large Whales recognize the offshore lobster fishery management zone (Lobster Management Area 3), exclusive of the southern New England overlap area between Lobster Management Areas 2 and 3, as defined by Amendment #5 to the American Lobster Fishery Management Plan (NEFMC January 24, 1994) and modified by the Draft Public Hearing Document dated May 16, 1995 (NEFMC 1995) as a means to differentiate measures that apply to the offshore lobster industry. The proposals offered by the offshore lobster industry are intended to apply to that area unless a sub-area of Area 3 is specified in the proposal.
- The offshore lobster industry recommends that all lobster trap and mobile gear fishing vessels operating in the offshore lobster management zone be required to carry Vessel Tracking Systems (VTS).
- The offshore lobster industry recommends that the Great South Channel Right Whale Critical Habitat Area be closed to fishing with lobster gear that poses a threat of entanglement to whales during April, May, and June, but be open to fishing with gear that does not pose a threat to whales.
- The offshore lobster industry recommends that Groundfish Management Closure Area I be closed to fishing with lobster gear that poses a threat of entanglement to whales during April, May, and June. This area should remain open to fishing with gear that does not pose a threat to whales.
- The offshore lobster industry recommends that offshore lobster gear buoy lines within 50 fathoms (approximately 100 meters) of the surface shall have a breaking strength no greater than 3780 pounds (the breaking strength of ½" polypropylene) except during the period from November 27 to March 31, when the breaking strength of buoy lines on gear set deeper than 100 fathoms shall not be limited. This requirement may be met through the use of a "weak link" at a point in the buoy line 50 fathoms from the surface.
- The offshore lobster industry recommends that NMFS, in consultation with the fishing industry, develop, within two years from the date of implementation of the Large Whale Reduction Plan, a program to do two things:
    1. Develop a comprehensive program for reducing gear conflicts that create a threat to whales from "ghost" gear;
    2. Create a fishery and region gear-coding system.

- The offshore lobster industry recommends that NMFS, as a first step toward reducing the threat of entanglement of whales in "ghost" lobster gear, approve and implement at the earliest possible time the Gear Conflict Regulations for Offshore Southern New England.
- The offshore lobster industry recommends that NMFS establish regulations that require offshore lobster gear to be hauled on a regular basis, not less than once in every thirty days, as a means to insure that unproductive gear is not left in the ocean. The VTS requirement makes it possible to monitor the activity of a vessel to determine whether is has been on the offshore grounds during a thirty day period. The offshore lobster industry also recommends that NMFS, in consultation with the lobster industry, develop a program through which abandoned or un-tended gear could be removed from the ocean.
- The offshore lobster industry recommends research on "noisy" buoy lines as a means to minimize the entanglement of whales. This research should include the characterization of the natural noise created by buoy lines, the potential for enhancement or modification of the natural noise of buoy lines through rope construction characteristics, and the possible addition of noise generation devices to buoy lines. The expertise and resources of the Naval Undersea Warfare Center (NUWC) should be utilized to the fullest extent possible in this research.
- The offshore lobster industry recommends that the members of the Large Whale Take Reduction Team commit to exploring the possibility of developing a program of conservation certification and market promotion for seafood harvested in compliance. We support the proposal offered by Environmental Solutions International to investigate these options without prejudice as to any final agreement on the specifics of such a program or its acceptability.
- The offshore lobster industry recommends that the NMFS Voluntary Vessel Buy-out Program be expanded and broadened to include vessels engaged in Category I fisheries.
- The offshore lobster industry recommends that the Large Whale Take Reduction Plan include provisions that would use existing provisions of US law to impose sanctions on the importation of Canadian fishery products if Canada does not implement whale conservation measures on its fisheries comparable to those that are applied to the US fisheries. All sources of whale mortality contribute to the status of whale populations that creates the need for take reduction measures. The US fishing industry will be placed at a competitive disadvantage to its Canadian competitors if comparable conservation measures are not placed on Canadian fisheries.
- The offshore lobster industry recommends that the conservation community and the fishing industry explore market mechanisms through which the goals of both groups could be met. These free-market solutions to whale conservation should be encouraged by the National Marine Fisheries Service.

The offshore lobster industry has based its recommendations on the following information presented to the LWTRT concerning right whales.

- Calves tend to become entangled more than adults;
- Calf sightings are generally closer to the shore and in shallower water than non-calf sighting;

- Feeding appears to be the primary activity while right and humpback whales are in the northeastern and Canadian waters;
- Particular sets of physical conditions that result in the development of high density patches of *Calanus finmarchicus* control the geographic distribution of right whales on the western North Atlantic feeding grounds;
- There are five known major feeding areas for right whales in the northeast -- the Great South Channel, Cape Cod Bay, Wilkinson Basin, Roseway Basin, and the Bay of Fundy;
- During March to May, most of the right whale population occupies the Cape Cod Bay and Great South Channel feeding areas;
- From July to October, most right whales occur in two feeding areas in the Bay of Fundy and the southeastern Scotian Shelf;
- Right whales move from one feeding area to another without any long pauses, and they migrate to their southern habitat without pausing for any protracted time;
- Cows with calves tend to migrate along the shore;
- Diving to the bottom is primarily a feeding mechanism, and is otherwise a waste of energy that would not be expected.

Based on the information presented to the LWTRT, the offshore lobster industry believes that the risk to whales from lobster gear decreases with increasing depth, particularly in areas other than the five known feeding areas.

In addition to the information on whales presented to the TRT, the offshore lobster industry has based its recommendations, and its responses to recommendations from the whale conservationists, on the operational information about the offshore lobster fishery.

Lobster Management Area 3 was created by Amendment #5 to the federal Lobster Fishery Management Plan based on a combination of operational and lobster resource factors. Anecdotal information indicates that approximately 100 vessels fish lobster traps in Lobster Management Area 3 on either a seasonal or year-round basis. The lobster trap fishery extends out to depths of 200 plus fathoms along the edge of the continental shelf from the U.S./Canada boundary to Cape Hatteras. While inshore lobster boats may fish either singles, pairs, or trawls, one can make the general observation that all offshore lobster boats use trawls, generally from 40 to 60 traps in length. The trawls are required by law to have a "high-flyer" with a radar reflector on each end. In addition to the high-flyer, an inflatable buoy is fastened to the buoy line adjacent to the high-flyer to take the strain of the current and allow the high-flyer to remain upright. The buoys must be marked with an ownership identification, as must the traps.

The rigging of offshore buoys is a science in itself, because the buoys must remain intact through severe North Atlantic winter storms. Because the buoys are at the surface, they are constantly in motion, causing each part of the rigging to chafe against the other parts. Storm seas regularly twist the aluminum poles into useless U shapes.

Offshore lobster buoys serve three primary purposes: 1. to allow the lobsterman to find and haul his traps; 2. to mark the location of traps so that other lobstermen will not set their trawls across those already in place; 3. to mark the location of traps so that draggers will not tow them up. In addition, lobster trap buoys provide anchor points for the offshore tuna fleet.

Offshore lobster buoy lines are generally made with polypropylene rope near the bottom to avoid having the bottom of the buoy line wrap around the traps or bottom obstructions as the current swings the buoy in an arc around the end of the trawl. In most offshore locations, currents are rotary. That is, they proceed in a circular pattern as the tidal cycle progresses. The current is usually stronger in one axis than the other, and may or may not actually go slack. Polypropylene rope is also stiffer and smoother and holds its shape better, being less likely to unlay or "hockle" than sinking rope. Polypropylene buoy lines also create less drag on the buoys because they provide their own flotation.

Just as it is a problem to have the bottom of a buoy line dragging on the sea bottom, it is a problem to have slack line floating at the surface. Therefore, offshore buoy lines either have a length of sinking line near the surface, or they have a line-weight part way down the buoy line to keep the line from floating at the surface.

As with most other aspects of fishing, or with life, the scope of buoy lines requires a trade-off. Longer buoy lines reduce the likelihood that buoys will run under in a strong current and that the traps will be dragged around by the buoy, but longer buoy lines also limit the proximity in which one trawl can be set next to another, or the amount of bottom that one fisherman excludes from the use of others. Lobstermen setting gear near another trawl must be able to judge the location of a trawl on the bottom compared to the position of the buoy at the surface, which requires a general idea of the length of the buoy line and the direction of the current. Similarly, trawler fishermen towing gear near lobster pot trawls must be able to judge the scope of the buoy.

Picking up an offshore lobster buoy requires the skipper to judge the direction of the current from the position of the tide buoy relative to the high-flyer. He must then bring the boat into the current so that the crew can get enough slack to get the buoy line into the trap hauler after they gaff or grapple the high-flyer or the line between the high-flyer and the tide buoy. In strong currents, such as those associated with Gulf Stream eddies on the edge of the shelf, large tide buoys and high-flyers can run under water, making it difficult to get the buoy aboard and the buoy line into the hauler. Storm seas add to the difficulty. If an offshore lobster vessel falls off the wind and current, a large strain is placed on the buoy line before the boat can be brought up into the wind and tide to run up on the line toward the trawl.

Offshore lobster fishing is a year-round business, although some boats have concentrated on crab trapping during the winter months in recent years. Some offshore lobster boats bring their traps ashore during the winter, some concentrate their fishing on the narrow edge of the continental shelf, and some fish for crabs in the mid-shelf region. Offshore boats generally have from 1500 to 3000 traps in the water which they haul once per week or more when the lobsters are potting well, and somewhat less during the winter when the weather controls their ability to haul the traps. In the early days of the offshore lobster trap fishery (the 1970s and 1980s), some boats

A few years ago it would have been possible to state that offshore lobster boats generally used somewhat larger traps than inshore boats, but recent years have seen an increase in the average size of traps in the inshore fishery and a comparable shift to smaller traps in the offshore fishery to the point where many inshore boats use traps that are larger than those used by many offshore boats.

Gear conflicts in which mobile gear trawlers and scallopers tow through lobster gear are a major problem in the offshore lobster trap fishery. Many offshore lobster fishing decisions are based on the avoidance or minimization of gear conflicts. Offshore lobster fishermen spend a significant amount of time searching for "ghost" gear that has been towed from its original location by draggers. As the power of the trawl fleet has increased, gear is towed further and further from its original location. Often, the inflatable buoys that mark the lobster gear are towed under water to the point where the buoys collapse and sink, if they are not cut loose by the dragger. To find their gear, lobstermen tow a grapnel that will pick up the line between the traps. It is difficult to keep a grapnel "tending bottom" unless it is towed at a very slow speed, which limits the ground that can be covered. Polypropylene groundline that floats between the traps makes it more likely that lobstermen will recover ghost gear as they tow their grapnel.

In addition to towing a grapnel to recover ghost gear, offshore lobster fishermen have also worked with electronics suppliers to develop depth sounders that will show the polypropylene line between their traps. In this way, ghost gear can be found while covering ground at a faster speed than would permit a grapnel to tend bottom. Alternatively, a trawl that the grapnel passed over may be seen on the sounder and another, slower pass with the grapnel may be made to recover the gear. One of the disadvantages of sinking groundlines is that the ability

Other disadvantages of sinking rope for offshore lobster trap groundlines are the following:

- Sinking rope costs more per pound than polypropylene rope and contains fewer feet per pound, making it substantially more expensive than floating rope.
- Sinking rope lays in the bottom sediment and picks up sand particles that wear the line as it moves in the current, as it twists while being hauled, and as it is squeezed between the sheaves of the trap hauler. The grit does not simply attach to the outside of the line, but works its way into the strands of rope, grinding away from the inside.

- Sinking rope with embedded sand particles acts like sandpaper when it is pulled through the steel sheaves of a trap hauler. Such rope quickly grinds away the critical angle that allows the hauler to grip the line and pull the traps. Lobster fishing is generally a relatively safe operation, but one of the most dangerous aspects of hauling lobster traps is having the groundline fly out of the hauler under tension because the hauler sheaves are worn. To renew the proper angle on a set of offshore trap hauler sheaves requires taking the heavy sheaves to a machine shop to be re-faced on a lathe or milling machine. Each time a set of sheaves is re-faced, a portion of the life of the sheaves is lost.
- Sinking rope chafes more on the corners of the traps, creating a weak spot in the line adjacent to the traps. This appears to be a result of the rope twisting as it is hauled through the hauler with a strain on it, with the trap laying against the line being hauled vertically to the surface. This problem is also greater in deep water because the groundline tends to be vertical rather than leading at an oblique angle from the boat to the bottom.
- Lighter, stiffer, slicker-surfaced polypropylene rope is less likely to tangle when trawls of lobster traps are being set overboard as the boat moves ahead. These gear tangles create a safety hazard both when the gear is being set and when it is retrieved. A snarl cannot usually be pulled through the davit block and trap hauler, requiring the snarl to be cleared while there is a great deal of strain on the trawl line. Snarls in softer, sinking rope are more difficult to release because the snarled rope cinches tighter on itself. Sinking rope is more likely to snarl when it is running out because the loops fall down within each other and the rope drags more heavily over the coils of line on deck or in a rope locker.
- Adding line weights to polypropylene groundlines will create a "point source" of weight that will tend to drop into the coils of groundline under the hauler, potentially causing dangerous snarls.
- Line weights will act similar to knots and splices in lifting the line out of its tight wedge in the hauler and causing the line to fly out of the sheaves under tension. The line weight then has the potential to hurt someone.
- Sinking rope is heavier to work with on deck. Traps rigged in multiple trap trawls must be carried from the hauling station to the rear deck, dragging the groundline behind them. On some vessels the man at the hauling station pulls slack line from the rope locker or the pile on deck to make it easier for the trap stacker to pull the line aft. On other vessels the trap stacker must pull the line from the pile as he carries the trap. In the cases where the man at the hauler pulls the line, the procedure requires a repetitive motion that will be aggravated by heavier line. In cases where the trap stacker normally pulls the line with him, heavier, sinking rope may require that the procedure be changed to have a man pull the slack line out of the pile for the trap stacker.
- The offshore lobster fleet has a substantial investment in polypropylene rope.

Offshore lobster boats generally set their trawls in the same direction as the current is flowing, which stretches the trawls out and keeps the line between the traps tight and low. When a dragger tows through one or more trawls of lobster traps, hauls them to the surface, and cuts them loose, the result is a tangled mess.

Responsible representatives of the offshore lobster trap fishery and the offshore mobile gear fisheries have attempted to reduce gear conflicts through a variety of methods. Most recently,

the New England Fishery Management Council amended its fishery management plans to create a "framework process" through which gear conflict regulations can be developed for specific areas. The first area to be addressed has been the edge of the continental shelf in southern New England. Regulations to separate lobster gear and mobile gear on a seasonal basis in that area are now pending before the National Marine Fisheries Service.

Experience has demonstrated that the development of additional bottom-sharing regulations governing lobstermen and draggers will be difficult to achieve for a variety of reasons. The offshore lobster fleet believes that a requirement for vessel tracking systems on all offshore lobster vessels and mobile gear vessels operating in Lobster Management Area 3 will be necessary to control gear conflicts.

Anecdotal information indicates that lobster trap fishing effort in Lobster Management Area 3 has been increasing slowly but steadily over the years. Although the total number of federal lobster permits in now limited, there are many inactive permits that can be turned into active offshore lobster vessels. The offshore lobster industry has been working for ten years to develop a management plan that would control the fishing mortality on the offshore lobster resource. The two alternative management proposals that were submitted by the industry to the New England Fishery Management Council in 1995 were a trap limit proposal and an individual transferable quota (ITQ) management proposal. The ITQ proposal is similar in concept to the Canadian offshore lobster management plan that has seen a decrease in fishing effort in the Canadian offshore lobster fishery, while landings have increased or remained steady. Either of the industry proposals would have reduced the number of traps in the offshore fishery. The New England Fishery Management Council did not adopt either of the management proposals, but instead shifted the responsibility for lobster management to the Atlantic States Marine Fisheries Commission. ASMFC and the Secretary of Commerce will be developing a fishery management plan for the offshore lobster fishery in the coming months and years.

The proposals made by the offshore lobster industry are also based on the belief that "ghost" gear created by gear conflicts between lobster gear and mobile gear is an important component of any threat of entanglement that lobster gear may pose to whales. As has been described by a member of the TRT who has observed lobster trap trawls underwater (Brad Barr, TRT presentation), the groundline between lobster traps on a trawl, even though it is floating line, is almost level between the traps. If a trawl is set with the current, as they normally are, the groundline is stretched taut between the traps. When a trawler tows its nets through one or more trawls of lobster traps, however, and then hauls the gear to the surface and cuts it loose, it becomes a tangled mess that is more likely to entangle a whale. In addition to the more dangerous configuration of gear that has been towed-up, that gear becomes unproductive gear that must be replaced by the lobsterman to maintain his production. The total amount of gear in the water is therefore increased and the incidence of gear and techniques for these new trawl fisheries has increased the incidence of gear conflicts in New England and mid-Atlantic waters. This is the basis for the offshore lobster trap industry's recommendations for gear conflict reduction and a requirement for vessel tracking systems for all lobster trap and mobile gear vessels fishing in Lobster Management Area 3 exclusive of the overlap area between Areas 2 and 3 in southern New England.

An additional basis for the proposals made by the offshore lobster industry is that a regulatory approach can not accommodate the diversity within the offshore lobster fleet. Offshore lobster fishing businesses cover a range of vessel sizes, gear configurations, and operating areas and conditions. To be widely acceptable to the industry, regulatory gear modifications must be tailored to the most demanding requirements. "One size fits all" conservation measures that might be acceptable to some fishermen, and thus reduce the risk to whales, are not broadly acceptable, and thus may be eliminated.

In contrast, a cooperative, non-regulatory approach may bring about a much broader adoption of significant whale conservation measures. A non-regulatory approach includes the research, education, and outreach components discussed by the TRT, but should also include private, individual arrangements between whale conservationists and fishermen.

The nature of free-market solutions to environmental problems is that the true cost of the solutions becomes apparent in the negotiated arrangement. If, in fact, the restrictions that whale conservationist want will not be unreasonably expensive for fishermen, fishermen will contract to adopt those restrictions at a very low price. The "valuable consideration" needed to validate a contract may not even be money. On the other hand, if the restrictions are very costly, that will also be reflected in a negotiated arrangement. It is highly unlikely that a market solution to whale conservation would require the extreme need for an outright "buy-out" of the fishery by the conservationists. This would only be the case if the common objection that "you'll put us out of business" is, in fact, true. In a free market approach, political positioning will give way to private bargaining over real values.

A variety of market mechanisms could be utilized to implement whale conservation measures. The use of market mechanisms has been enhanced by the recent development of limited "fishing rights", which are likely to be further developed and specified in the future. It is therefore possible for meaningful contracts between conservationist and fishermen to be negotiated because these arrangements can no longer be undermined by the open access nature of the fisheries.

The arrangements that would seem most likely to be developed to conserve whales would be contracts between conservation groups (perhaps coalitions formed for the purpose) and fishing businesses that would require fisherman to fish or refrain from fishing in certain areas and certain manners.

An outstanding example of a market mechanism that brought about the conservation of a marine species that would not have been achieved otherwise concerns the Greenland salmon fishery. The Greenland salmon fishery was of serious concern to salmon conservationists. To satisfy their concerns while meeting the needs of the Greenland fishermen, the North Atlantic Salmon Fund negotiated an agreement with the Greenland salmon fishermen to stop that fishery in 1993.

The recommendation of the offshore lobster industry reflect our belief that further exploration of market mechanisms can improve whale conservation beyond what can be done through regulations, and should be pursued.

Proposal B:

In portions of Management Area 3 (NMFS blocks 40702, 40701, 40692, 40691, 40682, 40683, 40681, 40674, 40673, 40664, 41662), lobster gear must be modified by January 1, 1998.

Modifications include:

A) Weak link at or near the buoy in the buoy line;
B) Sinking groundlines, or weights on floating groundline between traps, to minimize entanglement risk to whales using the bottom portion of the water column;
C) A vertical buoy line with a breaking strength of no more than 1,200 pounds.

Vessels are required to carry a device to allow vessel tracking (VTS) for assurance that no fishing is occurring in closed areas, and to allow enforcement of requirements for modifications. Offshore lobster gear must be marked or color coded to allow identification and provide further information toward understanding where and how entanglements occur. It is recommended that research into design of bottom weak links (near the anchor in the buoy line) to allow additional possibility of animals breaking free of entanglements.

We agree with the industry's proposal to close Groundfish Management Closure Area 1 to lobster fishing. Because the industry reports that there is currently no lobster fishing in this area, this proposal does not result in any reduction in risk, but will prevent future risk by preventing utilization of this area. We also agree with their proposal that gear should be hauled at least once every 30 days.

Offshore lobster gear has lines that are longer and heavier and gear that is heavier. Because of this, whales are less likely to pull free or swim off with gear; and offshore gear may well pose a greater threat than gear used in shallower water. Offshore lobster gear has been implicated in at least one entanglement-related mortality in the Bay of Fundy. Furthermore, because this offshore gear is in an area that is largely unobserved by whale watch boats, recreational boats and coastal fishing vessels, entanglements are more likely to go unreported, and whales in the area are less likely to be able to benefit from any mitigation of risk through disentanglement effort.

Some of the assumptions about right whales on which the industry has based its proposal (See p.) are not based upon data presented to the TRT (e.g., differential entanglement and strandings of calves versus adults, the use of deep water habitat, deep water dives by right whales, etc.).

It is critical that risk posed by this fishery be reduced, however the industry has proposed no measures that are likely to reduce risk of serious injury or mortality to humpback and right whales. They propose mandating that buoy lines within 50 fathoms (300 feet) of the surface have a breaking strength of no greater than 3,780 pounds. This represents no reduction in risk

because, according to the industry representative on the TRT, this is the breaking strength of the 1/2" polypropylene line, which is the line that is currently used by most of the industry. If the industry cannot implement requirements for modified gear that will reduce the risk of serious injury and mortality to whales, then portions of the Management Area should be considered for closure for at least part of the year. The only other industry proposals relate to reducing gear conflicts with mobile gear fisheries, in the hopes of reducing "ghost" gear. While we support reducing ghost gear in the ocean, the TRT was provided with no information to suggest that ghost gear has been implicated in any entanglement-related serious injury or mortality of large whales. Furthermore, while we support research into alternative methods of fishing that may reduce entanglement risk; research into acoustic harassment devices, "pingers," or so-called "noisy gear" is not likely to provide any immediate reduction in risk. Similarly, market incentives may offer a long-term means of encouraging responsible fishing and meeting longer-term goals, but are not likely to result in a reduction of serious injury and mortality in the time required to meet the short-term goals of levels below PBR as required in the TRP. Proposed buy-outs of the lobster industry by conservation groups are not likely to occur, and the so-called "fishing rights" mentioned in the industry's proposal do not exist in current law.

2. Mid Atlantic Gillnet Fishery

The following strategies have been proposed to reduce the potential for large whale entanglement and/or serious injury or mortality from fishing gear.

1) Establish large whale disentanglement network in Mid-Atlantic.
   a) establish regional (possibly by state) equipment/supply centers
   b) identify and train regional response personnel
   c) develop reporting and response protocols
   d) train fishers and observers to utilize the network

2) Based upon available data for large whale distribution in the Mid-Atlantic, it is proposed that December through March be designated as a potentially high risk period for the area.

3) By January 1, 1998, the following gear modifications, accepted by the TRT for fixed/anchored gillnet gear in the Mid-Atlantic, should be required during the high risk period and encouraged for full time use through promotion of responsible fishing practices:

- weak link at or near the buoy (Breaking strength determined under R & D program. Goal will be to make link as weak as possible while consistent with practical gear handling and whale safety.)
- sinking line for buoy line, except last 10 fm, which may be up to 1/2" polypropylene that is spliced to prevent formation of a knot. The polypropylene is to be used with the intention of tying in the anchors and weights so that there is no more than two fathoms of vertical lift, and in order to prevent chafing and any subsequent gear loss.
- weak links in bridles and between net panels

- net cap of 80, buoy cap of 20
- danforth-style anchors required in under 40 fm of water
- gear marking and method developed by region and gear type
- float line 5/16" to 3/8"
- poly foam core 1/2"

Additional and/or updated gear modifications will be reviewed for acceptance by the TRT at the Team's biannual meetings. Interim periods will be used for research, development, and testing of proposed modifications.

4) Fishers using un-anchored gillnet gear during the high risk period should be required to have their gear with them, whenever they return to port.

5) Realizing that the following goals are extremely difficult to achieve and enforce, it is recommended that they be part of the education and promotion of responsible fishing practices as a realistic way to introduce these practices to fishers.

- Gillnets and other fixed gear should not be set near whale(s).
- Gear should be removed as soon as possible if whale(s) move into the area.
- Fishers using un-anchored gillnet gear during the high risk period should remain with actively fishing gear. (Based upon a description of how this gear is fished, any possible interactions/entanglements would be observed and should be reported.)

Implementation

Members of the TRT have expressed the following concerns regarding implementation of the TRP. Enforcement of many of these proposed changes will be extremely difficult at best. These concerns need to be addressed for the desired results of the plan to be realized. The states, fishing industry, conservationists, and fishers must feel they are a vital part of this effort, involved at all levels of the planning and implementation, and participating in the design and creation of solutions. Achieving the willing and active participation of all parties in these efforts is the best chance for success of the plan, and ultimately, the whales. Implementation of the TRP should be carried out in a manner in which all concerned can have confidence that the intent of the TRT is upheld.

1) Outreach/education must be part of the TRP. Fishers and other involved groups must be informed about the MMPA, ESA, and the TRP, why they are necessary, and their goals and strategies.

2) Establish time frame and guidelines and let states and the fishing industry respond to proposed gear modifications, allowing time for research, development and field testing, without compromising the intent of the TRT and the mandates of the MMPA.

3) The TRT recommends that all coastal states be encouraged to develop conservation/management plans for protected marine species.

3. Southeast Shark Gillnet Fishery

The following strategies have been proposed to reduce the potential for whale entanglement and /or serious injury or mortality from fishing gear.

1. The area from 27°51', approximately Sebastian Inlet, Florida, north to 32°, Savannah, Georgia, and out to longitudinal line 80° will be closed to drift gillnetting, except for strike net fishing, from November 15 to April 1.

2. In the area from 26°46.5', approximately West Palm Beach, north to 27°51', driftnetting is permitted between November 15 through April 1, provided that there is a 100% observer coverage. (The LWTRT recommends that NMFS designate funds for 100% observer coverage. However, in the event that NMFS is unable to provide an observer on a given night, trips may be made with prior NMFS approval.)

Strike Net Fishery

Strikenetting is permitted within the above areas between November 15 and April 1, provided that:

a) There is no night time setting, nor setting in limited visibility (defined as less than 500 yards).
b) Sets must be made under observation by the spotter plane.
c) Vessels are subject to 100% observer coverage.
d) No net should be knowingly set within 3 nautical miles of an endangered whale.
e) If a whale moves to within 3 nautical miles of the gear, the gear should be immediately removed from the water.

Other Requirements

The recommendation of the TRT for the southeast shark gillnet fishery assume that NMFS will issue the final regulations prohibiting approaches closer than 500 yards to right whales, with specific exceptions. Should this not be the case, then these recommendations should be revised so as to prohibit approaches closer than 500 yards without specific authorization from NMFS to do so.

Continue closure of state waters of Georgia and Florida. If any change is proposed by either state, then the plan is subject to immediate review.

All operators are subject to observer coverage. Observers must be placed on the boat in such a manner as to allow unobstructed view of setting and retrieving of gear as it enters or leaves the water.

Liability coverage for the observer program will be consistent with other NMFS observer programs.

Research Needs

Follows is a prioritized list of research needed in the southeast.

1. Establish a GIS.
2. Continue expanded offshore survey effort.
3. Establish air surveys to investigate whale use of the southeast between October 1 and the start of the EWS surveys (December 1), and the end of the EWS surveys (March 31) through April 30.
4. Expand efforts to obtain data from telemetry to better understand movements and activities of whales within the calving area.
5. Telemetry to determine movement patterns of right whales between summering and wintering habitats.
6. Research to more accurately characterize the shark gillnet fishery in the southeast.

C. Compliance with ESA for Endangered Species

1. Critical Habitat

The northern right whale was listed as endangered on June 2. 1970 (35 FR 8495). Section 9 of the ESA prohibits the taking of endangered species, and section 7 requires Federal agencies to ensure that their actions are not likely to jeopardize either threatened or endangered species. For species listed prior to 1978, when Congress required that critical habitat be designated, concurrently with the listing, critical habitat may be designated although such designation is not required.

NMFS was petitioned by the Right Whale Recovery Team to designate critical habitat for the northern right whale on May 18, 1990. The proposed rule was published on May 19, 1993 (58 FR 29186), and provided for a 60-day comment period. After consideration of public comments, and based on the best available scientific information, NMFS designated the following areas, which are essential for the reproduction, rest and refuge, health, continued survival, conservation and recovery of the northern right whale population, as critical habitat. See **Appendix 13** for maps of these critical habitat areas.

Great South Channel: The area designated as critical habitat in these waters is bounded by the following coordinates: 41°40'N/69°45'W; 41°00'N/69°05'W; 41°38'N68°13'W; 42°10'N/68°31'W.

Cape Cod Bay: The area designated as critical habitat in these waters is bounded by the following coordinates: 42°04.8'N/70°10.0'W; 42°12'N/70°15'W; 42°12'N/70°15'W; 42°12'N/70°30'W; 41°46.8'N/70°30'W; and on the south and east, by the interior shoreline of Cape Cod, MA.

Southeastern United States: The area designated as critical habitat in these waters encompasses waters between 31°15'N (approximately located at the mouth of the Altamaha River, GA) and 30°15'N (approximately Jacksonville, FL) from the shoreline out to 15 nautical miles offshore; and the waters between 30°15'N and 28°00"N (approximately Sebastian Inlet, FL) from the shoreline out to 5 nautical miles.

2. Brief Review of Duties and Authorities Relevant to Whale Conservation Under the ESA (See Appendix 14)

V. IMPLEMENTATION

A. Assessment of Actions and Progress Toward Goals

The proposed Plan is structured to mitigate the impact on populations of large whales of entanglements in fixed fishing gear. To that end, the Plan proposes gear modifications, area closures, alteration of fishing operations, and increased disentanglement effort. The LWTRT recognizes, however, that numeric information central to achieving the PBR goals is uncertain. Areas of substantial uncertainty significant to the LWTRT considerations and requiring further study include:

1) Actual mortality due to entanglement;
2) The degree to which any proposed actions in the plan will reduce mortality;
3) The distributional characteristics of the species and identification of all high use areas significant to each species;
4) The behavioral responses of the whales to initial engagement;
5) The significance of disentanglement efforts in mitigating gear impacts;
6) What techniques could be used to measure the effectiveness of the recommendations of the Plan;
7) How, where, and when whales become entangled;
8) Fishing effort and spatial/temporal distribution of such effort by gear type and degree of risk to whales; and
9) Survivorship following entanglement and disentanglement.

Furthermore, the LWTRT recognizes that the mortality rates are minimum estimates and that real mortality due to fixed fishing gear is greater than the estimation by an unknown amount.

Nevertheless, the proposed Plan is the result of a good-faith effort based on the best information available to identify the problem, mitigate the effects, and put in place the best methods for monitoring the success of the Plan.

1. Modeling

Throughout the LWTRT's deliberations, Team members recognized the difficulty inherent in determining the effects of different actions on serious injury and mortality rates for whales. In an

effort to better quantify the effects of disentanglement efforts in particular, one member of the LWTRT developed a preliminary model to help predict the outcome of such efforts. Due to time constraints, this model was not thoroughly discussed by the Team in detail. The model is attached as **Appendix 15**.

2. Gear Modifications

In the short term, gear modifications can only be tested by experiment. Such an experiment should include efforts to quantify the strength of a whale, mimic a whale hitting a line using weak links of varying strength and at varying places in the gear, and testing of tag lines and pop-up buoys. Other modifications such as sinking buoy lines, sinking ground lines, and placing weights on ground lines should also be evaluated.

In the long term, contingent on continued field studies on right whales to collect adequate photographic data, the incidence of new entanglement scarring will be reviewed annually. A reduction in the severity and presence of entanglement scarring may suggest that gear modifications and fishing effort reduction have reduced the incidence of an entanglement resulting in scars (it is assumed that if an animal can break away before getting wrapped in the gear, there should be little to no evidence of scarring).

Presumed mortality numbers will also be tallied to determine if there is a reduction, however these figures will not be useful unless field survey effort is expanded and maintained, and until a minimum of six years after the implementation of gear modifications.

Effectiveness of gear modifications may also be evaluated based on witnesses entanglement events. Efforts should be made by all potential witnesses to video or photograph the event and/or describe in detail the sequence of events which occurred, including in what part of the gear the whale was entangled, whether the animal was last seen carrying line, if there was gear still attached to the line (i.e. pots or gillnet), and where on the animal the gear was found (i.e. through the mouth, around the tail, or elsewhere). Knowing how and if the entanglement gear was modified is essential for evaluating whether the gear modification was effective.

VI. EVALUATION OF THE TRP AND MONITORING OF THE STRATEGIES TO REDUCE INCIDENTAL MORTALITY AND SERIOUS INJURY

A. Evaluation of the TRP

The immediate objective of this TRP is to reduce the incidental mortality and serious injury of strategic stocks to levels below the PBR estimated for each of these large whale stocks within 6 months of the implementation of the final plan. Nevertheless, the LWTRT recognizes that the strategies outlined in this plan need to be evaluated on a continual basis to determine whether they achieve this objective. Therefore, according to the mandates of the MMPA, the LWTRT will reconvene every six months to monitor the implementation of the final LWTRP, or until such time that NMFS determines that the objectives of the TRP have been met. When the LWTRT reconvenes, its duties will include reviewing information on the latest minimum

population, PBR estimates, mortality and serious injury of strategic stocks, and any information on new or existing gear modifications. Furthermore, according to the MMPA, if at the time the LWTRT reconvenes, the TRP objectives have not been met, the LWTRT will evaluate and recommend additional methods to reduce marine mammal interactions to reduce take levels to below PBR.

In addition to the evaluation required under the MMPA, the LWTRT recommends that NMFS reconvene the team under the following conditions:

- Action by either the New England Fishery Management Council, the Mid-Atlantic Fishery Management Council, the South Atlantic Fishery Management Council, the Atlantic States Marine Fisheries Commission, or the Secretary of Commerce that would in any way affect the strategies outlined in the TRP or potentially increase or decrease incidental mortality or serious injury; or

- Action by the courts that would in any way affect the TRP strategies.

The LWTRT recognizes that the management actions of these bodies and court decisions may impact the LWTRT recommended strategies. Therefore, the LWTRT believes that reconvening the LWTRT under these conditions is critical to effective and coordinated conservation and management of these strategic large whale stocks and other living marine resources. After considering the management actions of court decisions, the LWTRT may amend the TRP and implementing regulations as necessary to meet the TRP's objectives.

B. Monitoring of the Strategies to Reduce Incidental Mortality and Serious Injury

The LWTRT acknowledges that many of the proposed gear modifications included in the various strategies are new and untested and will require some level of monitoring to determine their effectiveness in reducing incidental mortality and serious injury of large whales. In order to achieve the necessary monitoring to make such a determination, the LWTRT recommends that NMFS either undertake or support the following:

- Long term research using photo identification to document the presence and prevalence of gear entanglement scars on large whale populations (especially juveniles).
- Annual documentation of the number of reported entanglements, estimated annual mortality, number of animals successfully released, severity of the entanglements, and any assessment or evidence indicating the effectiveness of the proposed gear modifications.
- Collection of gear removed from whales in a central repository to allow the assessment of rates of entanglement by each fishery, whether gear was actively fishing or ghost gear, and location of entanglement.

Glossary and List of Abbreviations

ASMFC - Atlantic States Marine Fisheries Commission

CCS - Center for Coastal Studies

CETAP - Cetacean and Turtle Assessment Program

EEZ - US Atlantic Exclusive Economic Zone

ESA - Endangered Species Act

LOF - List of Fisheries

MMPA - Marine Mammal Protection Act

NEFSC - Northeast Fishery Science Center

NMFS - National Marine Fisheries Service

NOAA - National Oceanic and Atmospheric Administration

OSP - optimal sustainable population - 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.

PBR - potential biological removal - the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

TRP - Take Reduction Plan

LWTRT - Large Whale Take Reduction Team

USCG - United States Coast Guard

ZMRG - zero rate mortality goal -

APPENDIX 1

Northern Right Whale Entanglements and Humpback Whale Entanglements:

Notes/Caveats to consider when reviewing the spreadsheets.

1. These tables represent a "work in progress." Additional information may be received at any time which could result in a record being reclassified from injury to serious injury or vice versa. The tables were compiled based on information reported to NMFS. In many cases, NMFS does not have a copy of the original record, so additional details on many of these entanglements may exist which have not been included here.

2. Data represents reports of sightings of free-swimming, stranded, or floating, entangled whales. The number of records is considered a minimum. The total number of entanglements can not be estimated.

3. In most records, dates and locations given describe the initial sighting of the entangled whale, not where and when the entanglement actually occurred. However, there are a few records in which the actual date and location of entanglement are listed.

4. The Comments/Remarks column contains summarized information from initial sighting reports. Some have been updated with subsequent investigation. Many initial comments regarding the injury to the whale and the whale's behavior were left intact. However, serious injury determinations were not made based on the initial observer's comments alone. For example, if an entanglement was initially described as "not life threatening," that does not mean that the entanglement was not counted as a serious injury. Serious injury determinations were made considering all available information about the actual entanglement of the gear on the whale along with the basic biology and behavior of the animals.

5. On the Humpback table, record numbers with an asterisk are those which were counted as serious injuries or mortalities and are therefore used in the analysis of entanglement rates relative to PBR. On the Right Whale table, records which were used in the serious injury/mortality analysis are indicated by an "X" in the "Used" column. Records from non-U.S. gear were not considered in the analysis.

NORT RIGHT WHALE ENTANGLEMENTS, 1970 - 1996 Reported to NMFS through 27 January 1997)

Record	Used?	M	D	YR	ID#	Area	Latitude	Longitude	Type	Gear Present ?	Gear Types	Gear Description	Condition	Outcome	Photos/ Video	Source
1		1	27	70		FL	30 385	81 391	E	U	Unknown		A	I		NEWS
2		7	1	76		NJ	40 300	73 942	E	Y	Lobster	LINE CONNECTING LOBSTER POTS;POTS PRESENT	A	I		SMNH
3		7	20	76		NJ	40 102	74.028	E	Y	Line	2 CM LINE	A	I		SMNH
4		8	5	76	1005	NB	44 667	66 800	E	Y	Weir/Trap	WEIR	A	U		NEA
5		8	5	76	1076	NB	44 667	66 800	E	Y	Weir/Trap	WEIR	A	U		NEA
6		8	25	76		MA	41.895	70 125	E?	U	Unknown		D	D		
7		8	31	76		MA	41 902	70 130	E	Y	Net	NETS AND LINES	A	I		NEA
8		6	16	78		MA	41.792	70 153	E	Y	Gillnet	GILLNET	D	D		SMNH
9		6	16	78		MA	41 833	70 167	E	Y	Gillnet	GILLNET W/BUOYS ATTACHED	A	I		NEA
10		8	27	81	1152	BOF	44 998	66 732	E	Y	Gillnet	NON-MONOFILAMENT GILLNET	A	I		NEA
11		3	3	82		FL	26.926	80 054	E	Y	Gillnet	GILLNET	A	I		NEA
12		2	7	83		RI	40.117	71 183	E?	Y	Trawl	OTTER TRAWL FOR SQUID	D	U	N/N	NMFS
13		4	5	83		NC	34 169	77.205	E	Y	Gillnet	STURGEON GILLNET	A	I		SMNH
14		5	15	83	1306	MA	41.984	70.500	E	Y	Lobster	LOBSTER POT LINES WITH BUOYS	A	U		NEA
15		7	26	84	UNK	NFL	46.833	54 033	E	Y	Weir/Trap	ENTIRE COD TRAP	A	I		LIEN
16		9	6	84	1308	BOF	44.555	66.447	E	Y	Gillnet	GILLNET	A	I		NEA
17		5	2	85	1406	ME	43.718	69.474	E	Y	Lobster	3/8" POLY;TRAILING 75' LINE+FLOATS+SEVERAL TRAPS	A	I		USCG
18		5	13	85		MA	42.000	72.5	E	Y	Net	NET	A	U		CCS
19		9	0	85		GOM	42 800	70.283	E	Y	Gillnet	GILLNET	A	I		NEA
20		10	14	85		MA	42.152	70.143	E	Y	Line	LINES/ROPES	A	I		CCS
21		5	15	86	1411	GSC	42.252	68.717	E	Y	Gillnet	GILLNET	A	I		NEA
22		8	27	86	1163	MA	42.263	70.218	E	Y	Line	LINE	A	I		CCS
23		11	14	86		MA	42.5	70	E	Y	Hand Gear	TUNA DART WITH LINE	A	I		USCG
24		10	2	87	1113	NSS	42.937	65 363	E	Y	Line	LINE	A	I		NEA
25		11	17	88	UNK	BOF	44.867	66.65	E	Y	Lobster	ABOUT 1/2 TRAWL OF OFFSHORE LOBSTER POTS;CANADIAN	D	D		NEA
26		8	2	90		BOF	44.933	66 8	E	Y	Gillnet	CANADIAN SINK GILLNET ?? "LEAD" LINE ONLY ??	A	I		MURI
27		8	16	90	1907	BOF	44 620	66 478	E/V	Y	Gillnet	1/4" WHITE LINE+3" MESH MONO GILLNET+SMALL FLOATS	A	I		NEA
28		9	18	91	2123	BOF	44 267	66 533	E?	Y	Line?	LINE	A	N		BIOS
29	X	7	9	93	2233	MA	40 377	67 633	E	Y	Lobster,Sword	LOBSTER BUOY+WARP+SWIVEL PLUS SWORDFISH DRIFTNET	A	I	Y/N	NMFS
30		8	20	93	1704	BOF	44 672	66.443	E	Y	Gillnet	SINK GILLNET ??"LEAD"?? LINE;CANADIAN GEAR	A	I		NEA
31	X	12	21	93	2366	GA	30.738	81.358	E	Y	Lobster	LOBSTER LINE;MOST POLY;ALSO POLY/DACRON W/TOGGLE	A	I	Y/Y	CCS
32	X	1	7	94	1621	GA	31.063	81.138	E?	N	Unknown	?LINE?	A	I	Y/?	NEA
33	X	2	22	94	2404	FL	30.197	81.157	E?/V?	N	?Shark?	scarring only	A	I	Y/Y	NEA
34		8	24	94	UNK	BOF	44.555	66.510	E	Y	Gillnet	GILLNET;1/4-1/2" YELLOW POLY +SM.BALL MONOFILAMENT	A	I		NEA
35		9	21	94	1247	BOF	44 653	66.357	E	Y	Line	5/8"BLACK/GREEN LINE + CLUMP OF 1/2" YELLOW LINE	A	I	Y/Y	NEA
36	X	11	16	94	2151	MA	42.767	70.683	E	Y	Line	3/8" SINKING LINE (POLY/DACRON)	A	I	Y/Y	USCG
37		8	17	95		MA	41 8312	70.183	E	Y	Lobster	INSHORE LOBSTER POT LINE	A	U	Y/Y	WWV
38		9	16	95	2110	BOF	44.707	66 430	E	Y	Gillnet	SNK GILLNET;900'ORANGE POLY LINE +BUOYS + HI-FLIER	A	I	Y/Y	NEA
39		12	0	95	2220	NB	44.862	66 691	E/V	Y	Lobster	LINE+PART OF 1 OF 20-POT LOBSTER TRAWL;CANADIAN	A	I		CCS
40	X	1	6	96	1707	FL	30 530	81 285	E	Y	Lobster	TWO YELLOW LOBSTER BUOYS AND 3/8-1/2" POLY LINE	A	I	Y/Y	FDEP
41	X	8	5	96		MA	42.452	70 483	E	Y	Unknown	?MONOFILAMENT? WITH DARK ORANGE 3X5" FLOATS	A	I	Y/?	WWV
42		9	22	96		NB	44.675	66.833	E	Y	Weir/Trap	WEIR;CANADIAN	A	U		NEA

Type Codes

E = Entanglement
V = Vessel Collision

Condition Codes

A = Alive
D = Dead

Outcome Codes

I = Injured
N = Not injured
D = Dead
U = Unknown Status

Record	Remarks
1	EST LOC ;POSSIBLE MOTHER OF CALF THAT STRANDED DEAD ON 1/26/70
2	EST LOC ;LINE CONNECTING POTS AROUND BODY,DIVERS CUT POTS OFF;SWAM AWAY;?AGAIN NEXT DAY 3 MI EAST?;?SAME WHALE SEEN W/2CM LINE ON IT ON 07/20/76?
3	EST LOC ;LINE ON WHALE,SEAN 1133,MAY BE WHALE THAT WAS ENTANGLED IN LOBSTER GEAR ON 7/1/76 OFF LONG BRANCH, NJ
4	GRAND MANAN ISL ;EST. LAT/LON,COW(W/ITS CALF#1076)IN A WEIR,RELEASED
5	GRAND MANAN ISL;EST LAT/LON,CALF(W/ITS MOTHER,#1005);ENTANGLED IN WEIR TOGETHER,RELEASED
6	EST LOC ;MAY BE SAME AS 08/31/76 ANIMAL ALIVE AND ENTANGLED OFF WELLFLEET
7	EST LOC ;WELLFLEET/CAPE COD BAY,NETS+LINES AROUND HEAD,CHECK TO SEE IF DUPLICATE OF 08/25/76 OR TRANSPOSED
8	EST LOC ;3 MILES NORTH OF EAST DENNIS, MA,CAUGHT IN GILL NET,UNSUCCESSFUL ATTEMPT TO FREE ANIMAL;?SAMEAS OTHER 06/16/78?
9	EST LOC ;IN GILLNET W/BUOYS ATTACHED,COULD OPEN MOUTH,SEEN SWIMMING TOWARD PROVINCETOWN;CHECK ?SAME AS OTHER 06/16/78?
10	NECKLACE,NET AROUND TAIL;SHED GEAR BY 8/90
11	EST LOC ;RELEASED-UNKNOWN WHETHER COMPLETELY DISENTANGLED
12	CALF,MAY HAVE BEEN DEAD ALREADY,FLOATED BELLY-UP,WHITE BELLY,FOREIGN FISHERY OBSERVER REPORT;CHECK OBSERVER DIARY
13	EST LOC ;PARTIALLY RELEASED,10 FEET OF NET REMAINED ON ANIMAL
14	C COD BAY(1.5 MI OFF PLYMOUTH);ANCHORED+PROB OCCURR THERE-ADJ BUOYS SAME COLOR;ESCAPED?FREE OF GEAR?;??SAME AS 05/13/85??
15	UNSUCCESSFUL DISENTANGLEMENT;DRAGGED TRAP OFF INTO DEEP WATER;PRESUMED DEAD;?ADULT?,ST. STEPHENS, NEWFOUNDLAND
16	GILLNET OVER HEAD,FREE OF GEAR BY 10/84
17	LINE AROUND TAIL+DRAGGING 75' W/TRAPS+FLOATS; GEAR of SO BRISTOL LOBSTERMAN;DISENT. BY USCG;UNKNOWN IF FREE OF GEAR;43 51N/69 38W;1-YR-OLD.
18	EST.LOC ;CAPE COD BAY; FREED ITSELF FROM NET OVER HEAD AND BACK;CHECK TO SEE WHETHER SAME WHALE AS 05/15/83
19	EST.LOC ;SWIMMING ENTANGLED,JEFFREYS LEDGE;STELLWAGEN BANK
20	EST.LOC ;NE OF RACE PT., PROVINCETOWN;ROPES AROUND FLUKES
21	NET AROUND TAIL OF JUVENILE;SHED GEAR BY 09/90;GREAT SOUTH CHANNEL
22	STARS,LAT/LONG FROM 8/29 SIGHTING;LINE THROUGH MOUTH+AROUND HEAD;UNSUCCESSFUL DISENTANGLEMENT;SHED GEAR BY 1990
23	EST.LOC.;TUNA DART W/LINE ATTACHED IN CALF
24	LINE IN MOUTH
25	EST LOC ;TAIL WRAPPED IN LINE FROM UNKNOWN PART OF THE TRAWL
26	EST LOC ;LINE AROUND TAIL FOR ABOUT 20 MINUTES AND SNAPPED WHEN FISHERMAN PULLED; ?? HIS OWN GEAR ??
27	BUOY GIRL;3 WRAPS LINE WOUND TIGHTLY AROUND TAIL;ALSO GILLNET,EMACIATED 02/91;DIED 03/91 FROM SHIP STRIKE
28	EST LOC ;BRIER ISLAND OCEAN STUDY PULLED LINE FROM WHALE'S MOUTH;WHALE MAY NOT HAVE BEEN ENTANGLED
29	TAIL CUT 8" FR. LOBSTER PART HEALED +RE-CUT BY NET,WRAPPED IN NET;PART DISENT.7/9 BY F-MAN,REST DISENT.8/7 BY CCS;RE-SIGHTED 09/93 IN NY;PRESUMED DEAD
30	LINE IN MOUTH FOR ABOUT 30 MINUTES;SNAPPED BY WHALE
31	OFFSHORE GEAR;6-8 WRAPS GREEN POLY ON R-FLIPPER,3"INTO BONE+THROUGH BALEEN;DARK WARP ON BACK;SEEN 08/94 C.COD BAY;STRANDED DEAD 07/95 IN RHODE ISLAND
32	DEEP ENTANGLEMENT SCAR ON BACK;DEEP LINE MARKS ON BOTH SIDES OF MOUTH;SEEN 08/01/94 MASS BAY IN BAD SHAPE
33	SEVERE INJURIES ON TAIL AND HEAD,PREVIOUSLY SEEN IN GOOD HEALTH 01/27/94;SHARK DRIFTNET FISHERY OPERATING IN AREA
34	LINE AND NET THROUGH MOUTH,TRAILING BALL OF GILLNET 8-10' BACK;SEEN STILL ENTANGLED IN BAY OF FUNDY ON 08/19/95
35	TAIL-5-7 WRAPS,2 LINES+PROBABLY OTHER GEAR TRAILING;WHITE SCARRING SUGGESTS NOT FRESH;LAST SIGHTED 2 YRS PREVIOUSLY W/O LINE;SEEN 6/95 BOF-?SLOWING?
36	FRESH WOUNDS,?INSHORE LOBSTER POT WARP?;THROUGH MOUTH,CUTTING INTO LEFT GUM+UNDER R.FLIPPER;3 TAIL WRAPS;CCS PARTIAL.DISENTANG.;40' OF LINE BROKE OFF
37	CALF ENTANGLED FOR 1/2 HOUR;FREED ITSELF;N.OF SESUIT HARBOR/W.OF BILLINGSGATE SHOALS,CAPE COD BAY
38	JUVENILE(3YR),LINE THROUGH MOUTH;SOME TRAILING LINE+BUOY REMOVED BY NEA;SM.FLOAT TIED ON TO MAKE RE-SIGHTING EASIER;CANADIAN GEAR;SM.FRESH CUT ON TAIL
39	EST LOC ;WASHED UP DEAD FR.SHIP STRIKE IN WELLFLEET,MA 03/09/96;TAG ON TRAP IDENTIFIED GEAR;F-MAN NOTICED GEAR MISSING 12/95 ALONG WITH ADJ.5-POT STRING
40	METOMPKIN,9 YRS.,FIRST SEEN SWIMMING S. OFF FLORIDA,PART.DISENT.+ATTACHED ANOTHER BUOY W/RADIO+SATELLITE TAGS;SHED GEAR BY 08/07/96
41	LIFE-THREATENING ENTANGLEMENT; MAY HAVE HAD WRAPS OF MONOFILAMENT ON ROSTRUM.
42	EST LOC.;BRADFORD COVE,GRAND MANAN ISLAND,NEW BRUNSWICK;TRAPPED IN WEIR;GONE NEXT DAY

Source Codes

NEWS = Newspaper Article

SMNH = Smithsonian Institution
NEA = New England Aquarium
LIEN = Jon Lien, Memorial University of Newfoundland
USCG = U S Coast Guard
CCS = Center for Coastal Studies
MURI = Laurie Murison, Grand Manan Whale and Seabird Research Station
BIOS = Brier Island Ocean Study, Carl Haycock
WWV = Whale Watch Vessel
FDEP = Florida Department of Environmental Protection

APPENDIX 2

HUMPB' 'WHALE ENTANGLEMENTS, 1975 - 1996 (As Rep d to NMFS through 27 January 1997)

Rec.	Species	Mo	Da	Yr	Area	Lat	Long	Gear Present?	Gear Type	Gear Description	Outcome	Condition	Photos/ Video	Source
1	HUWH	2	25	75	VA	36 55'	76 00'	?	gillnet	gillnet	mortality	D	?	LIT
2	HUWH	7	20	76	MA	42 53'	70 21'	Y	gillnet?	?gillnet?	injury	A	?	COA
3	HUWH	6	24	78	NH	43 06'	70 14'	?	gillnet	gillnet	mortality	D	?	SMNH
4	HUWH	7	21	79	ME	44 20'	68 10'	Y	line	line	injury	A	?	COA
5	HUWH	7	29	79	NB	BayFundy	Cromwell Cove	Y	line	line	injury	A	Y/?	COA
6	HUWH	8	17	79	NB	44 37'	66 54'	Y	weir	weir	injury?	A	?	COA
7	HUWH	8	17	79	NB	44 37'	44 37'	Y	weir	weir	injury?	A	?	COA
8	HUWH	9	2	79	ME	44 51'	66 59'	Y	stop seine	stop seine&rope	injury	A	?	COA
9	HUWH	9	10	79	ME	43 10'	70 10'	Y	gillnet	gillnet	mortality	D	?	COA
10	HUWH	12	0	79	NC	34 41'	76 40'	Y	net	net	injury	A	?	B.Fulford,Beau,NC
11	HUWH	0	0	81	NY	41 04'	71 50'	Y	cod weir	cod weir	injury	A	?	OKEA?
12	HUWH?	1	30	81	NC	34 41'	76 40'	Y	net	net	injury	A	?	SMNH &fisher?
13	HUWH	5	8	81	MA	?	?	Y	line	line	injury	A	Y/?	WHOI
14	HUWH	7	12	81	ME	43 24'	68 45'	Y	gillnet	gillnet	mortality	D	?	NMFS/LE
15	HUWH	8	9	81	MA	42 49'	70 16'	Y	gillnet	gillnet	injury	A	?	NEA/USCG/NMFS
16	HUWH	9	11	81	NY	41 02'	71 55'	Y	gillnet	gillnet	injury	A	Y/?	SMNH
17	HUWH	9	21	81	NB	44 41'	67 00'	Y	lobster	lobster gear	injury	A	?	?
18	HUWH	0	0	82	NY	Long	Island	Y	?	?	injury	A	?	?
19	HUWH	11	7	82	MA	41 56'	70 04'	Y	?	nets&ropes	mortality	D	Y/?	NEA/NMFS-LE
20	HUWH	7	0	83	MA	41 10'	69 52'	Y	scallop	scallop cable	injury	A	?	NEA
21	HUWH	9	9	83	NB	44 42'	66 43'	Y	weir	weir	injury	A	?	SMNH
22	HUWH	10	6	84	MA	42 26'	72 17'	Y	grdfish gillnet	gillnet	injury	A	?	CCS
23	HUWH	10	22	84	MA	42 38'	70 30'	Y	?gillnet?	?gillnet?	injury	A	?	NEA
24	HUWH	10	23	84	MA	42 22'	70 32'	Y	lobster	lobster line &float	injury	A	?	CCS
25	HUWH	1	0	85	MA	42 24'	70 00'	Y	gillnet	gillnet	injury	A	?	CRU
26	HUWH	4	1	85	MA	42 08'	70 20'	Y	gillnet	synthetic ropes& float	injury	A	?	CCS
27	HUWH	7	21	85	MA	42 07'	70 10'	Y	bot.longline	cod longline	injury	A	?	CCS
28	HUWH	8	29	85	MA	42 10'	70 11'	Y	purse seine	tuna purse seine	injury	A	?	NMFS/LE
29	HUWH	8	29	85	MA	42 10'	70 11'	Y	purse seine	tuna purse seine	injury	A	?	NMFS/LE
30	HUWH	8	29	85	MA	42 10'	70 11'	Y	purse seine	tuna purse seine	injury	A	?	NMFS/LE
31	HUWH	2	23	86	MA	42 40'	70 20'	Y	otter trawl	otter trawl	mortality	D	?	CRU
32	HUWH	4	16	86	MA	42 25'	70 30'	Y	gillnet	gillnet leadline&mono	injury	A	Y/?	CRU
33	HUWH	5	0	86	MA	42 25'	70 26'	Y	longline or gillnet	longline(bot.) or gillnet leadline	injury	A	Y/?	CRU/CCS
34	HUWH	5	3	86	MA	?	?	Y	gillnet	gillnet line & blue plastic float	injury	A	Y/?	CRU
35	HUWH	8	21	86	MA	41 55'	70 31'	Y	line	line	injury	A	?	CCS
36	HUWH	9	1	86	MA	41 26'	69 23'	Y	gillnet	line to net w/tuna float	injury	A	?	CCS/LE
*37	HUWH	5	29	87	MA	42 04'	70 37'	?	lobster	lobster gear;pots present	injury	A	?	NEA
*38	HUWH	10	27	87	MA	42 47'	70 05'	Y	tuna hand line?	3/8-1/2" hemp line	injury	A	Y/?	CRU
*39	HUWH	6	10	88	MA	42 48'	70 20'	Y	line	loop of line w/float	injury	A	Y/?	CRU/CCS

HUMPBACK WHALE ENTANGLEMENTS 1975 - 1996

Rec.	Comments
1	caught in gillnet
2	one 60'whale caught in fishing gear;animal calm,occasional struggle;broke free;much gill netting in the area;captain named.
3	floating;caught in gillnet;no size.
4	calf wth rope trailing from mouth;Gulf of Maine Sighting Network.
5	young animal,probably calf(25ft.);rope trailing from mouth&stuck in baleen;whale also seen from shore.
6	2 whales with long white flippers caught in weir at Bradford Cove(8/17); on 8/18 no whales seen;fisherman said they had escaped.
7	trapped in weir with another humpback;Bradford Cove, Grand Manan;gone next day;fisherman said whales escaped.
8	calf trapped in Carrying Place Inlet for 6 hrs or more;released by diver;gear damage;whale scratched up;line in mouth;observed several days later feeding.
9	fisherman found whale drowned in his gillnet;whale had long flippers;fisherman cut it loose;fisherman's name not known.
10	off Cape Lookout Beach;caught in fisherman's net;freed&swam away.
11	freed;unknown whether completely free of gear.
12	freed by fisherman&swam away; unknown whether free of gear
13	heavy line wrapped around body&left flipper,forward of fin preventing use of flippe;Karen Moore.
14	known F/V dragged up dead whale entangled in gillnets;advanced decomposition; crew stated pectoral fins very long.
15	entanglement reported to USCG;no subsequent sightings.
16	tail entangled in & towing gillnets;last seen 13Sept81.
17	trailing lobster gear.
18	no id on gear;freed.
19	nets&ropes wrapped around peduncle;scars&probable rope abrasion on flippers
20	humpback named "Cicatrix";scalloper's cable wrapped around tail;no sightings after attempted idsentanglement.
21	trapped in weir; released; unknown whether free of gear.
22	"Ibis";20 &23Oct 84 NEA attempted unsucc.to disentagle.;22 Nov.1984 near P-town Hbr.w/net thru mouth,across back&around tail w/5meters of net trailing;disentangl. com
23	"Efta";Thatcher'sIsland,Gloucester,MA;swimmimg with gear wrapped around tail stocks&flukes;seen in May;seen July with trailing gear&unable to fluke.
24	calf with female observed trailing lobster line&float.
25	single animal accompanied by 4 others;trailing a gillnet.
26	"Fern";reptd.by fisherman;later WWV rep. gear wrapped around tail stock&over flukes, cutting deep;comp.disentang.19April 85;obs.w/norm. behav. in Apr.
27	"Digit";cod longline;release effort east of Boston BE buoy(7/30/85)successful;disentangled itself of remainder of gear.
28	3 humpbacks caught in tuna purse seine;one escaped;2 released by hand;all resighted.
29	3 humpbacks caught in tuna purse seine;one escaped;2 released by hand;all resighted.
30	3 humpbacks caught in tuna purse seine;one escaped;2 released by hand;all resighted.
31	reported to CRU by several fishermen; small animal caught in groundfish trawl; fishermen tried to get it out, but animal died.
32	animal#603 dove near gillnet marker;surfaced thrashing w/leadline&monofilament through mouth&around body bet.blowhole&dorsal fin;one flipper pinned down.
33	"Tierra";calf,bottom longline or gillnet leadline around flukes&caudal peduncle;trailing 6-10ft.;open wound at base of tail;shed gear by 1990.
34	"Slingshot";line wrapped tightly around body bet.blowhote&dorsal fin;blue plastic float on back;7/17/86 attempted disentanglement;last sighting no line.
35	"Crown";1st sighted in 7/86;line around body several times,strapping mouth shut;CCS attempted unsuccessful disentanglement(8/21/86).;animal not in good shape.
36	"Zebra" released from gillnet (w/buoy& #)) 20 n.m.E. of Chatham Inlet;disentanglement fast&easy;one line thru mouth&around tail stock.
37	trapped in lobster gear;divers freed whale; unknown whether free of gear;1 mile east of Duxbury Beach, Cape Cod Bay.
38	1 wrap thru mouth;coil of line post.to blowholes w/bridle-like line running anterior;whale fluking;photographed(4/19/88)entanglement same.
39	"Wrap";sighted Jeffrey's Ledge sev.times in 1988&Great So.C hannel(9/3&8/88);loop of line w/sm. float around tail stock&digging into base of flukes.

*40	HU		6	88	MA	42 03'	70 09'	Y	weir	gled in weir leader	injury	A	?	CCS
*41	HU		29	88	MA	42 00'	70 25'	Y	lobster	ne&highflyer of lob.trawl	injury	A	?	CCS
*42	HUW	12	6	88	MA	42 03'	70 09'	Y	weir	same weir as 10/16	injury	A	?	CCS
*43	HUWH	0	0	89	MA			Y	?dragger? net	old net fragment	injury	A	Y/?	CCS
*44	HUWH	8	7	89	MA	42 25'	70 25'	Y	tuna handline	tuna handline rig	injury	A	?	CRU
45	HUWH	8	7	89	MA	42 25'	70 27'	Y	tuna handline	tuna hand line rig	injury	A	?	ACRC
*46	HUWH	8	8	89	MA	42 25'	70 26'	Y	tuna handline	3/4" tuna hand line	injury	A	?/Y	ACRC
*47	HUWH	9	18	89	NJ	40 20'	73 57'	Y	?tuna & trawl?	net/line/steel leaders	mortality	D	Y/?	MMSC
*48	HUWH	4	1	90	VA	36 41'	75 55'	N	line	rope marks	mortality	D	Y/?	VIMS/VMSM
*49	HUWH	4	4	90	VA	36 50'	75 58'	Y	shad gillnet	shad gillnet	injury	A	Y/?	VIMS/VMSM
*50	HUWH	4	10	90	MA	42 25'	70 26'	Y	lobster	lobster gear	injury	A	?	CRU?
*51	HUWH	6	18	90	MA	40 10'	70 21'	Y	lobster	lobster warp&float	injury	A	Y/?	CCS
52	HUWH	6	20	90	VA	36 45'	75 56'	N	line	rope marks	injury	D	Y/?	VIMS/VMSM
*53	HUWH	7	3	90	ME	43 46'	69 59'	Y	stop seine	menhaden stop seine	injury	A	?	NEA/CCS
*54	HUWH	7	4	90	NH	43 04'	70 43'	Y	lobster	lobster line& orange buoy	injury	A	Y/?	NEA
*55	HUWH	7	10	90	MA	42 26'	70 26'	Y	sink gillnet	gillnet	injury	A	?	CRU?
*56	HUWH	7	16	90	MA	42 26'	70 23'	Y	sink gillnet	gillnet	injury	A	?/Y	CCS
*57	HUWH	7	27	90	MA	?	?	?	mono line	monofilament line	injury?	A	?	CRU
*58	HUWH	8	3	90	MA	42 12'	70 27'	Y	tuna	tuna line&float	injury	A	?	CCS
*59	HUWH	8	17	90	NH	42 48'	70 20'	Y	sink gillnet	gillnet w/yellow floatline	injury	A		CCS
*60	HUWH	8	27	90	NH	43 10'	69 59'	Y	gillnet	gillnet&floats	injury	A	?	USCG/NEA
61	HUWH	11	14	90	VA	36 56'	76 11'	N	line	rope burns&scars	mortality	D	?	VMSM?
*62	HUWH	5	31	91	MA	42 24'	70 25'	Y	trawl	dragger net w/3/4"fiber line	injury	A	Y/?	ACRC
*63	HUWH	5	31	91	NY	40 39'	73 05'	N	?line/cable?	line and/or cable from unknown gear	mortality	D	Y/?	OKEA
64	HUWH	7	12	91	MA	42 11'	70 14'	Y	net	net	injury	A	?	USCG/CCS
65	HUWH	7	16	91	MA	42 25'	70 27'	Y	sink gillnet	gillnet&hiflier	injury	A	?	fisherman toCCS
*66	HUWH	7	16	91	MA	?	?	?	longline	unknown type of longline	injury?	A	?	CCS
*67	HUWH	8	1	91	MA	42 51'	70 45'	Y	gillnet/lob/tuna	gillnet,lob&tuna gear,grappling hook	injury	A	Y/Y	CCS
*68	HUWH	8	24	91	NY	40 37'	73 19'	Y	lobster	offshore lobster rig;hifliers	injury	A	Y/?	OKEA
*69	HUWH	8	28	91	ME	43 15'	70 03'	Y	line	line	injury	A	Y/?	CCS
*70	HUWH	9	18	91	MA	42 09'	70 25'	Y	gillnet	gillnet	injury	A	?	USCG
*71	HUWH	10	3	91	MA	42 25'	70 58'	Y	lobster	lob trawl w/2 buoys	injury	A	?	NEWS
72	HUWH	4	20	92	MA	42 25'	70 26'	Y	line	3/4 or1" line	injury	A	?	CRU
*73	HUWH	5	13	92	MA	42 26'	70 21'	Y	sink gillnet	gillnet line	injury	A	?	CCS
*74	HUWH	6	24	92	MA	40 44'	70 20'	Y	sink gillnet	gillnet&lobster gear	injury	A	Y/?	CCS?
*75	HUWH	8	3	92	MA	42 16'	70 05'	Y	net	orange mesh net and line	injury	A	Y/?	CCS
*76	HUWH	8	7	92	NJ	38 51'	73 48'	Y	line	100' of rope	injury	A	?	MMSC
*77	HUWH	8	9	92	ME	44 16'	68 03'	Y	sink gillnet	mono net&poly lines	injury	A	?	WWV/COA/CCS
*78	HUWH	8	10	92	MA	42 13'	69 36'	Y	net	orange mesh net	injury	A	N	CCS
*79	HUWH	9	17	92	MA	43 09'	70 09'	Y	line	1/2" grey poly line& poly ball	injury	A	N	CCS
*80	HUWH	9	26	92	NY	41 00'	71 50'	Y	sink gillnet	mono netw/5/8"poly lines	injury	A	Y/?	OKEA
*81	HUWH	10	7	92	MA	42 10'	70 30'	Y	net	2 ropes&small amt.web	injury	A	Y/?	CCS
*82	HUWH	10	8	92	MA	41 08'	69 11'	Y	lob.or longline	lobster or longline w/orange buoy	injury	A	N	CCS
*83	HUWH	10	22	92	VA	36 46'	75 57'	N	line	line cuts and scars	mortality	D	Y/?	VMSM

40 entangled in leader of weir(owner known);netting around rostrum,l.flipper&flukes;relatively immobile;released byCCS&left area.
41 entangled in line of 9 lobster pots&highflyer(11/29); whale&gear gone (11/30).
42 entangled in same weir as 10/16/88 entanglement;caught by netting around flukes;released by CCS&left area.
43 Summer;1989 calf of Pegasus;E.Stellwagen(10 miles NE of Race Point);partial disentanglement by CCS; shed gear later in summer.
44 "Maple";line wrapped around left flipper;tuna boat cut its gear;float&line trailing; shed gear by 08/10/89;LORAN 44 25.4/13 82.2;NW STELLWAGEN.
45 "Bandit"; briefly entangled in same hand line as "Maple";NW STELLWAGEN.
46 "Brine";line thru mouth&possibly around l.fluke;ACRC partially disentangled at LORAN 44257.5/13808.3;whale swam away slowly.
47 3/4" poly line w/steel clips&leaders and unid./non-mono. net;line over back from dorsal fin to blowhole;failed rescue attempt;animal pesumed dead;NOAA photos.
48 animal had obvious rope marks around tail;covered with whale lice;shad gillnets in the area.
49 whale entangled in leadline of shad gillnet&struggling to get free; apparently freed itself;last seen swimming north rapidly.
50 fisherman observed whale dragging hundreds of yards of gear and cut most off.
51 may have been "Ase";flipper entangled in lobster warp trailing blue&orange float;didn't appear life threatening;with 2 other whales.
52 thrashing in surf;very thin;labored breathing; euthanized with permission.
53 caught behind menhaden net across mouth of bay on 7/3/90;animal in poor condition prior to release by CCS,NMFS&NEA on 8/3/90.
54 Great Bay,NH;NEA corralled whale out of harbor;whale freed itself of some gear;last seen trailing buoy;photos to be circulated for id.
55 "Quixote" intially spotted by CRU and next day by tuna fisherman entangled in gillnet;resighted 7/16/90.
56 "Mallard";gillnet thru mouth&draped over back;50 yards trailing;great distress;mostly disentangled; swam off w/small piece in mouth.
57 ?"Pleiades"?;mono line across back, hindering movements.
58 may have been "Ase";tuna line&float entangled on back;gear pulled out of whale;gear retained.
59 "Manta" ;tail wrapped w/gillnet+yellow floatline;?gear trailing?;seen by CCS cruise#R033;slow, linear swimming;low fluke. See record for 08/01/91.
60 USCG saw from air;2 whales-1 entangled;gillnet floatline around tail;?disentangled 27 August?;unknown whether free of gear.
61 various rope burns & large abrasion on tail stock;rope scars on left flipper.
62 "Ozone";15-18'of net trailing;2 strands over back&r. flipper pinned to side;1 line digging in;burn marks;apparently freed itself subsequently.
63 "Silver";seen entangled sev. days before beaching;fresh scars;photos(on beach show line thru mouth); scars around pect.;saw marks around mouth&jaw w/exposed bone.
64 seen w/net soulh of shipping lanes;thought net had come off,saw net floating by-didn't see any more net on whale.
65 fisherman reported whale in his gillnet to CG;IWC stood by for CCS;apparently whale freed itself; ??no remaining gear??.
66 NW Stellwagen;cow w/calf;flipper snagged and pinned to side;freed itself; unknown whether trailing gear.
67 ?Manta?;gillnet&assorted lobster,tuna gear&grappling hook;trailing 50' netting;net around mouth&tail;emaciated&tired;disent. 8/11/91 byCCS;in bad shape. See 08/17/90 re
68 lobster line over flipper and fluke;at least 12 pots;disentangled by Okeanos&USCG.
69 "Manta"entangled around flukes w'line;moving slowly,tired,gasping;hanging flesh bet.flukes;appears life threatening.
70 vessel reported to CG who reported to CCS;no mesh visible.
71 tangled around tail in lobster trawl w/2 buoys;freed by local lobsterman&headed out to sea; unknown whether trailing gear.
72 line(3/4" or 1") between blowhole&dorsal;seems to be OK.
73 "Strait";gillnet line through mouth&around r.flipper;mouth lines anchored to bottom;animal worn out&in peril;open wounds on tail;disentangled by CCS.
74 gillnet on tail; anchor of gillnet had hooked lobster gear;disentangled by lobster boat crew; unknown whether free of gear.
75 orange mesh netting&line wrapped over head&back w/about 15-20' trailing;spotted by whalewatch boat;animal moving slowly&not fluking.
76 third hand report;animal tangled w'100' of rope and trailing unk. amount;appeared robust.
77 mono net&poly lines across back + 1 flipper;gear may be trailing but not seen;bleeding, abrasions,labored breathing; WWV may have photos.
78 second hand report from tuna stick boat; couldn't be sure orange mesh gear;animal "looked bad".
79 1/2' 3 strand grey poly line w/ poly ball;poly ball removed w/some identification;breathing labored;took off.
80 mono. gillnet w/5/8" poly lines;mesh visible;gear wrapped around head,flippers&bunched at tail stock;labored breathing&trumpeting.
81 reported by whalewatch boat;ropes&some mesh wrapped around head&body;animal in good condition.
82 scalloper reported to CCS; lobster or longline gear w/large orange buoy w/ name on it;whale entangled at dorsal fin;breathing labored.
83 line entanglement scars & cuts on leading edge of fluke&around caudal peduncle.

* 84	HUWH	1	0	93	NC	35 52'	74 50'	Y	sword driftnr	swordfish driftnet	mortality	D	?/?	N[illegible]
* 85	H[illegible]	4	22	93	MA	42 01'	70 06'	Y	lobster	bster line	injury	A	Y/?	( )
* 86	HU[illegible]	5	5	93	MA	42 26'	70 27'	Y	sink gillnet	buoy warp	injury	A	?	AC[illegible]
* 87	HUWH	6	13	93	NH	42 57'	70 26'	Y	lobster	pot warp	injury	A	Y/?	CCS?
* 88	HUWH	7	26	93	ME	44 00'	67 38'	Y	line	line	injury	A	N	COA
* 89	HUWH	7	27	93	ME	44 17'	68 00'	Y	net	fish net	injury	A	N	COA
* 90	HUWH	8	8	93	ME	44 17'	68 00'	Y	sink gillnet	net&buoys	injury	A	Y/?	COA
* 91	HUWH	8	11	93	MA	42 01'	70 17'	Y	line	line similar to lob.pot line	injury	A	Y/Y	CCS
* 92	HUWH	8	11	93	ME	43 52'	68 59'	Y	lob.&sink gillnet	gillnet&lobster&line	injury	A	?/Y	USCG
* 93	HUWH	8	19	93	ME	44 09'	67 51'	Y	lobster	lobster gear	injury	A	?	CCS
94	HUWH	8	20	93	NJ	40 18'	73 58'	N	unknown	line and/or net	mortality	D	Y/?	MMSC
95	HUWH	9	5	93	BOF	?	?	Y	gillnet	1/2 mileof gillnet&buoys	injury	A	?	DFO
96	HUWH	12	2	93	NC			N	line	line marks	injury?	D		MMSN
* 97	HUWH	2	14	94	PR			Y	line	line	injury	A	?/?	NMFS
* 98	HUWH	6	0	94	MA	42 03'	70 13'	Y	gillnet	nylon surface mackerel gillnet	injury	A	N	CCS
* 99	HUWH	7	14	94	ME	43 23'	68 59'	Y	gillnet	gillnet	injury	A	?	USCG
100	HUWH	7	24	94	NH	43 09'	70 04'	Y	gillnet	gillnet	injury	A	?	CRU
* 101	HUWH	8	11	94	ME	44 17'	68 16'	Y	lobster	probable single trap gear	injury	A	?	COA
* 102	HUWH	11	18	94	MA	42 32'	69 57'	Y	sink gillnet	gillnet &highflier	injury	A	?	USCG
* 103	HUWH	11	23	94	NJ	39 50'	74 03'	Y	gillnet	gillnet w/buoy	injury	A	?	IWC
* 104	HUWH	12	4	94	NC	35 44'	75 28'	Y	gillnet	7"mesh;5/16" blk.poly;wh.oval floats	injury	A	N	NPS/NMFS
* 105	HUWH	2	28	95	NC	35 17'	75 31'	Y	MDA gillnet	gillnet,poly line, oval floats, anchor	mortality	D	Y/?	MMSN
106	HUWH	4	16	95	NC	35 02'	76 11'	?	net?	net?	unknown	D	?/?	MMSN
* 107	HUWH	4	23	95	NC	34 37'	76 43'	Y	MDA gillnet	sink gillnet	injury	A	?/?	NMFS
* 108	HUWH?	5	20	95	DE	38 53'	75 06'	Y	?	monofilament	injury	A	?	DE/DFW
* 109	HUWH	5	26	95	MA	41 16'	69 20'	Y	sink gillnet	net&mono line	injury	A	?	NEA/CCS
* 110	HUWH	6	0	95	GB	40 04'	68 20'	Y	sword driftnet	swordfish driftnet	mortality	D	?/?	NMFS/SS
* 111	HUWH	7	6	95	MA	42 03'	69 58'	Y	drift gillnet	large mesh drift net	injury	A	Y/Y	CCS
112	HUWH	8	29	95	MA	43 05'	70 07'	Y	gillnet	2 1/2"mesh mono tuna bait gillnet & rig	injury	A	?/Y	USCG
113	HUWH	10	6	95	FL	22 10'	72 08'	Y	?hauser?	2.5-3" line	injury	A	Y/Y	JJWP
* 114	HUWH	1	30	96	MA	42 27'	67 30'	Y	lobster	line,highflier,Norwegian float	injury	A	?	CCS
* 115	HUWH	7	18	96	ME			Y	line	floating line w/trailing gear	injury	A	?	COA/CCS
* 116	HUWH	7	28	96	MA	42 11'	70 19'	Y	lob. or s.gillnet	line&hifliers	injury	A	?	CCS
*117	HUWH	10	7	96	MA	41 09'	69 11'	Y	lobster	lobster line and buoy	injury	A	?	NMFS
*118	HUWH	10	18	96	MA	41 00'	69 10'	Y	unknown	bullet buoys and 1/4" steel cable	injury	A	?	CCS

Type Codes

E = Entanglement
V = Vessel Collision

Condition Codes

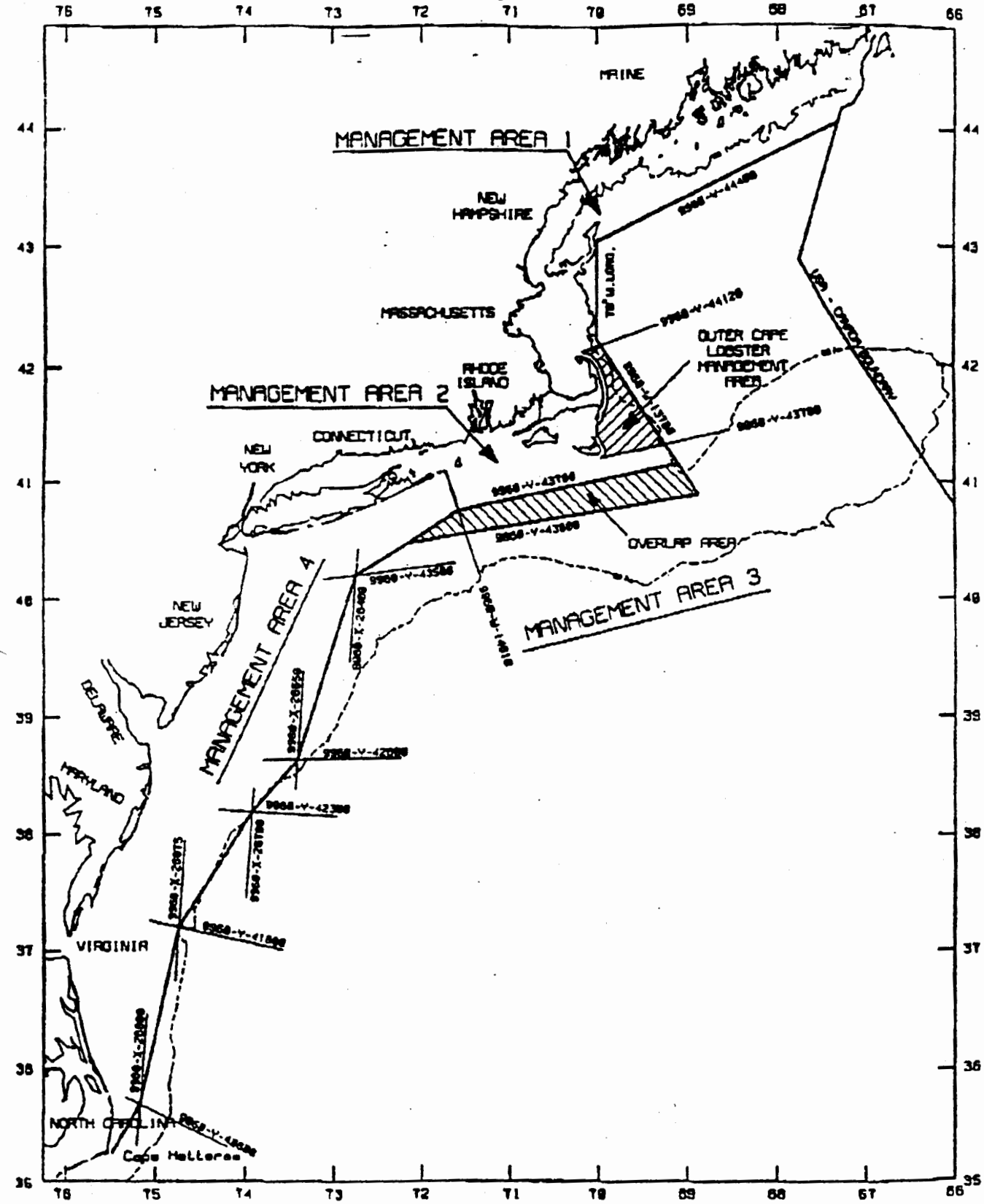
A = Alive
D = Dead

Source Codes

ACRC = Atlantic Cetacean Research Center
CCS = Center for Coastal Studies
CRU = Cetacean Research Unit
COA = College of the Atlantic
DE/DFW = Delaware Division of Fisheries and Wildlife
DFO = Canada Department of Fisheries and Oceans
IWC = International Wildlife Coalition
JJWP = Jo Jo Wildlife Project
LIT = Literature
MMSC = Marine Mammal Stranding Center
MMSN = Marine Mammal Stranding Network
NPS = National Park Service
NEA = New England Aquarium
NEWS = Newspaper Article
OKEA = Okeanos Foundation
SMNH = Smithsonian Institution/Museum of Natural History
VIMS = Virginia Institute of Marine Science
VMSM = Virginia Marine Science Museum
WWV = Whale Watch Vessel
WHOI = Woods Hole Oceanographic Institute

84 NMFS sea sampling observed mortality;offshore.
85 rep.by WWV; line around tail stock&flukes; whale thin; unknown if gear trailing; ??same whale disent.by CCS on 04/24/93??--thin& weak;healing around line.
86 reported by WWV; buoy warp wrapped around base of flipper;anchored&very fatigued;whale freed itself; unknown whether carrying gear.
87 calf of "Owl";rep. by WWV;pot warp wrapped around flippers&body;line trailing.
88 reported by whalewatch boat;rope wrapped around head&behind blowhole.
89 reported by whalewatch boat; fish net entangled around tail.
90 reported by WWV; net&buoys on head,dorsal fin,flippers;trailing gear;stressed behavior;cuts&blood reported; WWV yanked net off 8/10/93, left rope on tail.
91 reported by WWV; ?lobster? line over back behind blowholes;1-2 wraps;appears OK;same animal may have been seen by another whalewatch boat later 8/11.
92 rep.by lobsterman to CG; gear over back &through mouth; anchored; part.disent.by diver;left gear through mouth at hinge;whale swam away.
93 reported by WWV; lobster gear in mouth&around tail stock; semi-anchored.
94 net/line marks on leading edge of fluke; cause of mortality unknown.
95 "Large Marge" reptd.(2nd or more hand) entangled w/gillnet,buoys&possibly anchors;heading south.
96 stranded dead;rope marks on peduncle;Dare County.
97 Puerto Rico;line removed and animal released;unknown whether trailing gear.
98 divers attempted disentanglement; whale swam away; unknown whether carrying gear.
99 CG helicopter crew reported animal w/gillnet wrapped around head &swimming at surface.
100 "Badge";lightly entangled,trailing gillnet gear;observed 3 days prior &after event wo/gear.
101 ?single? inshore lobster trap gear draped over flipper;heavy density of pots in area;freed by local lobsterman;unknown whether carrying gear.
102 fisherman reported entanglement to CG; gillnet over back &trailing w/ high flier;another humpback nearby-not entangled.
103 reported by Int'l Wildlife Coalition;entangled in gillnet w/buoy accompanied by seal;weather was bad&CG couldn't locate whale.
104 reptd to Nat'l Park Serv.;net around head&left pectoral fin;disentangled by volunteers w/10'of poly line &floats still attached to flukes;whale swam away; gear was photograph
105 stranded dead with gear wrapped around peduncle; photos may have gear identification.
106 stranded dead; net reported but no gear or net marks found; decomposed;middle of Core Sound, Cartaret County.
107 fisherman reported whale anchored in his net;many fluke wraps;partial disent.;whale sounded &net was cut; whale swam off w/30-40' net trailing.
108 rep.by fisherman;possible juvenile humpback with monofilament on its head;Cape Henlopen/Brandywine Shoals.
109 fisherman reported entanglement to NEA;net&mono. around tail stock;whale anchored;mesh visible&gear trailing;CG unable to locate animal in overflight.
110 NMFS Sea Sampling observed mortality in offshore (Georges Bank, Oceanographer Canyon) swordfish driftnet.
111 "Zeppelin";whalewatch boat reported to CCS; wrapped heavily w/5-10'of gear trailing;animal shed gear later in summer but dorsal fin damaged.
112 report by tuna boat; CG disent. from buoy warp over pectoral;gillnet, weights&poly ball (w/vessel ID) trailing;owner set untended net 2-days earlier;whale towed gear 35 miles
113 line wrapped around mid-body and pinning one flipper to side;unknown if gear trailing;poor condition;Turks and Caicos Islands, Florida Keys.
114 offshore lobster gear; fishermen attempted disent.;gear parted &whale swam away w/line,highflier,buoy;owner of gear known;recovered all 40 pots.
115 juvenile; 5-6 miles E. of Mt. Desert Rock; anchored then free-swimming;line around peduncle and weight at other end.
116 southwest Stellwagen Bank; single line over tail w/hifliers;very recent entanglement.
117 reported by NMFS observer & captain on tuna seiner; yellow/white lobster line w/buoy wrapped around tail (fluke); trailing 100' from right fluke; captain reported whale as ad
118 reported by scalloper; cable (?and/or other line?) around peduncle

APPENDIX 3


MAINE
MANAGEMENT AREA 1
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
MANAGEMENT AREA 2
CONNECTICUT
NEW YORK
OUTER CAPE LOBSTER MANAGEMENT AREA
OVERLAP AREA
MANAGEMENT AREA 3
MANAGEMENT AREA 4
NEW JERSEY
DELAWARE
MARYLAND
VIRGINIA
NORTH CAROLINA
Cape Hatteras
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7/95

APPENDIX 4

1 SUE MAC KINNON
MASS. LOBSTERMEN ASSOC.
65 ELM ST.
MARSHFIELD, MA 02050

17 AUG 1995

NORTHEAST SINK GILLNET FISHERY ENVIRONMENTALLY AND ECCONOMICALLY BENEFICIAL

The Northeast sink gillnet fishery is a fixed gear, passive, ocean floor fishery with many ecconomical and environmental benefits that far exceed other groundfish fisheries in the area. It should not be related or confused with the high seas driftnet fishery or the unregulated small mesh gillnet fishery of Southern California. Environmental benefits include it's passive impact on bottom habitat, as well as protection of that habitat, fish size and species selectivity, low bycatch, little juvenile retention, low discard mortality and fuel efficiency Because of it's fixed gear nature, it is easily managed and regulated. Gillnetters consistantly land a very high quality fish product, employing large numbers of workers, both deck hands and support service workers. The sink gillnet is the most widely used gear type worldwide. It's existence as an important, environmentally sound and ecconomically viable fishery must be preserved.

IMPORTANT ECCONOMIC AND SOCIOECCONOMIC CONSIDERATIONS

Because of the nature of this small boat/ owner operated fishery, gillnetting will always provide employment for many, not just a few. Traditionally, the gillnet fleet has consisted of small boat/owner operated vessels (average size approximately 45') employing 2-4 deck hands. Harvesting of groundfish and crustaceans by gillnet has always been a manually intense means of fishing which does not lend itself to substitution by automation for that labor intensiveness. For this reason, sink gillnetting will always offer high employment capabilities within the industry and the community. In addition to captains and crew, the fishery also provides employment for support services and the infrastructure of the industry through dealers, gear manufacturers, net makers, dock workers, truck drivers, fuel companies, fish processors, etc.. Even though the small boat segment of the New England fleet comprises the majority of users throughout the region, it accounts for the smallest portion of total pounds landed. The nature of gillnetter vessels as owner operated small boats allows them to remain cost effective, ecconomically viable and community oriented. The gillnet fishery is an integral component of the make-up of the industry and should be valued as one of the many small, micro-enterprises of New England. It remains an essential part of the priceless fabric of many coastal communities.

IMPORTANT ENVIRONMENTAL CONSIDERATIONS

Most importantly, in light of declining groundfish stocks and habitat degredation, acceptance of the gillnet fishery as environmentally important is essential to sound management and environmental policy. Gillnet fishermen have taken an active role in helping to develop sound measures to preserve fish populations, marine mammals, and habitat in the management process.

Size and Species Selectivity - An extremely important factor in examining the environmental merits of the gillnet fishery is it's ability to be size and species selective. There can be no doubt that the sink gillnet fishery of the Northeast is a highly selective gear type on the targeted species it pursues and the size of fish caught in the net. This can be substantiated by the fishermen in the industry themselves and supported by the data that has been accumulated by the NEFSC through

the observer program. Gillnetters fish nets with mesh sizes from 6" to 12" and some larger. There is no other gear type presently in the multispecies fishery of the Northeast that uses mesh beyond the minimum mesh requirements. Even six inch mesh consistently lands fish larger than minimum size requires. (for example, few scrod cod are landed in 6" mesh nets - market size and large cod are the rule) This translates into a fishery that consistently harvests fish well beyond the minimum length requirements, leaving bycatch of sublegal fish and juvenile mortality at a minimum.

Gillnetting, by nature, is a species directed fishery. It's selectivity by species can be manipulated by mesh size and by different gear rigging practices. Different mesh sizes lend themselves to different species and sub-species of fish (for example, monkfish require 10" mesh or larger, haddock - 6[illegible]" and cod - 6"-7" mesh) Differences in rigging might include tie downs or foam core for targeting flounder.

Bycatch - Bycatch of unintended target species and wasteful discard practices are of escalating concern in fishery management. The sink gillnet fishery has a proven record minimizing these bycatch concerns in terms of the groundfish fishery, according to observer data. An important consideration for gillnetting is that fish and shellfish have the potential chance of being returned live to the ocean again and that juvenile bycatch is almost nonexistant. Closer working of this data needs to be done and will eventually prove gillnetting as an important fishery in encouraging fish stocks to rebound. Eliminating wasteful juvenile mortality and encouraging clean fishing practices is essential and achievable by gillnetting.

Interaction with harbor porpoise has long been a recognized area for improvement in the sink gillnet fishery. Northeast sink gillnet fishermen have been meeting in an ad-hock group with environmentalists, conservationists, and scientists for over five years to solve this problem. They have proved themselves as environmentally responsible in an age of great waste in the fisheries and are recognized for their unique and continuing efforts.

Bottom Habitat Preservation - As a passive, fixed gear, strings of gillnets rest on the bottom causing no habitat degredation. They do not destroy or disturb important ocean floor ecosystems. As well as being "habitat friendly" gillnets also serve as a protection to sensitive areas that, in their absence, would be subject to mobile gear towing on a regular basis.

Fuel Efficiency - The fishery has great value in its low energy use versus harvest production per unit of effort. Boats steam only to haul their nets and home again. This, naturally, is valuable in a world of diminishing energy resources and will become more prevalent as a factor in the future as fuel resources continue to decline.

Easily Managed - Because of it's small boat, fixed gear nature, it lends itself to ease in management and enforcement of regulations. Amount of nets fished and mesh size provide the tools important to managing this fixed gear. Unfortunately, ease in gillnet management as a passive, fixed gear, has escaped the current New England Fishery Management Council. The important, environmentally viable gillnet fishery and it's sound effort management concepts will suffer under effort management measures currently in place and tailored to the mobile gear fleet.

DEVELOPED FOR THE NORTHEAST REGION TAKE REDUCTION TEAM
MARCH 1996
JANICE COMEAU ANDERSON

APPENDIX 5

FIGURE 1.

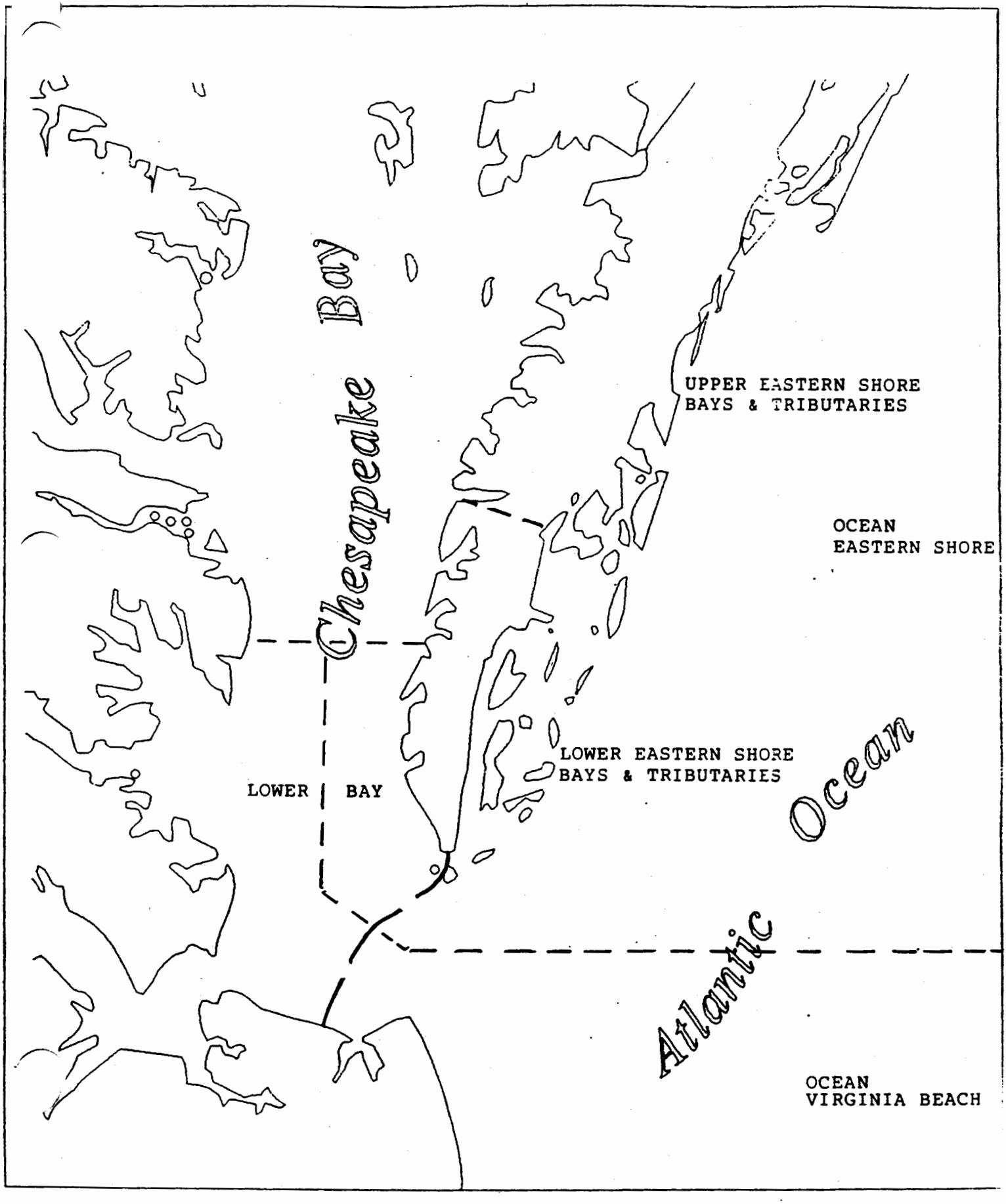

Chesapeake Bay
UPPER EASTERN SHORE
BAYS & TRIBUTARIES
OCEAN
EASTERN SHORE
LOWER EASTERN SHORE
BAYS & TRIBUTARIES
LOWER BAY
Ocean
Atlantic
OCEAN
VIRGINIA BEACH

CHART 1

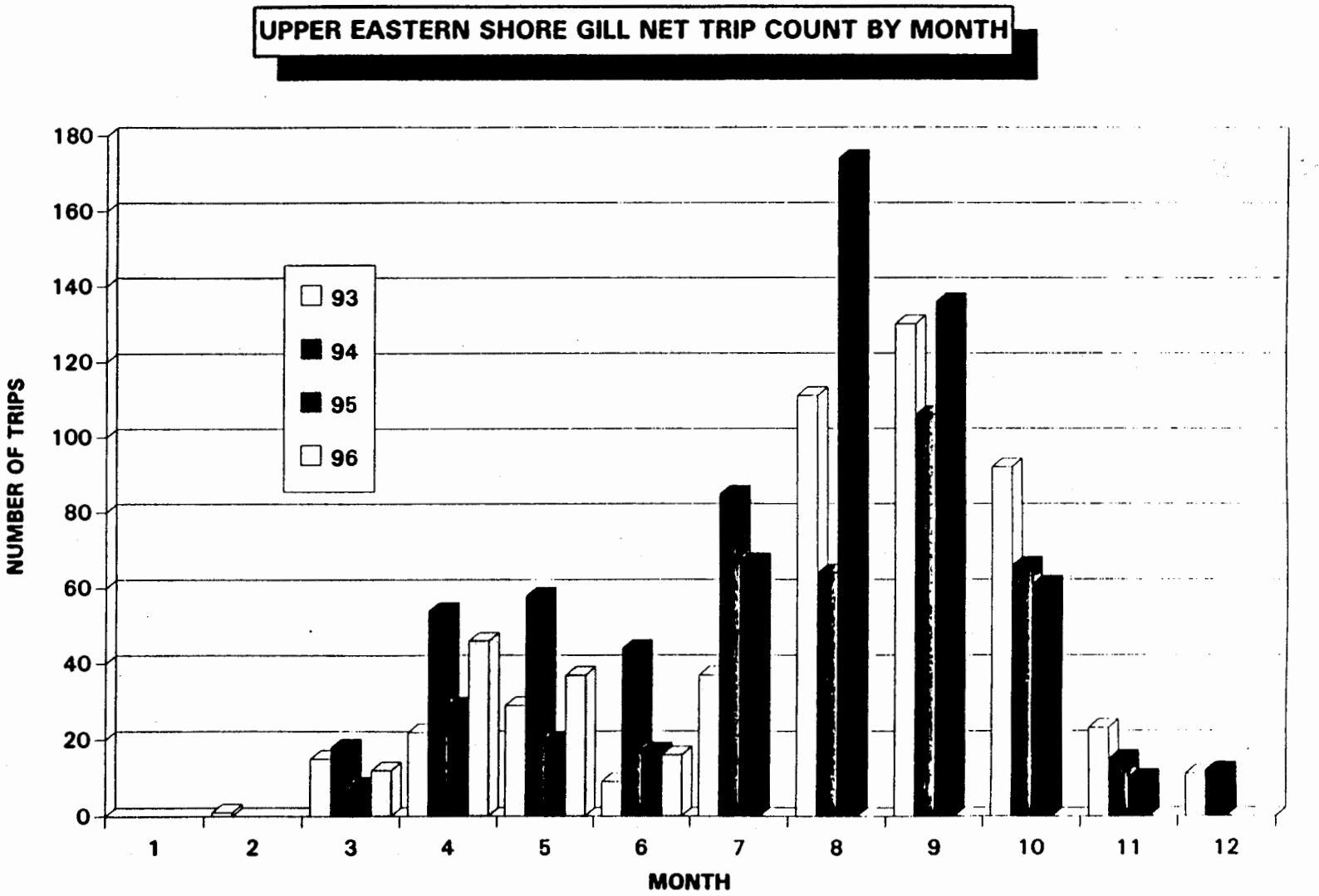

UPPER EASTERN SHORE GILL NET TRIP COUNT BY MONTH
NUMBER OF TRIPS
180
160
140
120
100
80
60
40
20
0
93
94
95
96
1
2
3
4
5
6
7
8
9
10
11
12
MONTH

CHART 2

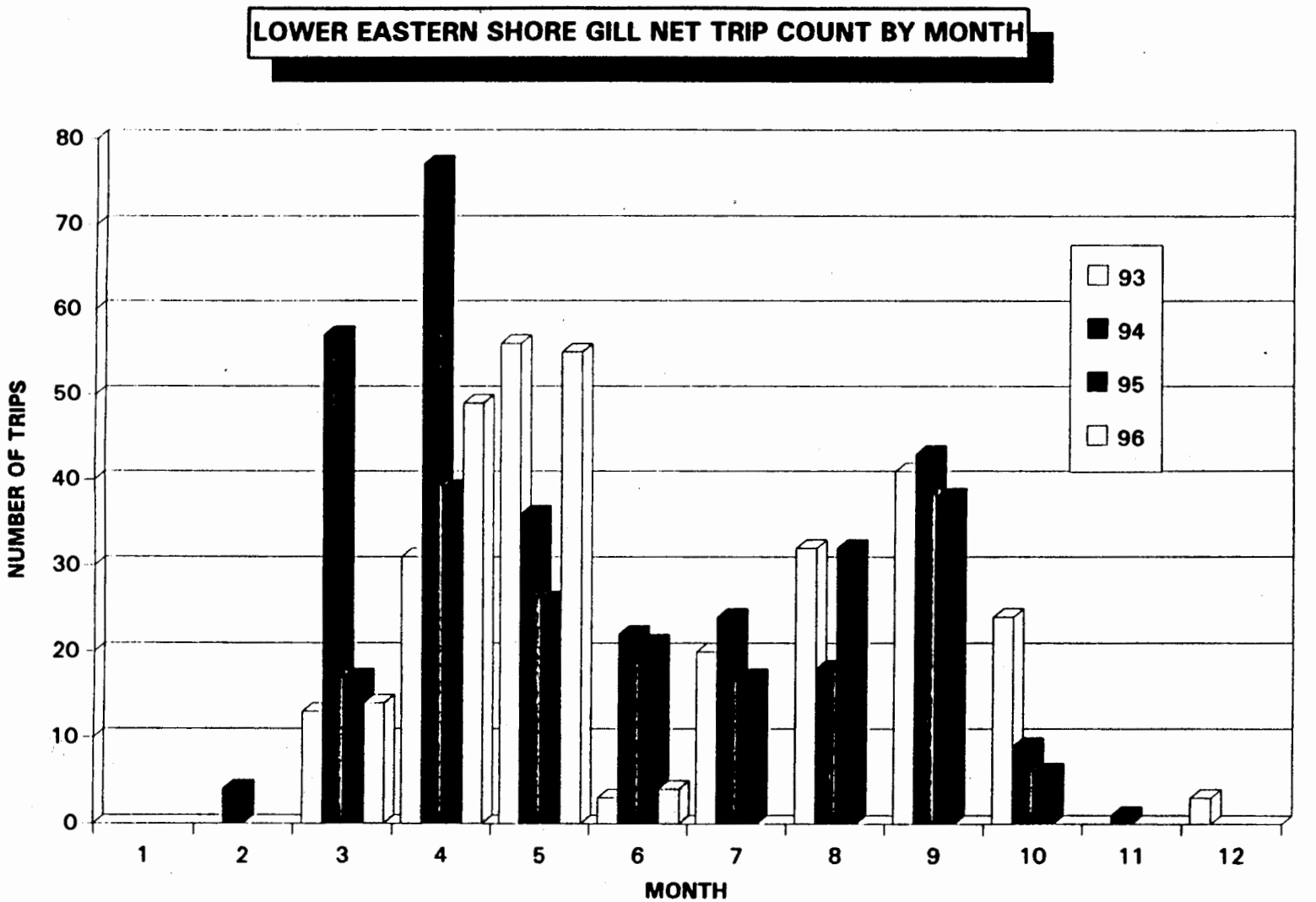

LOWER EASTERN SHORE GILL NET TRIP COUNT BY MONTH
NUMBER OF TRIPS
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
MONTH
93
94
95
96

CHART 3

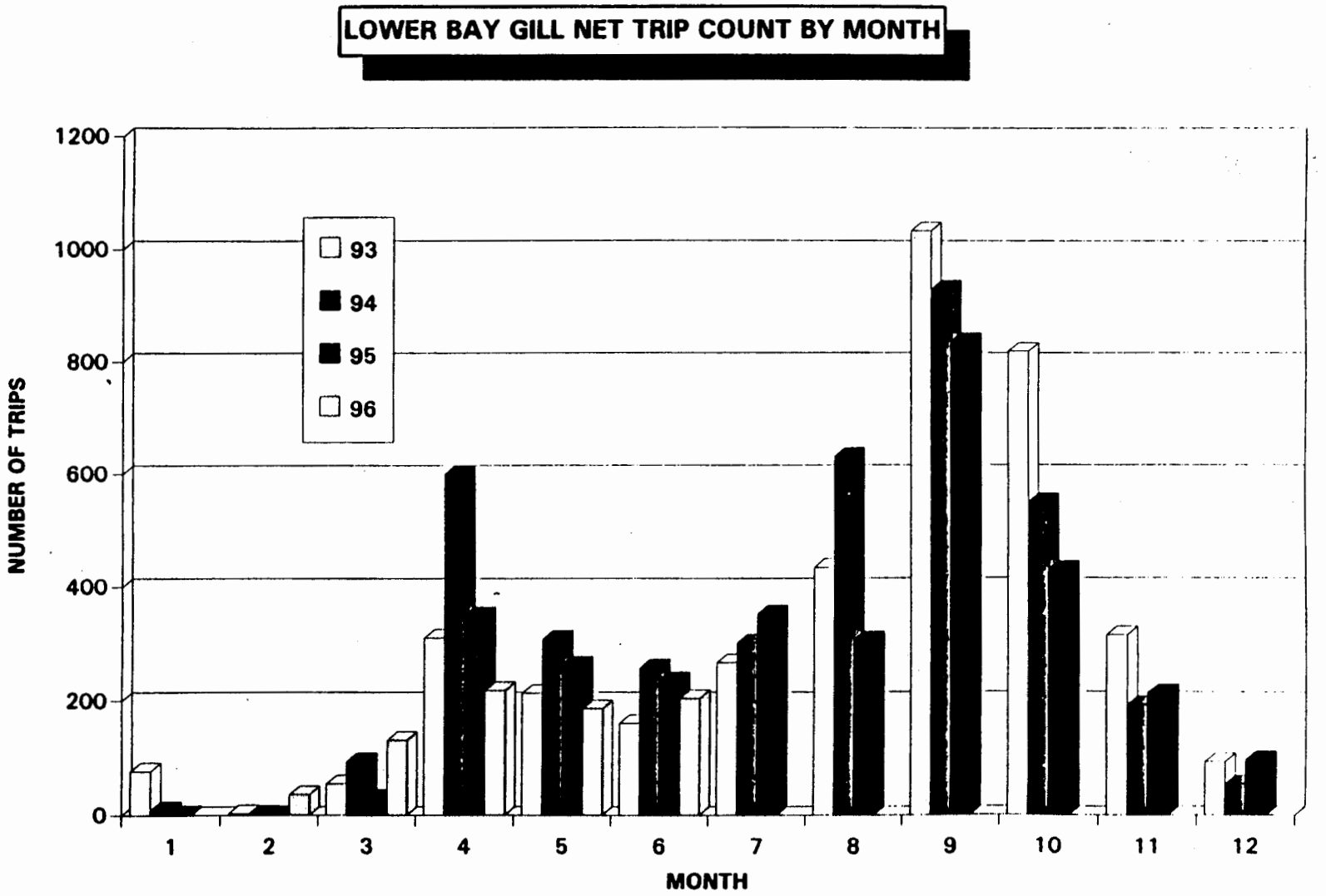

LOWER BAY GILL NET TRIP COUNT BY MONTH
NUMBER OF TRIPS
1200
1000
800
600
400
200
0
93
94
95
96
1
2
3
4
5
6
7
8
9
10
11
12
MONTH

CHART 4

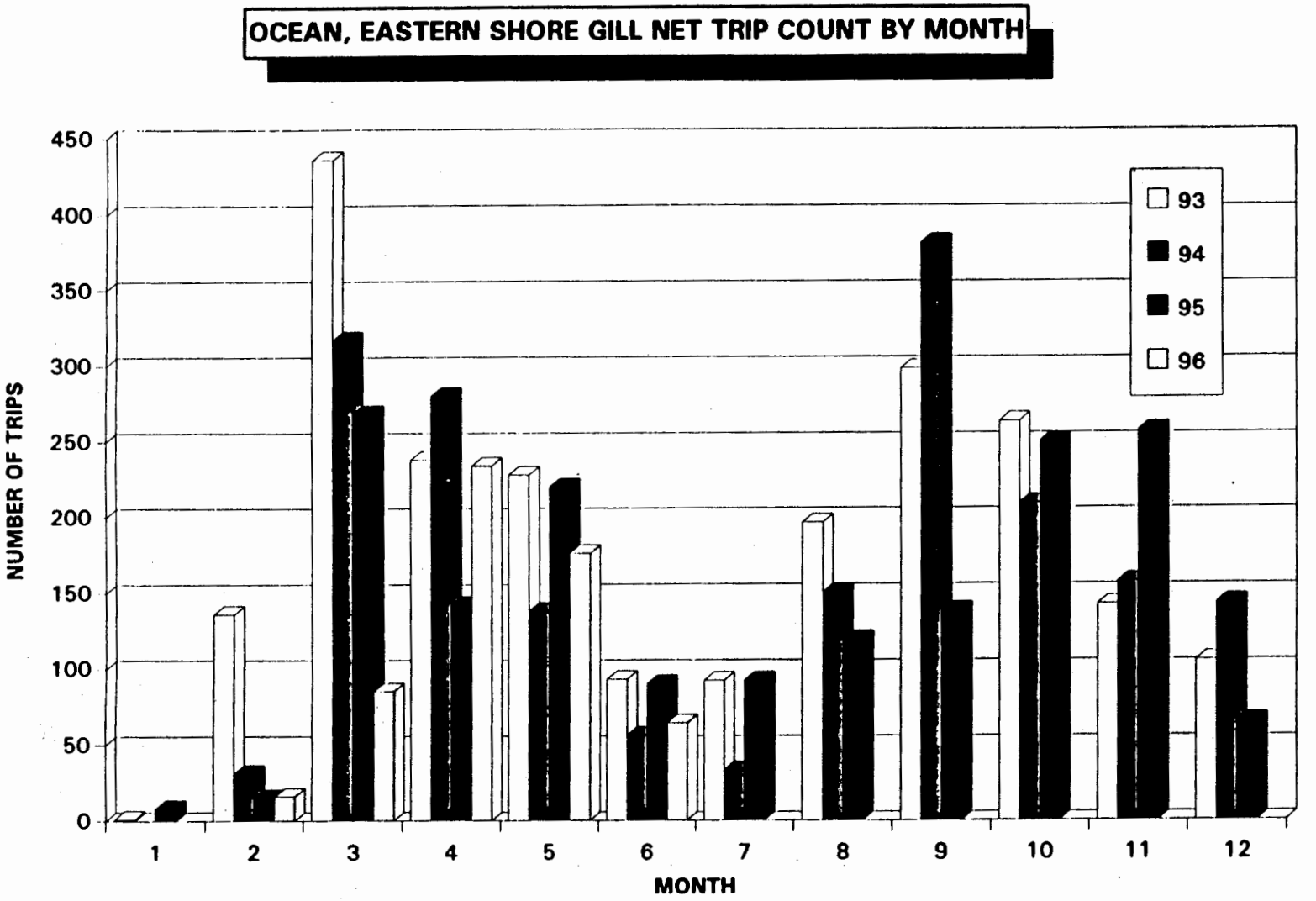
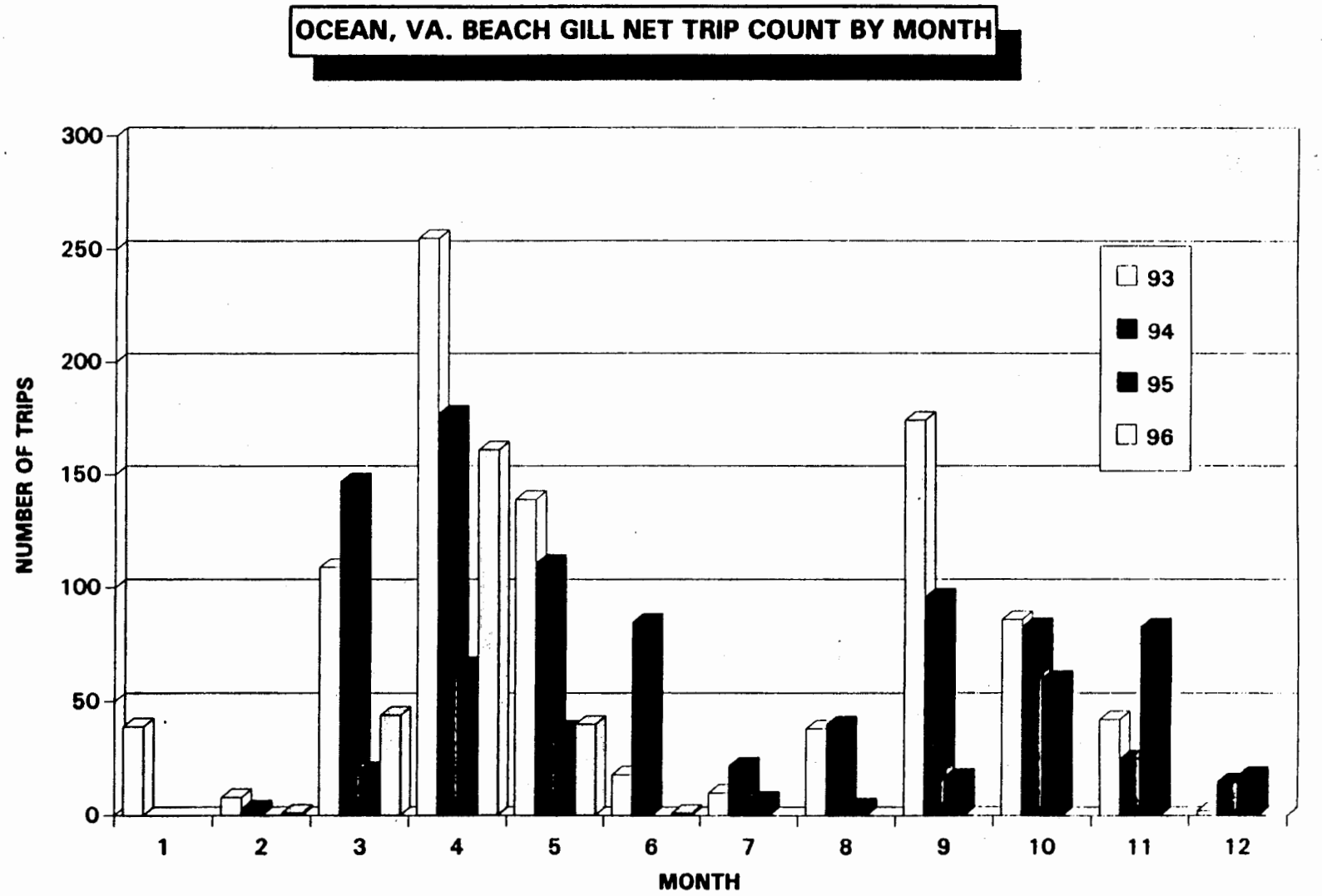
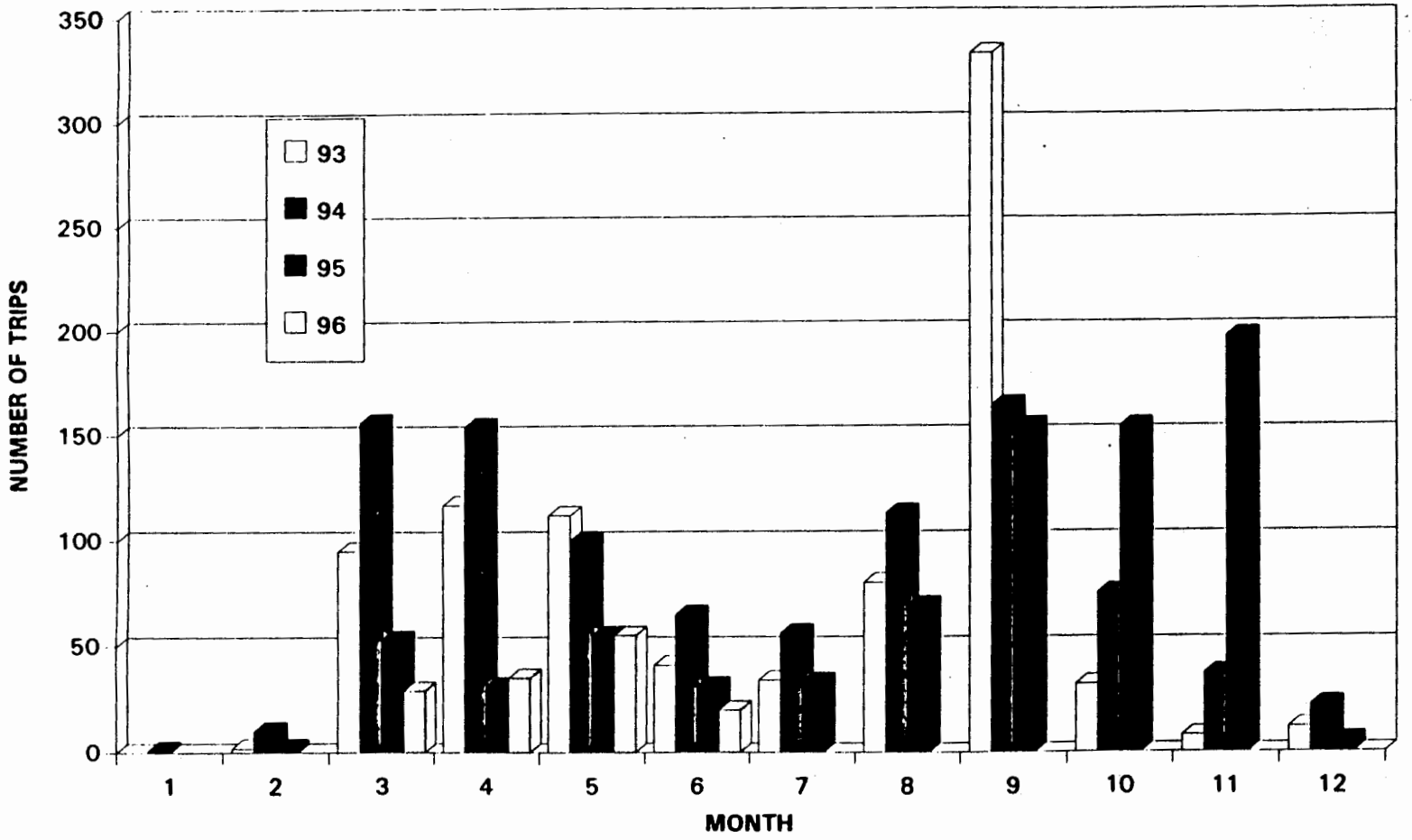

OCEAN, EASTERN SHORE GILL NET TRIP COUNT BY MONTH
NUMBER OF TRIPS
450
400
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
MONTH
93
94
95
96

CHART 5


OCEAN, VA. BEACH GILL NET TRIP COUNT BY MONTH
NUMBER OF TRIPS
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
MONTH
93
94
95
96

UNCLASSIFIED COASTAL RIVERS AND BAYS GILL NET TRIP COUNT BY MONTH



APPENDIX 6

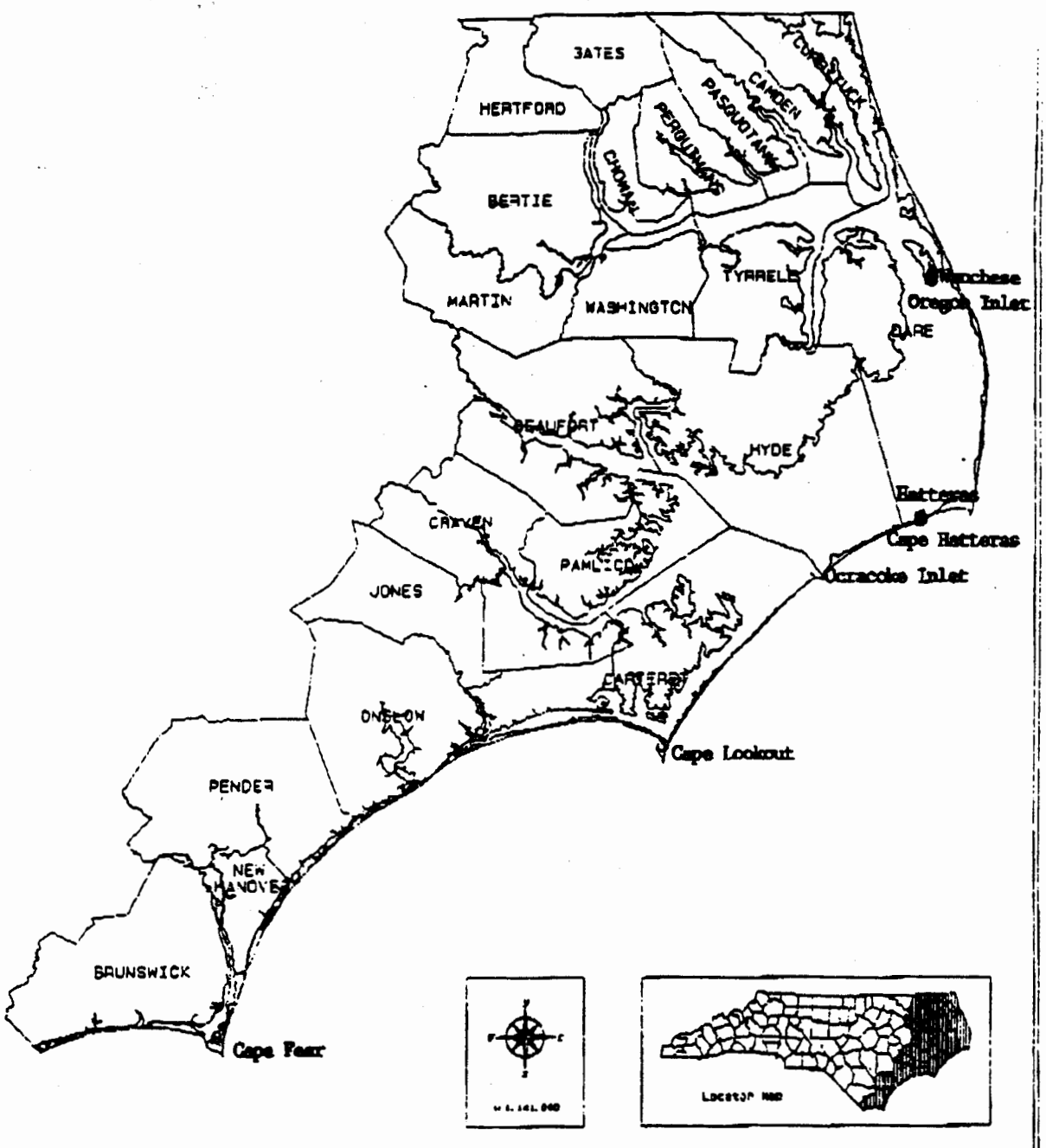


FIGURE 1

North Carolina Study Area

DRAFT

NORTH CAROLINA OCEAN GILL NET LANDINGS
LANDINGS (LB), 1/1994-6/1996

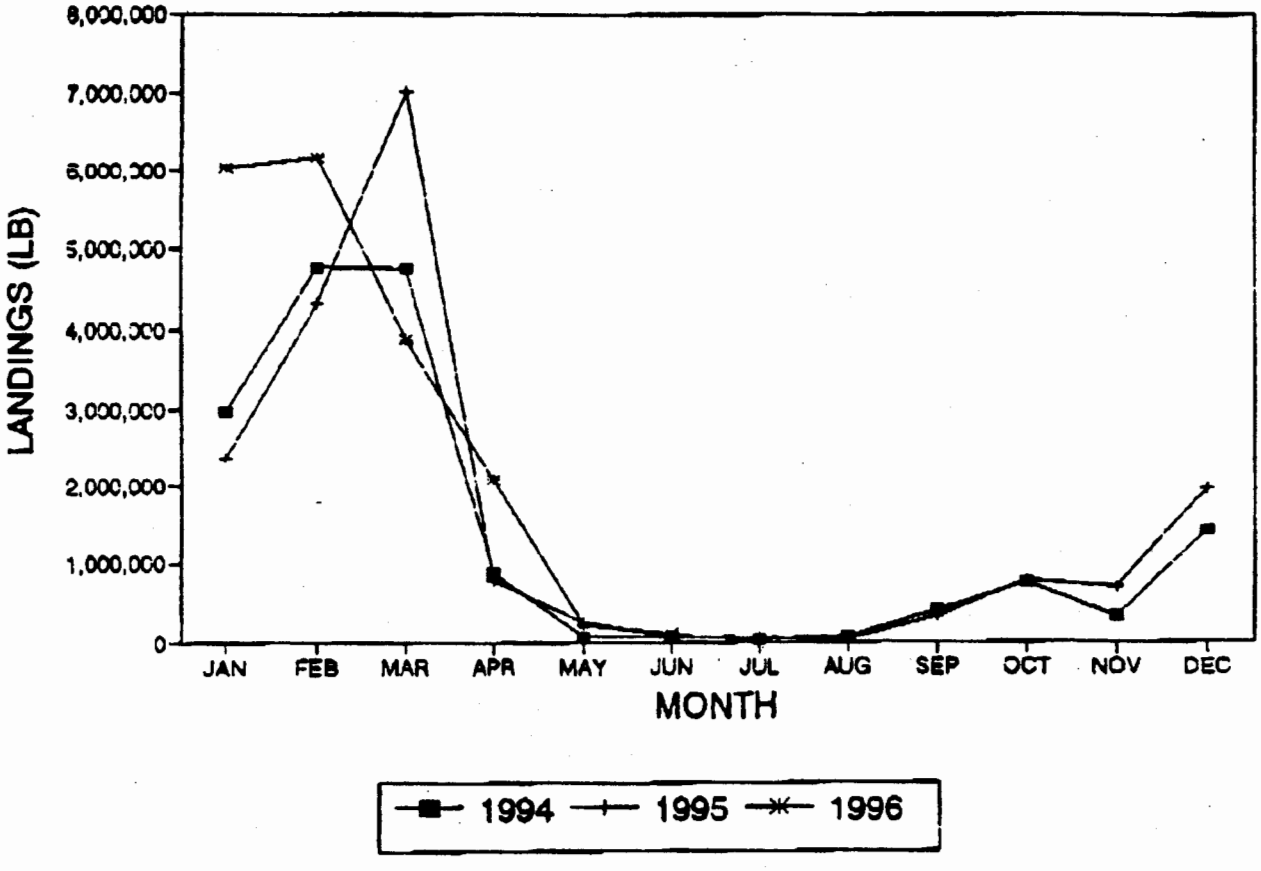


FIGURE 2

Table 2. GENERAL DESCRIPTION OF NORTH CAROLINA OCEAN GILL NET FISHERIES

AREA	TARGET SPECIES	MAJOR SEASON	MESH SIZE	NET LENGTH	NO. VESSELS (1990)	LENGTH RANGE	GEAR TYPE	TRIPS BY GEAR		
								TRIPS-94	TRIPS-95	TRIPS 96*
	WEAKFISH	DEC - MAR	3.75 - 4.5 in	3 - 5 nets@200-300 yd ea.			FLOAT	778	240	61
NC/VA BORDER TO	CROAKER	OCT - MAR	3.75 - 4.5 in	3 - 5 nets@200-300 yd ea.	8 - 154 PER MONTH	31 - 90 ft	DRIFT	34	8	16
OCRACOKE INLET	BLUEFISH	NOV - MAR	3.5 - 6 in	1 - 2 nets@200-300 yd ea.			RUNA/BND	6	8	10
	DOGFISH SHARK	DEC - MAR	6 - 6.5 in	3 - 5 nets@300-500 yd ea.			SINK	14878	8572	12661
	MONKFISH (mostly northern boats)	JAN - APR	8 - 12 in	3 - 5 nets@300-500 yd ea.						
	SPANISH MACKEREL	JUN - OCT	3.125 - 4 in	2 - 5 nets@200-400 yd ea.						
	KING MACKEREL	SEP - NOV	5 - 6 in	2 - 5 nets@200-400 yd ea.						
CARTERET COUNTY	SPOT	OCT - APR	2.875 - 3.125 in	2 - 5 nets@400 yd ea	1 - 47 PER MONTH	22 - 45 ft	FLOAT	96	299	25
	CROAKER	OCT - APR	2.875 - 3.125 in	2 - 5 nets@400 yd ea			DRIFT	0	7	0
	WEAKFISH	OCT - APR	2.875 - 3.125 in	2 - 5 nets@400 yd ea			RUNA/BND	68	48	59
	KINGFISH	OCT - APR	2.5 - 3 in	2 - 5 nets@400 yd ea			SINK	2114	2268	2914
ONSLOW AND	KINGFISH	MAR-MAY & AUG-NOV	2.5 - 3 in	2-4 nets@300-600 yd ea	0 - 36 PER MONTH	29 - 40 ft	FLOAT	50	0	7
PENDER COUNTIES	SPOT	"	2.875 - 3.125 in	2-4 nets@300-600 yd ea.			DRIFT	0	0	0
	MULLET	"	4 - 5 in	2-4 nets@300-600 yd ea			RUNA/BND	8	3	0
	CROAKER	"	2.875 - 3.125 in	2-4 nets@300-600 yd ea			SINK	143	135	0
	BLUEFISH	"	3.5 - 3.25 in	2-4 nets@300-600 yd ea.						
	SPANISH MACKEREL	"	2.5 - 3.25 in	2-4 nets@300-600 yd ea						
NEW HANOVER AND	SPOT	SEP - NOV	2.75 - 3 in		9 - 68 PER MONTH	16 - 19 ft	FLOAT	30	177	4
BRUNSWICK COUNTIES	KINGFISH	APR,MAY,OCT, NOV	2.5 - 3 in				DRIFT	12	25	0
	AMERICAN SHAD	JAN - APR	5.5 - 6 in				RUNA/BND	62	24	1
	MULLET	OCT - JAN	3 - 4 in				SINK	3013	1938	694
	CROAKER	NOV - FEB	2.75 - 3 in							

* THROUGH JUNE 1996

Appendix. NORTH CAROLINA OCEAN GILL NET FISHERY EFFORT (TRIPS), JANUARY, 1994 - JUNE, 1996

1994 CURRITUCK

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT			13	34	17	10		3	10	3			90
DRIFT						3							3
RUNARND													0
SINK				5						2			7
TOTAL	0	0	13	39	17	13	0	3	10	5	0	0	100

1995 CURRITUCK

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT													
DRIFT													
RUNARND							NONE						
SINK													
TOTAL													0

1996 CURRITUCK (thru 6/96)

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT				26		9							35
DRIFT													0
RUNARND													0
SINK				14	5								19
TOTAL	0	0	0	40	5	9							54

1994 DARE CO.

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	67	187	392	68	12	19	3	3	88	10	10	24	884
DRIFT				4		4			11	8	8		31
RUNARND				1					2		3		6
SINK	2132	2801	3305	1478	388	134	136	208	748	766	446	1126	13880
TOTAL	2199	2988	3697	1486	400	151	137	229	841	781	464	1150	14861

1995 DARE CO.

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT			15			5							20
DRIFT													0
RUNARND													0
SINK	2711	2053	3837	1188	848	455	388	212	798	1303	799	1818	17588
TOTAL	2711	2053	3852	1188	848	460	388	212	798	1303	799	1818	17608

1996 DARE CO. (thru 6/96)

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	1	2	4	10		2							19
DRIFT		3	7	6									16
RUNARND	10												10
SINK	2774	2384	2134	2100	752	314							10828
TOTAL	2785	2389	2146	2116	752	316	0	0	0	0	0	0	10873

1994 HYDE CO.

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT						14	20						34
DRIFT													
RUNARND													
SINK	102	328	214	54	15	46	11	3	4			184	973
TOTAL	102	328	214	54	15	60	31	3	4	0	0	184	1007

1995 HYDE CO.

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT			213	15									228
DRIFT													0
RUNARND													0
SINK	294	168	261	4	39		2		43	57	61	65	1003
TOTAL	294	168	474	19	39	0	2	0	43	57	61	65	1231

1996 HYDE CO. (thru 6/96)

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT		4	3										7
DRIFT													0
RUNARND													0
SINK	598	428	541	368	8	1							[illegible]
TOTAL	598	432	544	368	8	1	0	0	0	0	0	0	[illegible]

1994 CARTERET
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	4		1	8	4	7	1	4	10	87	90		96
DRIFT													0
RUNAROUND	11					1				55	17	4	88
SINK	804	96	18	187	74	19	8	108	347	347	467	91	2114
TOTAL	819	96	19	195	78	27	10	112	359	489	494	95	2299

1995 CARTERET
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	8		4	0	0		2		42	11	19	172	258
DRIFT					3							4	7
RUNAROUND					1			1	10	9	15	8	45
SINK	18	1	41	107	28	10	2	39	134	221	699	1042	2288
TOTAL	18	1	45	113	32	10	4	40	176	241	979	1230	2378

1996 CARTERET (thru 6/30)
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	4	8	9		8	4							33
DRIFT													0
RUNAROUND	9		6	4	8								19
SINK	971	398	461	532	58	3							2016
TOTAL	376	373	480	536	74	7	0	0	0	0	0	0	2068

1994 PENDER
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	1	2						1	1		4	1	10
DRIFT													0
RUNAROUND									2		0		5
SINK		2	0	114	5				3	2	12		144
TOTAL	1	4	0	114	5	0	0	1	5	2	16	1	161

1995 PENDER
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT													0
DRIFT													0
RUNAROUND													0
SINK													0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

1996 PENDER (thru 6/30)
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT		6		1									7
DRIFT													0
RUNAROUND													0
SINK				5									5
TOTAL	0	6	0	6	0	0							12

1995 NEW HANOVER
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT			2		1					4			7
DRIFT								2					2
RUNAROUND										1	12	14	27
SINK	10	90	200	804	87	33	4	85	286	286	74	14	1573
TOTAL	10	30	202	504	88	38	4	90	286	290	86	88	1608

1996 NEW HANOVER
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	1	36	34							2		1	74
DRIFT										8	8		8
RUNAROUND										3	11	1	15
SINK	10	1	58	66	30	7	8	6	28	115	102	36	552
TOTAL	11	36	92	66	30	7	8	6	28	128	200	40	673

1996 NEW HANOVER (thru 6/30)
MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT					4								4
DRIFT													0
RUNAROUND													3
SINK	10	88		103	78	47							310
TOTAL	10	20	0	103	74	47	0	0	0	0	0	0	314

1994 BRUNSWICK

MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT		3	21	9	3	4			2	1			43
DRIFT			8					2					10
RUNARND								19	12	3	1		35
SINK	72	235	330	173	99	110	58	63	216	349	205	139	1940
TOTAL	72	238	359	182	102	114	58	83	237	347	206	139	2031

1995 BRUNSWICK

MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT	1	11	34	8				3	10	24	21	2	104
DRIFT			1							13	3		17
RUNARND								8	3	2			11
SINK	159	94	110	167	87	50	7	38	87	283	196	68	1350
TOTAL	187	105	149	175	87	50	7	49	80	322	220	68	1482

1996 BRUNSWICK (thru 6/96)

MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FLOAT													0
DRIFT													0
RUNARND						1							1
SINK	78	101	75	58	38	12							362
TOTAL	78	101	75	58	38	13							363

APPENDIX 7

Humpback Whale Sightings Distribution for Large-whale TRT 18-19 November 1996

J. Hain
NEFSC/NMFS
Woods Hole, MA 02543

Contents:

A. Northeast U.S.

1. All data, 2,649 sightings
   Includes University of Rhode Island CETAP and SCOPEX data, Manomet data from NEFSC surveys, and YONAH Gulf of Maine data

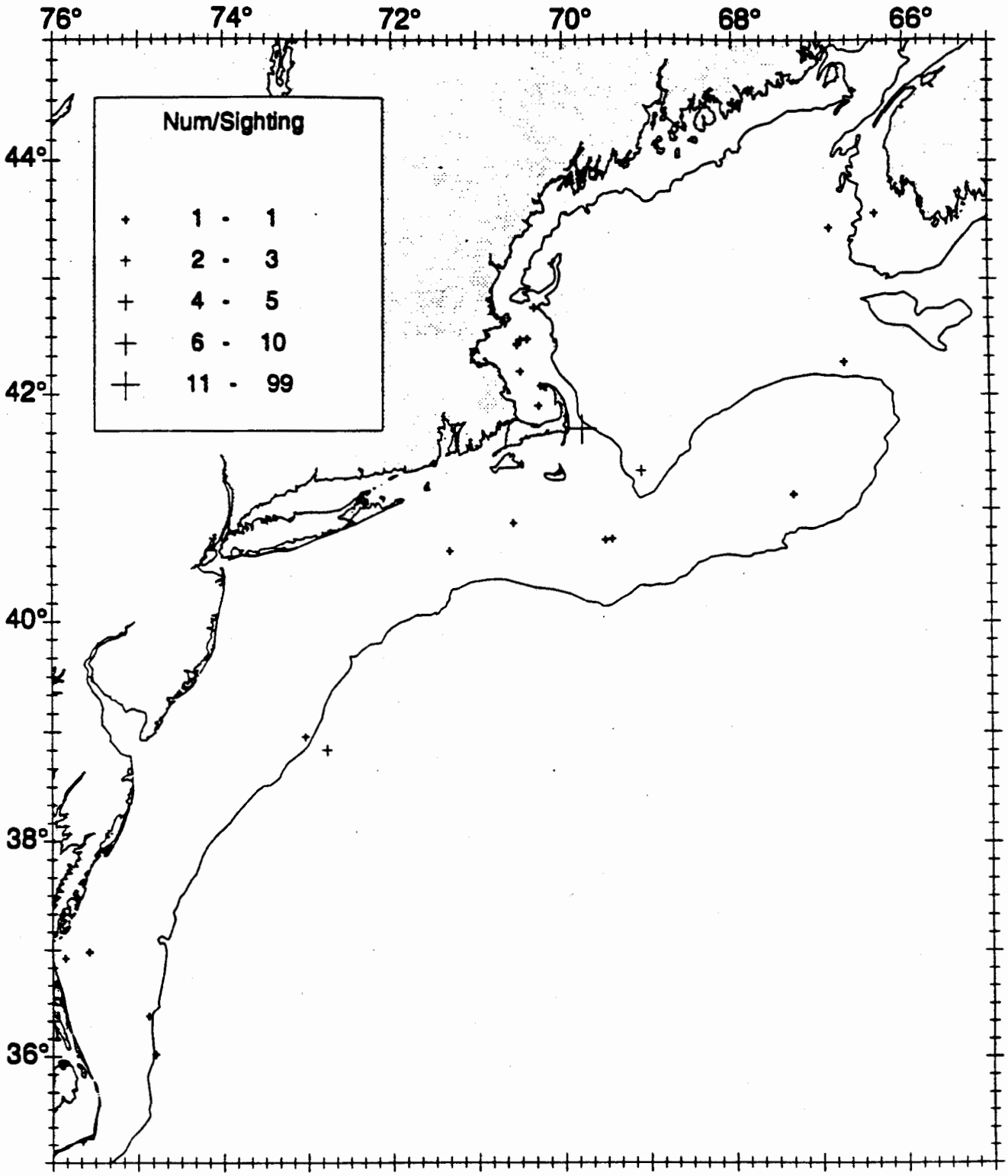
2. Sightings by quarter

B. Gulf of Maine

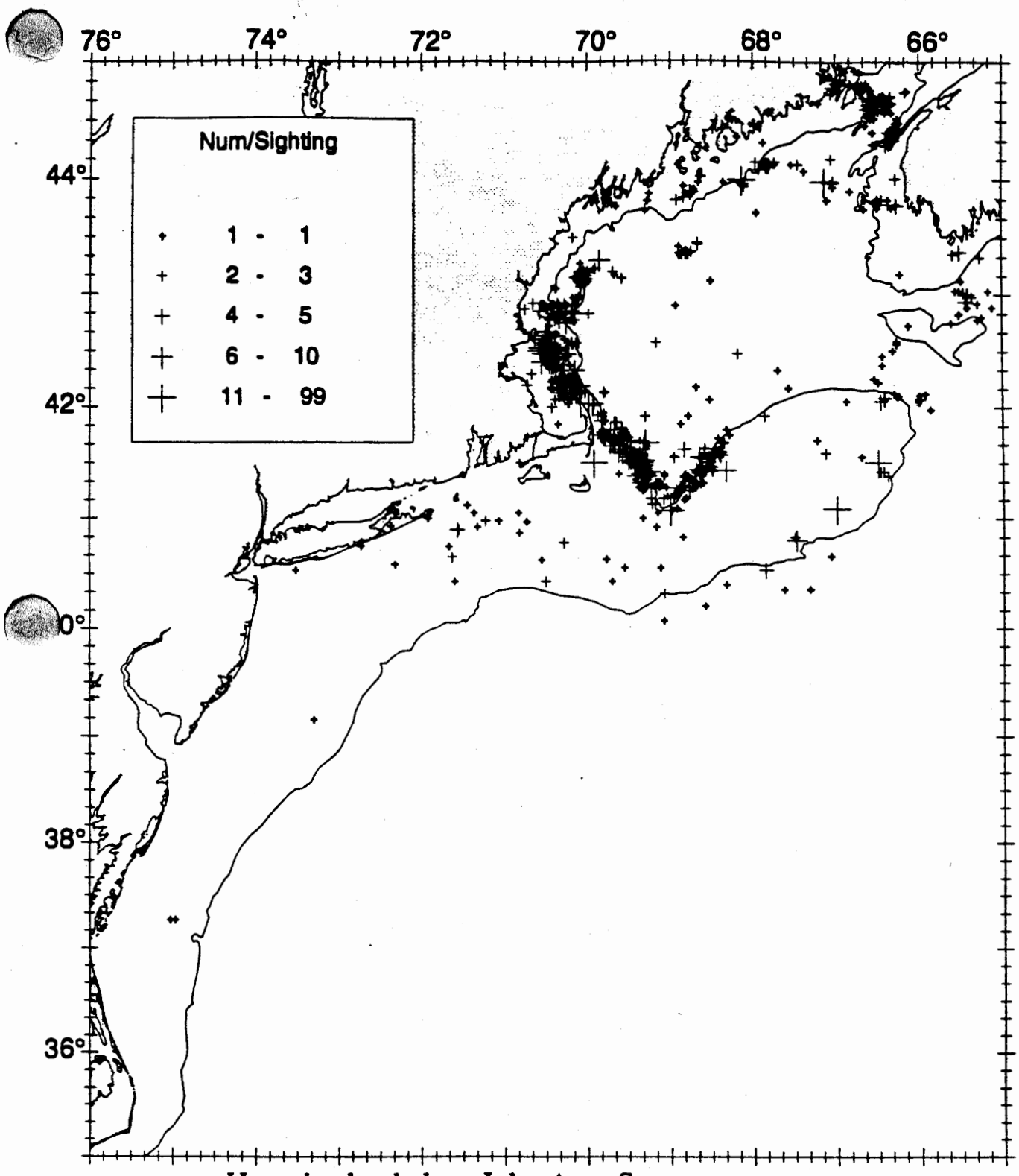
1. All data

2. Sightings by quarter

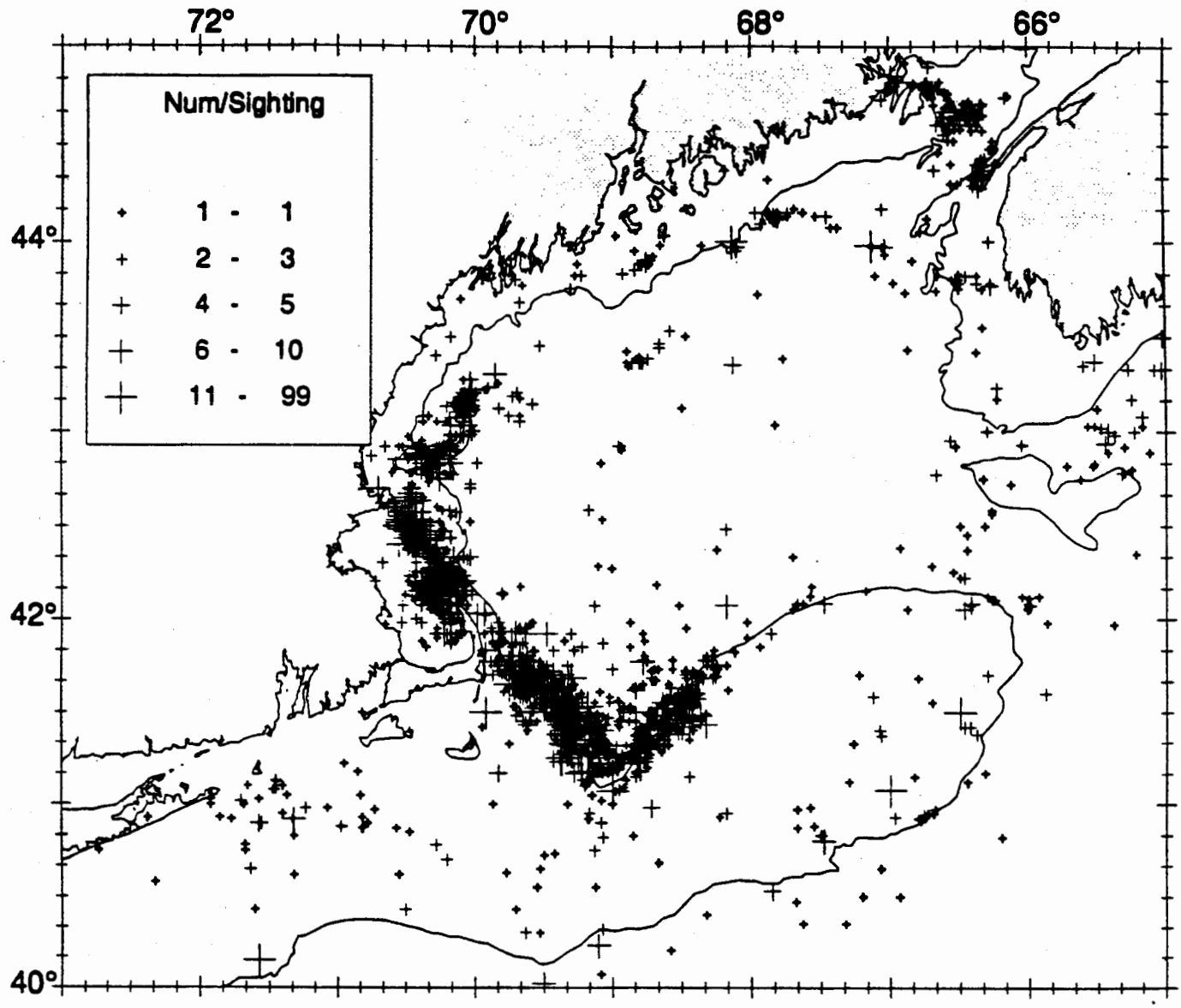
C. Relative abundance plots, sighting data corrected for sighting effort



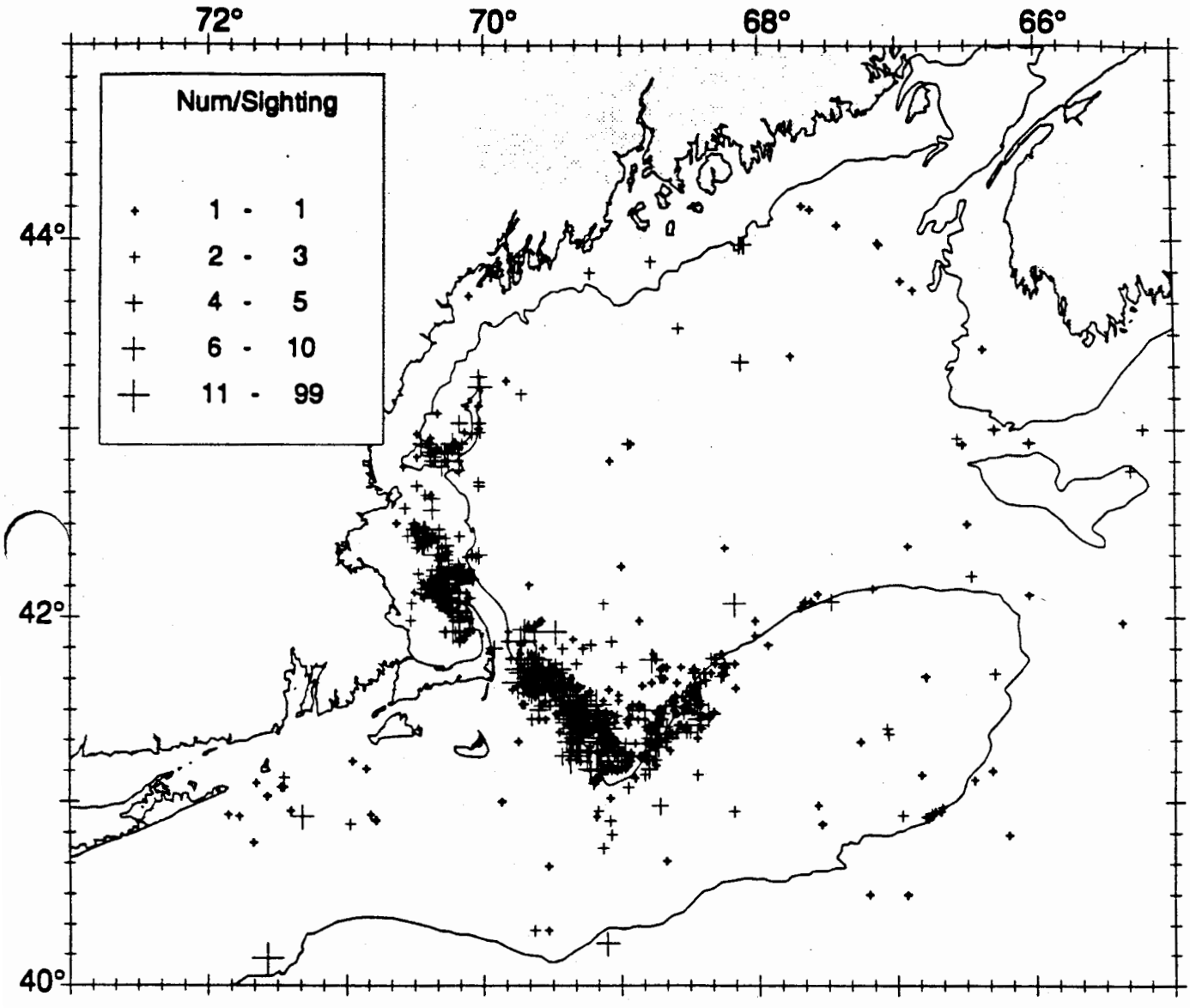
Humpback whales: Jan, Feb, Mar
(sightings distribution influenced by sighting effort)



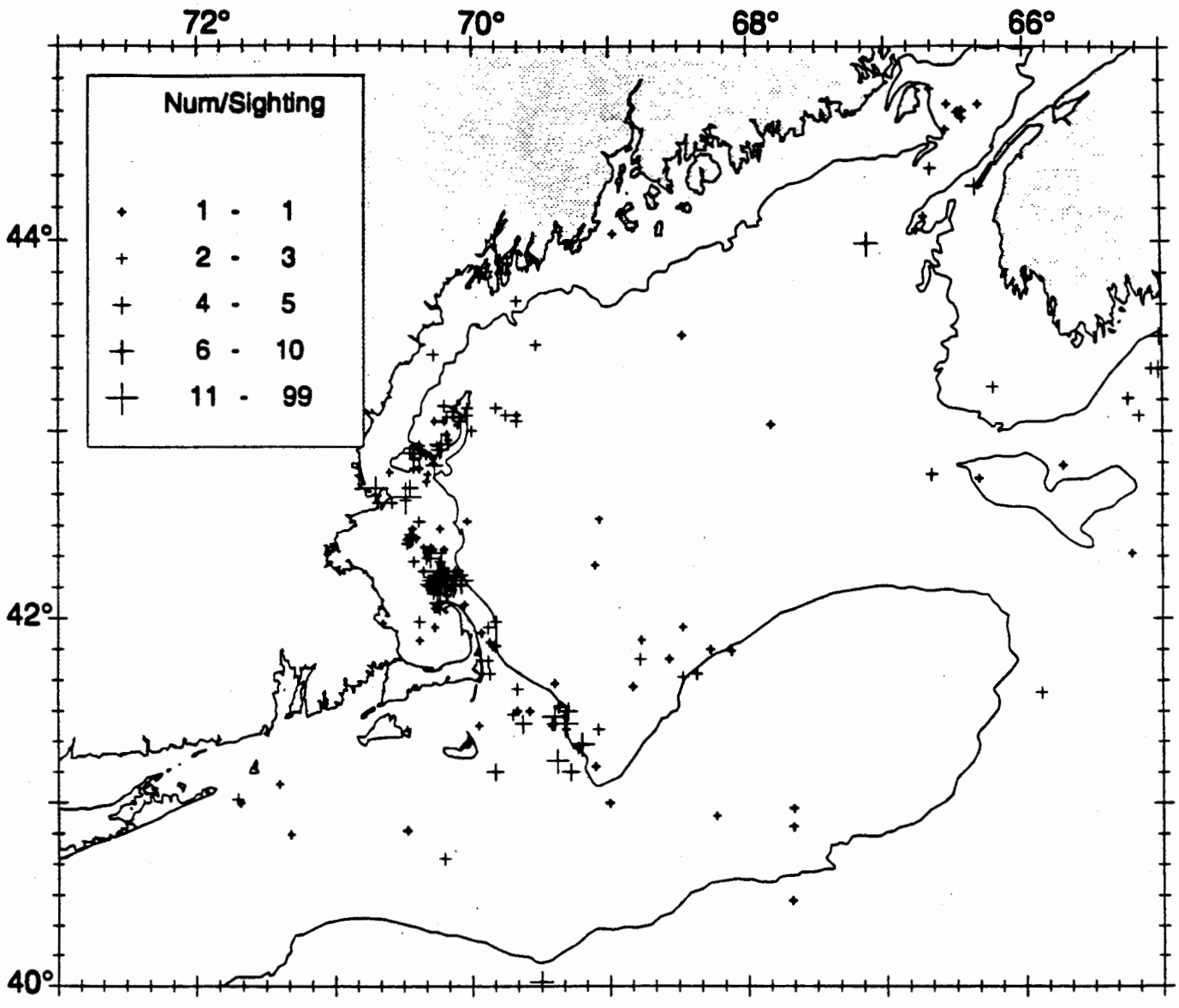
Humpback whales: July, Aug, Sept
(sightings distribution influenced by sighting effort)



Humpback whales: All data
(sightings distribution influenced by sighting effort)

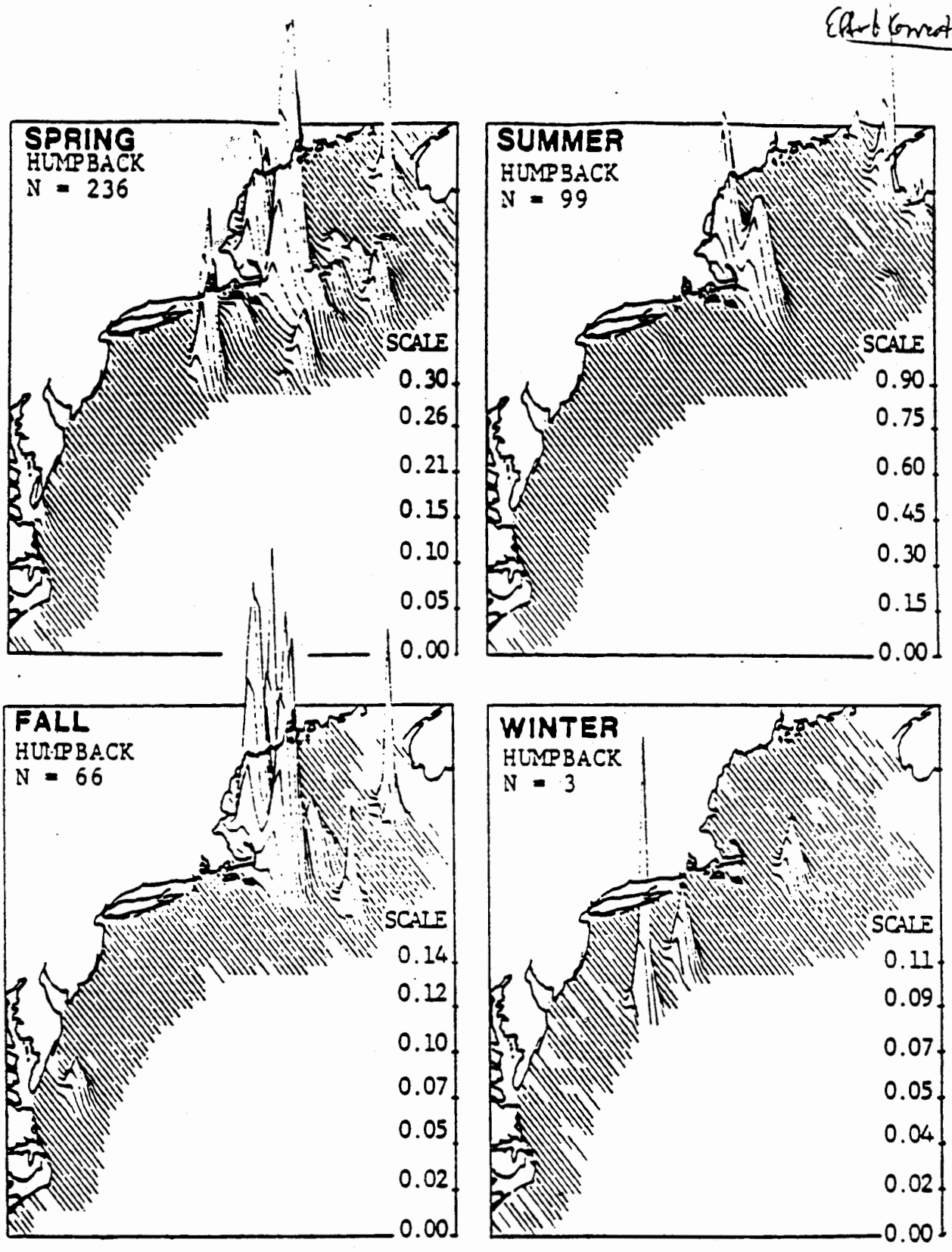


Humpback whales: Apr, May, June
(sightings distribution influenced by sighting effort)



Humpback whales: Oct, Nov, Dec
(sightings distribution influenced by sighting effort)

Effort Corrected

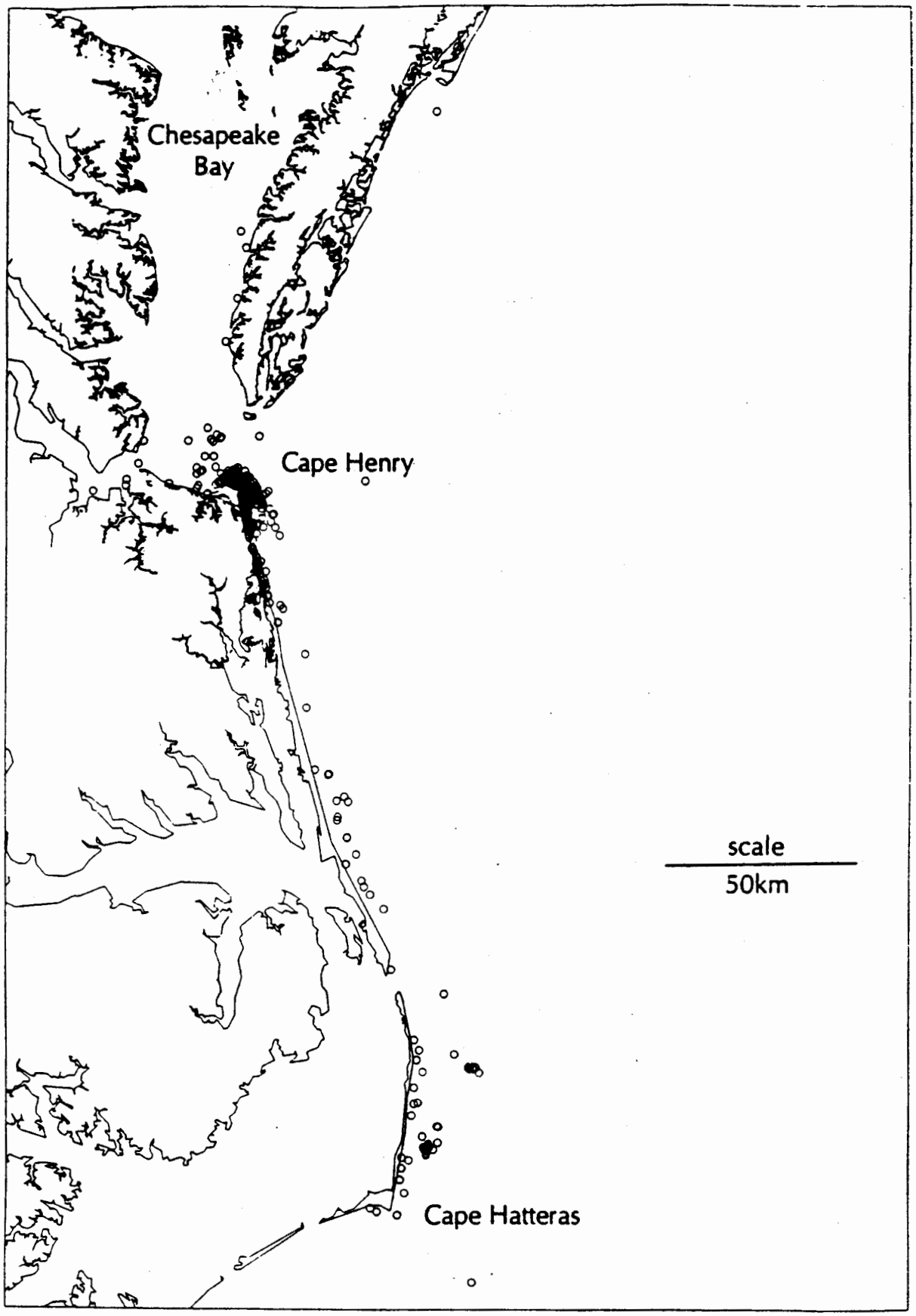


While the sightings distribution shown on the previous figures is influenced to varying degrees by a highly variable sighting effort, when a correction for sighting effort is made (individuals per kilometer of survey line per 10-minute quadrat) the results continue to show a number of high-use areas. It is less well known whether the zero relative abundance areas truly represent unoccupied areas or are only a function of low sighting effort. The previous sightings distribution plots suggest that the latter may be at least partially true. (Source: CETAP 1982)

APPENDIX 8

DRAFT

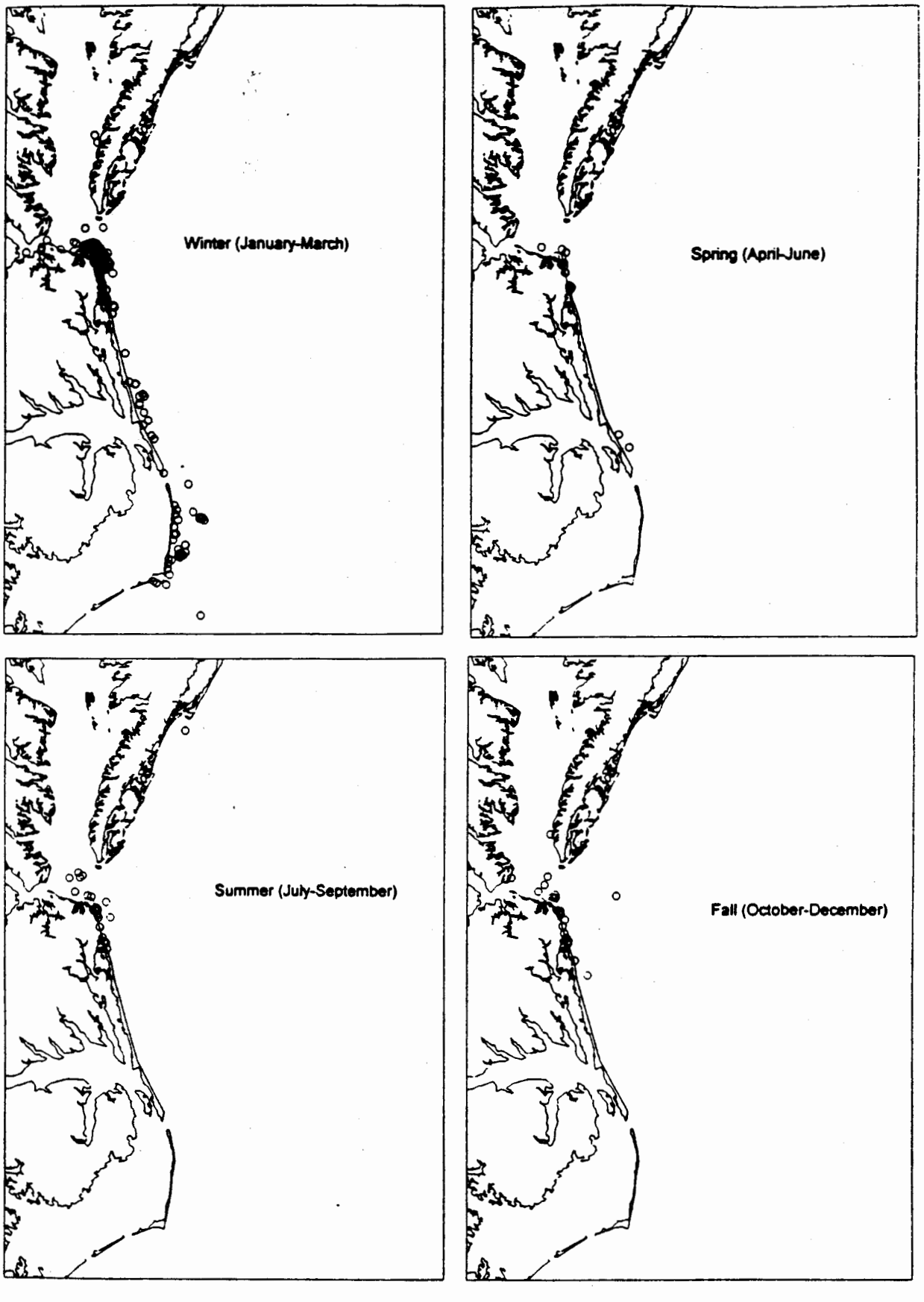
VMSM Whale Sighting Database



All whale sightings (1988-1995).

VMSM Whale Sighting Database

DRAFT

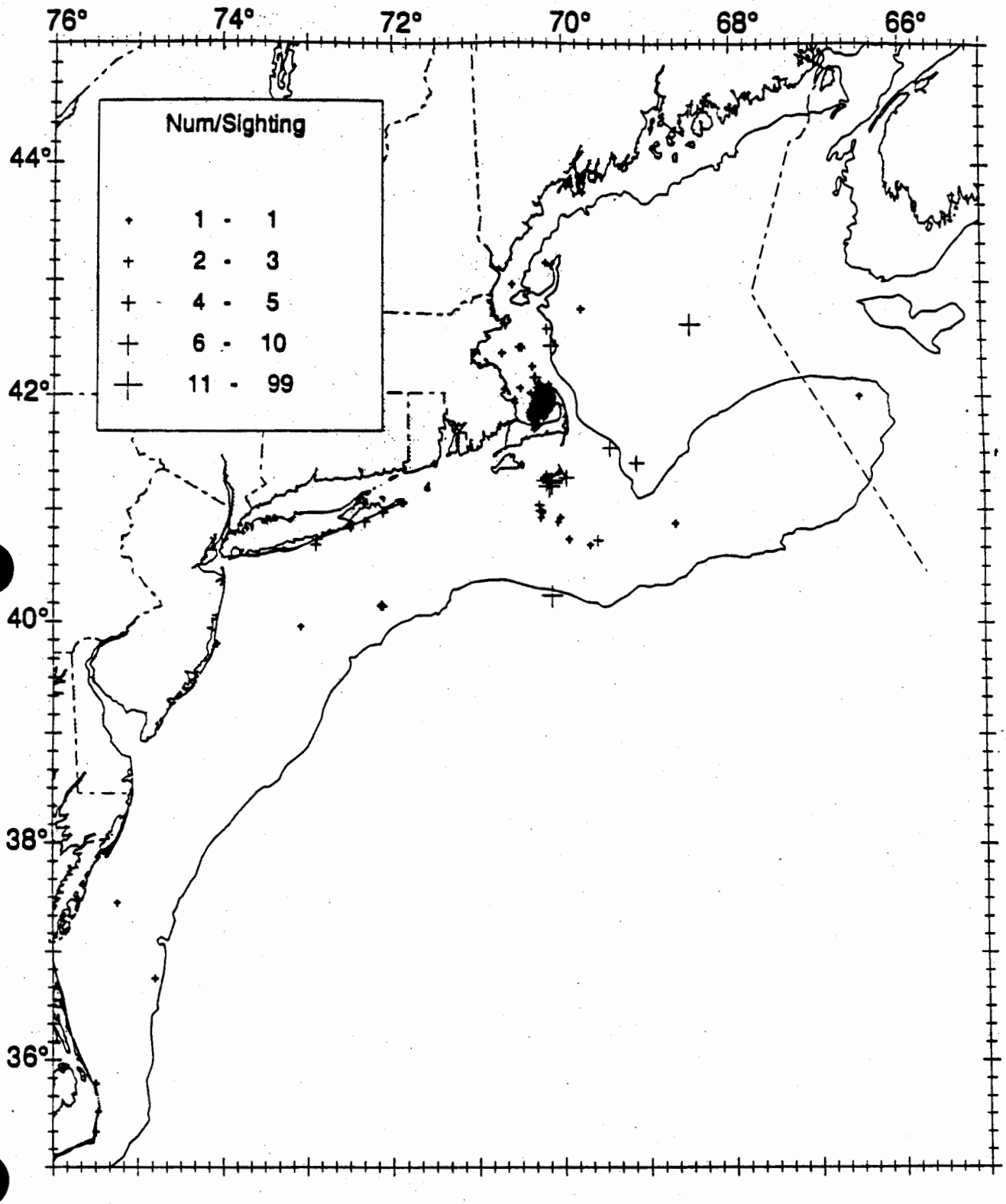


Seasonal differences in whale sightings (1988-1995).

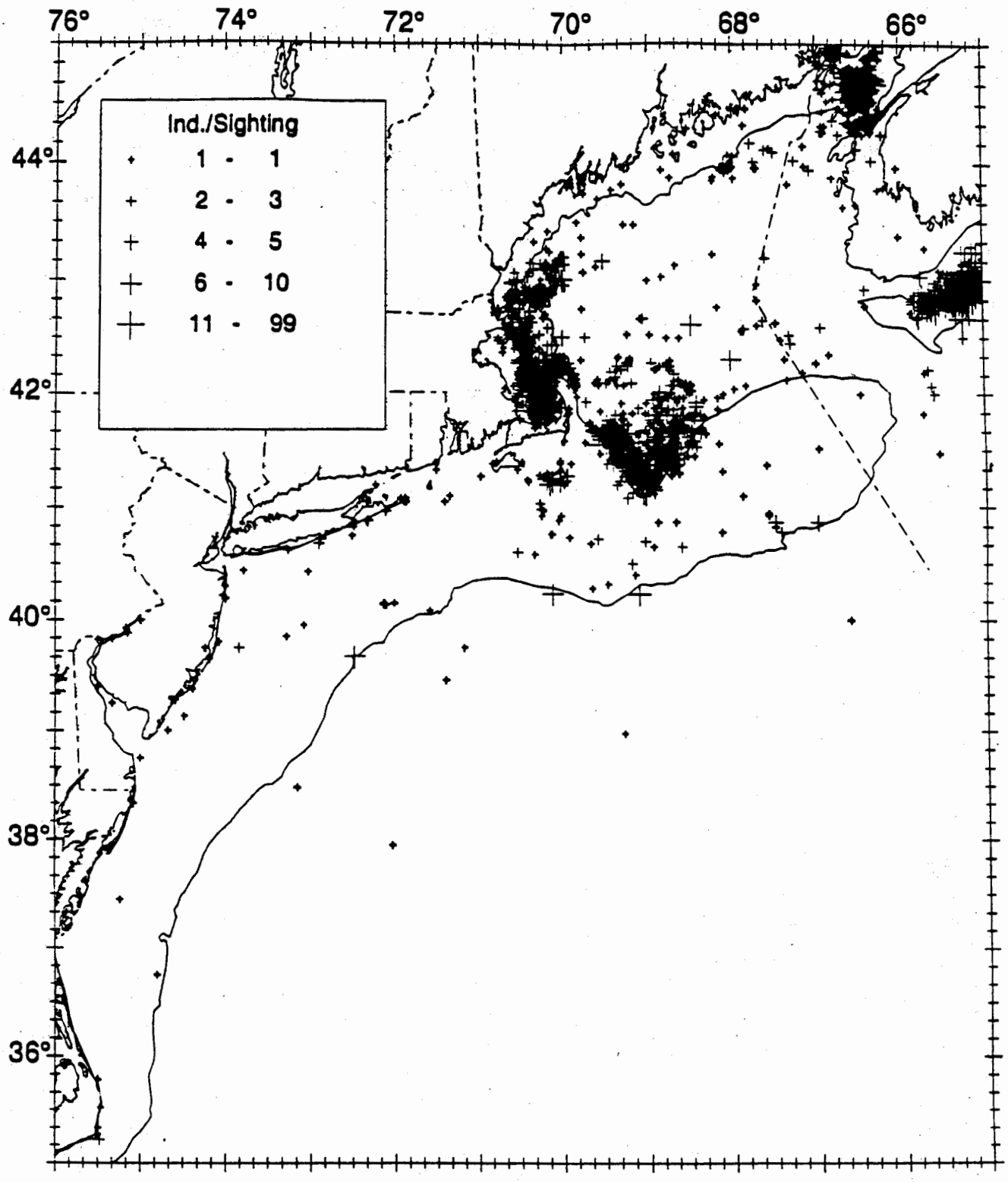
APPENDIX 9

Right Whale Sightings Distribution for Large-whale TRT 15-16 October 1996

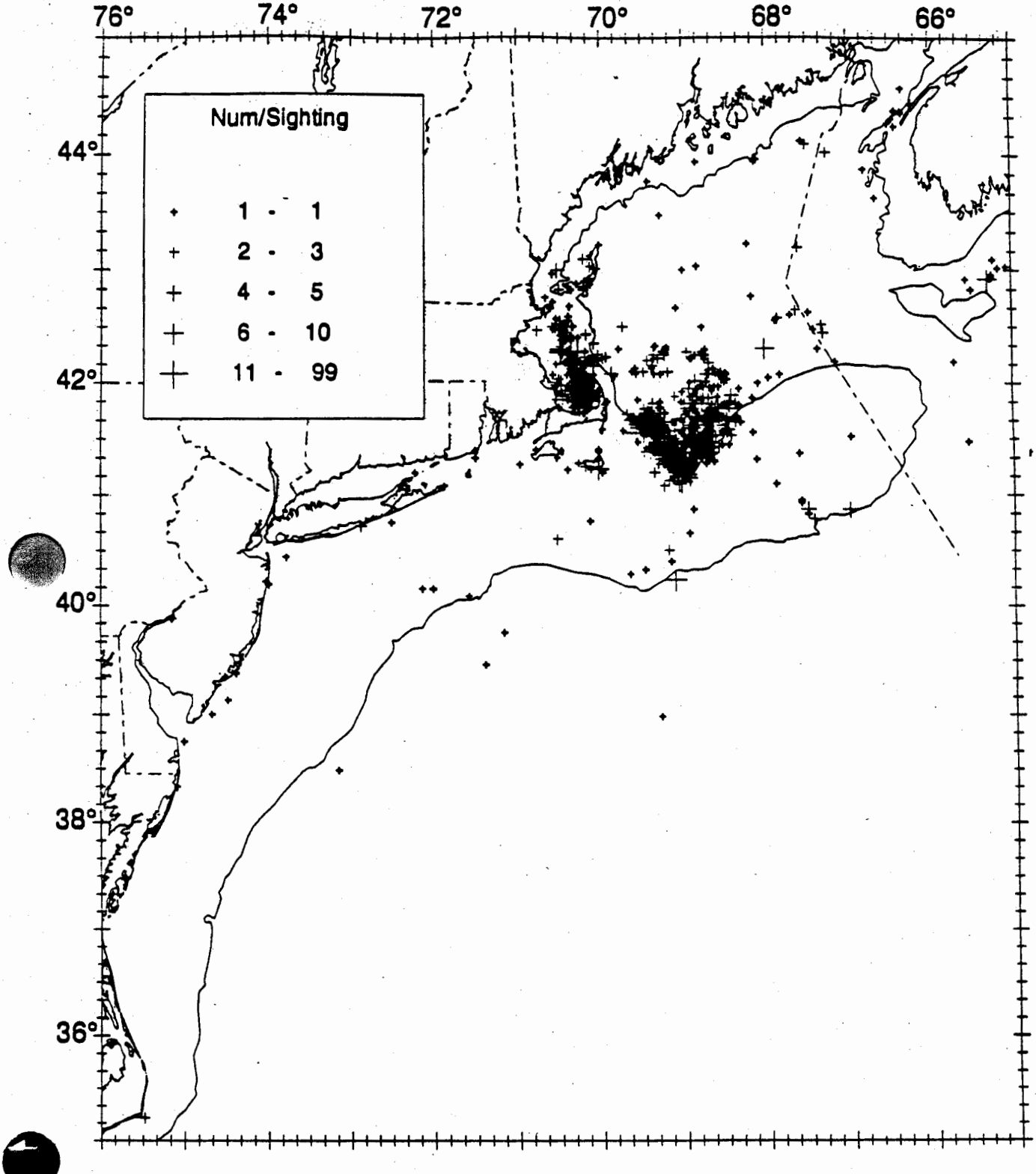
J. Hain
NEFSC/NMFS



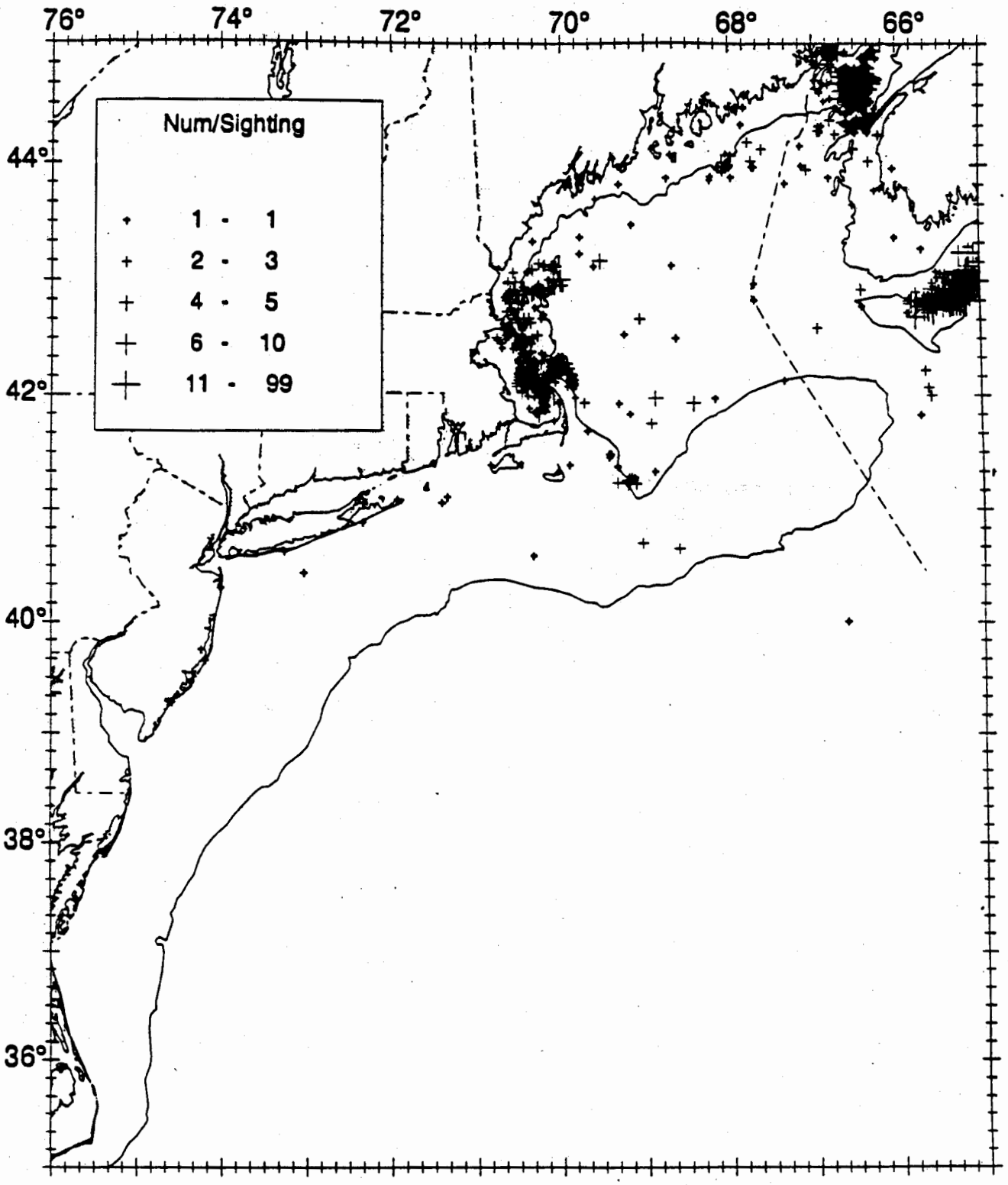
Right whales: Jan, Feb, Mar



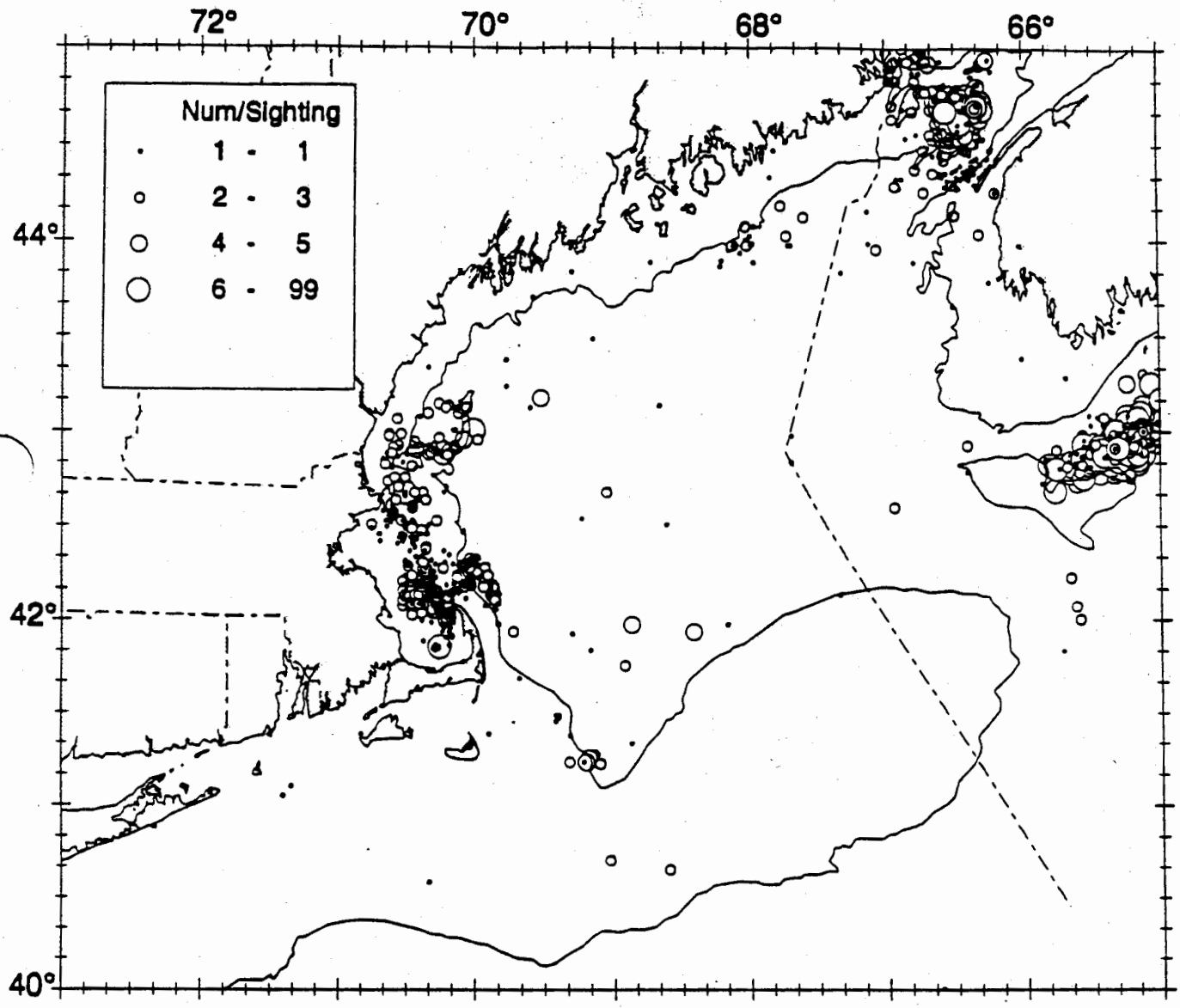
Right whales: All data



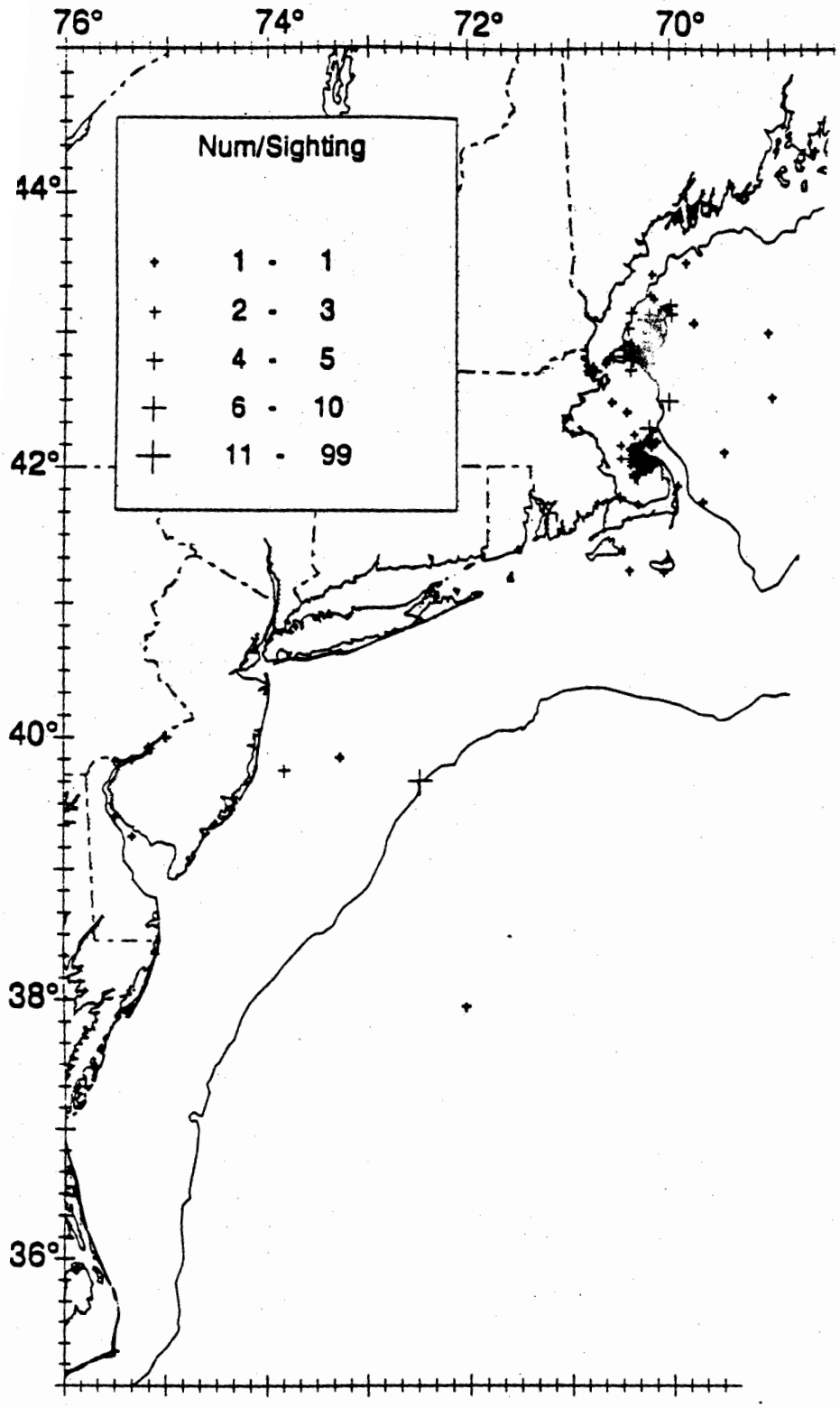
Right whales: Apr, May, June



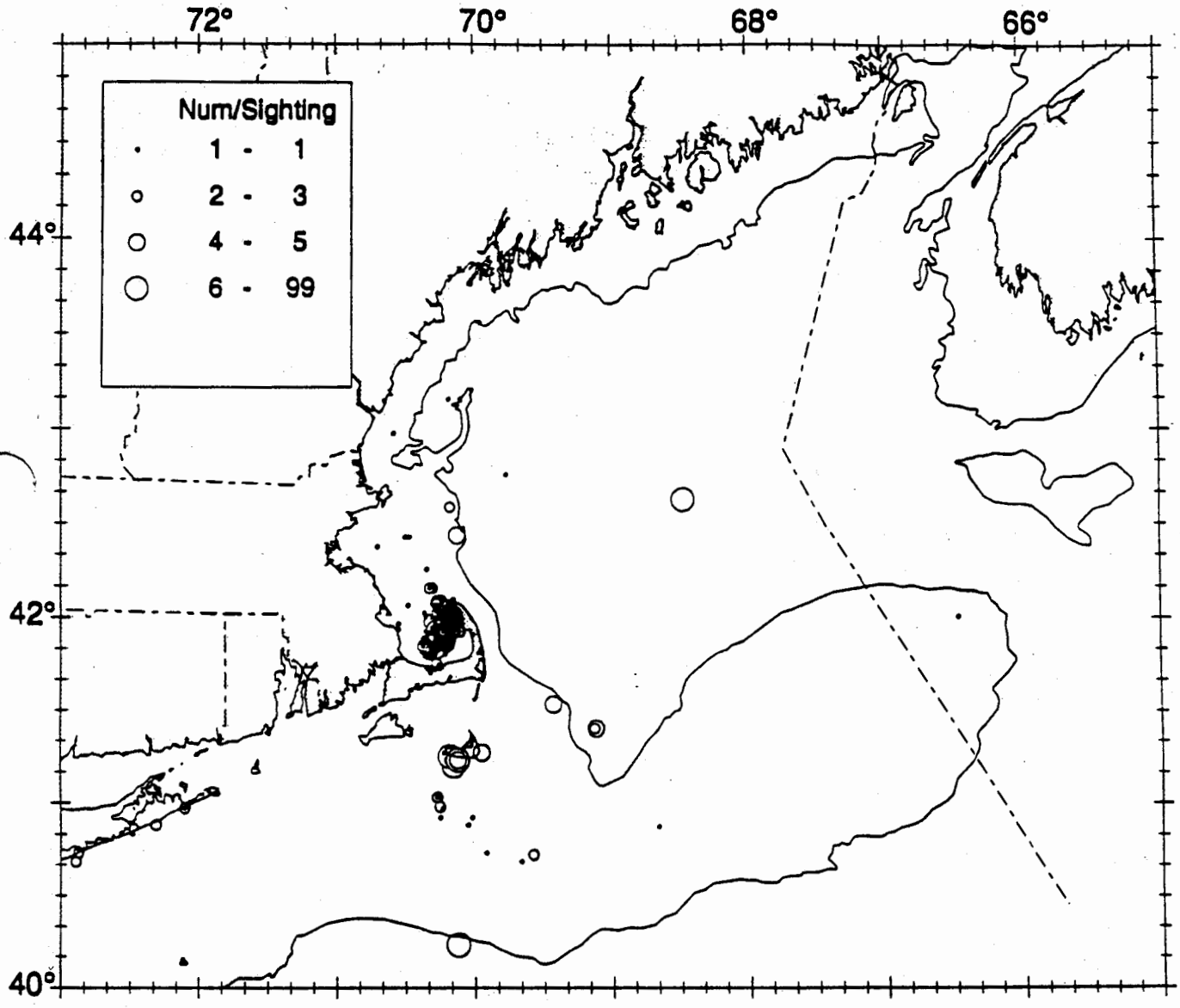
Right whales: July, August, September



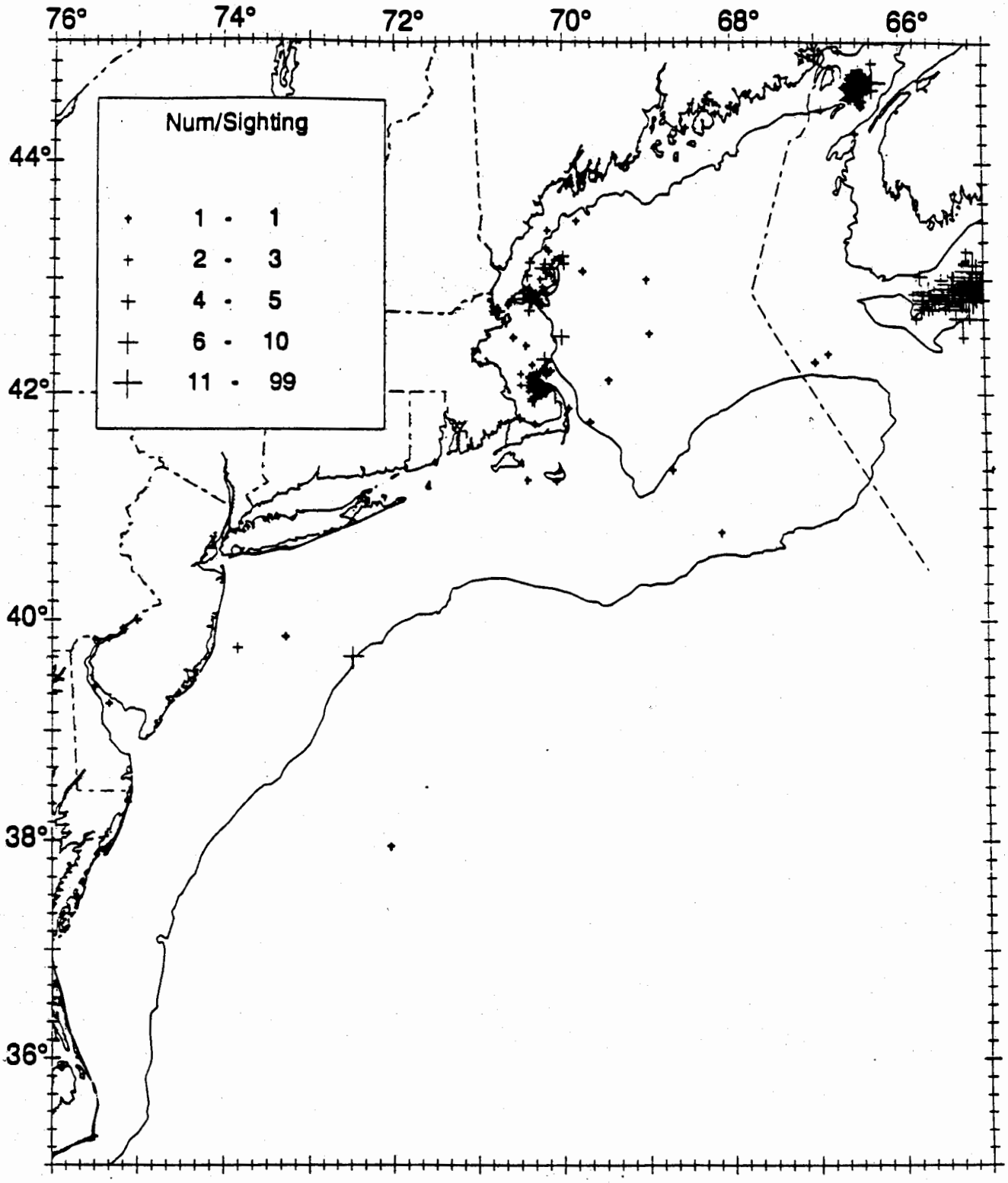
Right whales: July, August, September



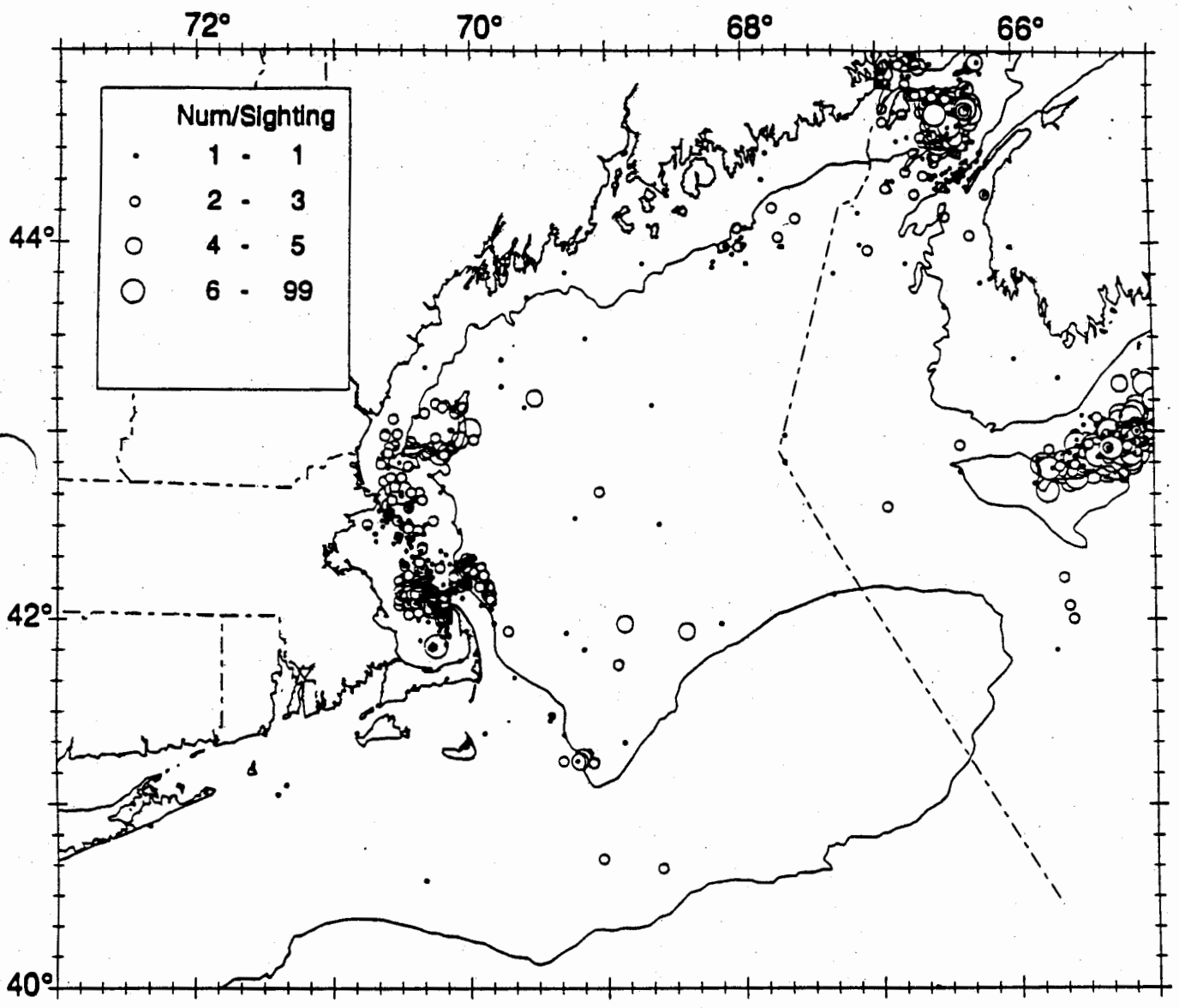
Right whales: Oct, Nov, Dec



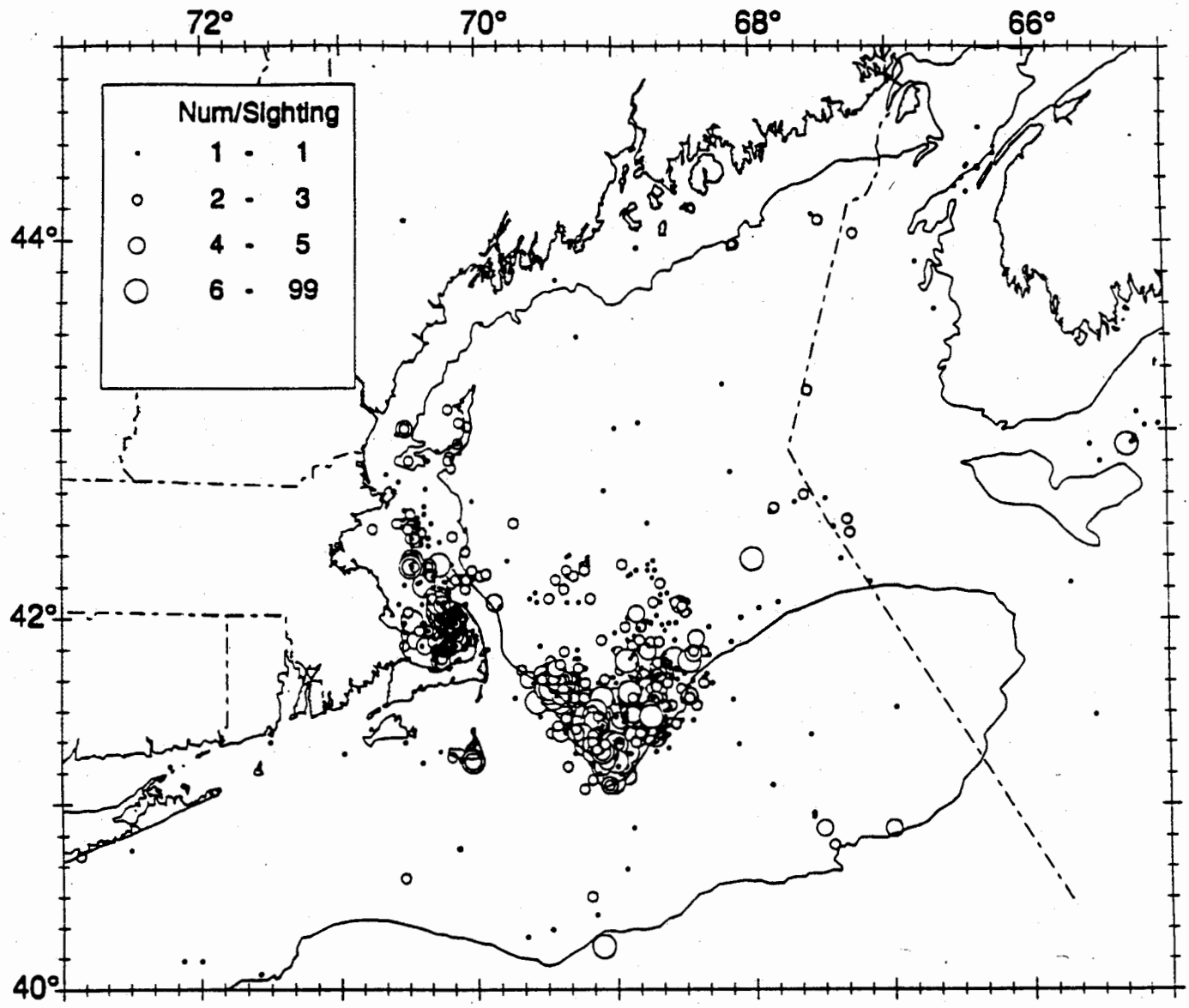
Right whales: Jan, Feb, Mar



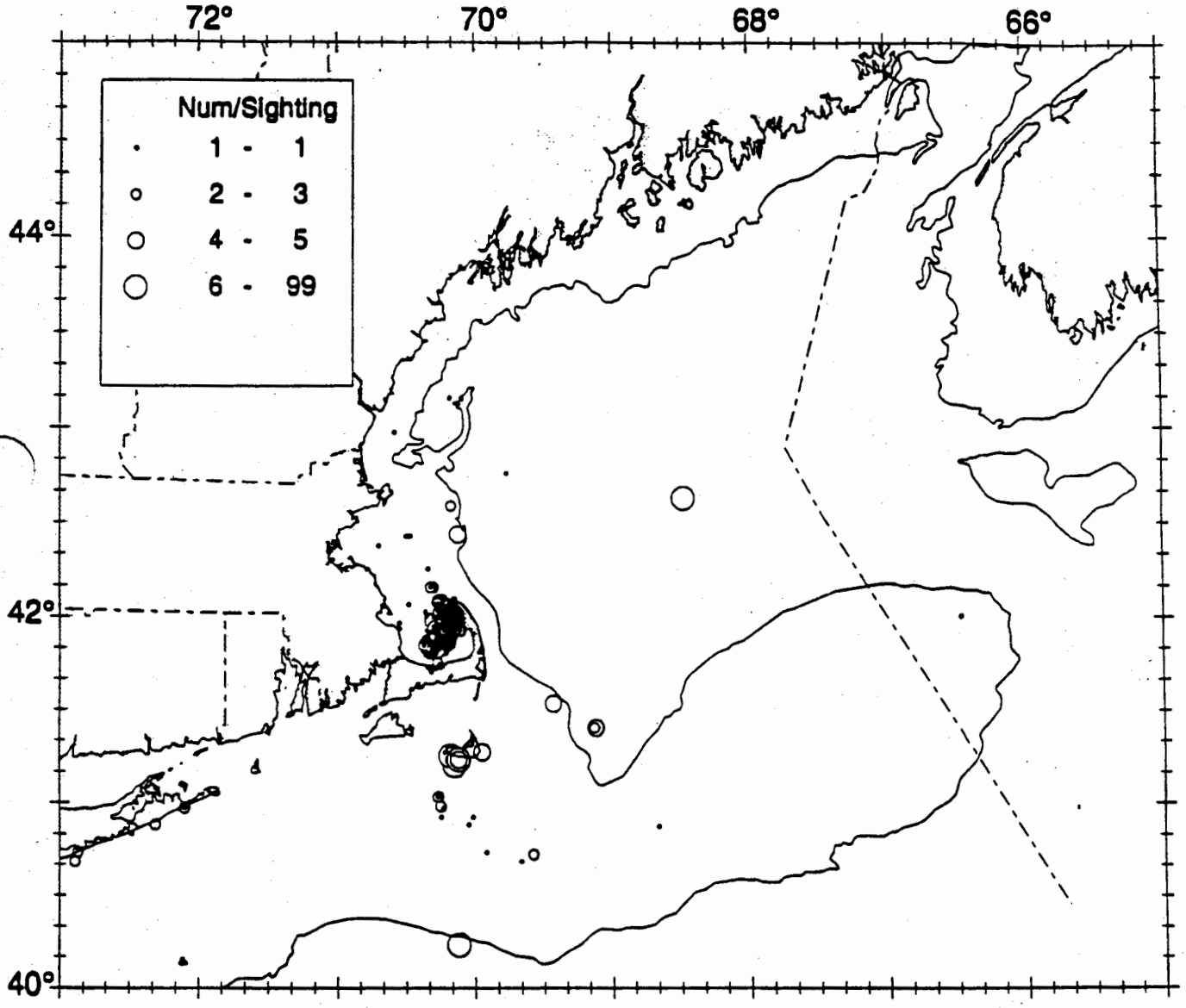
Right whales: Oct, Nov, Dec



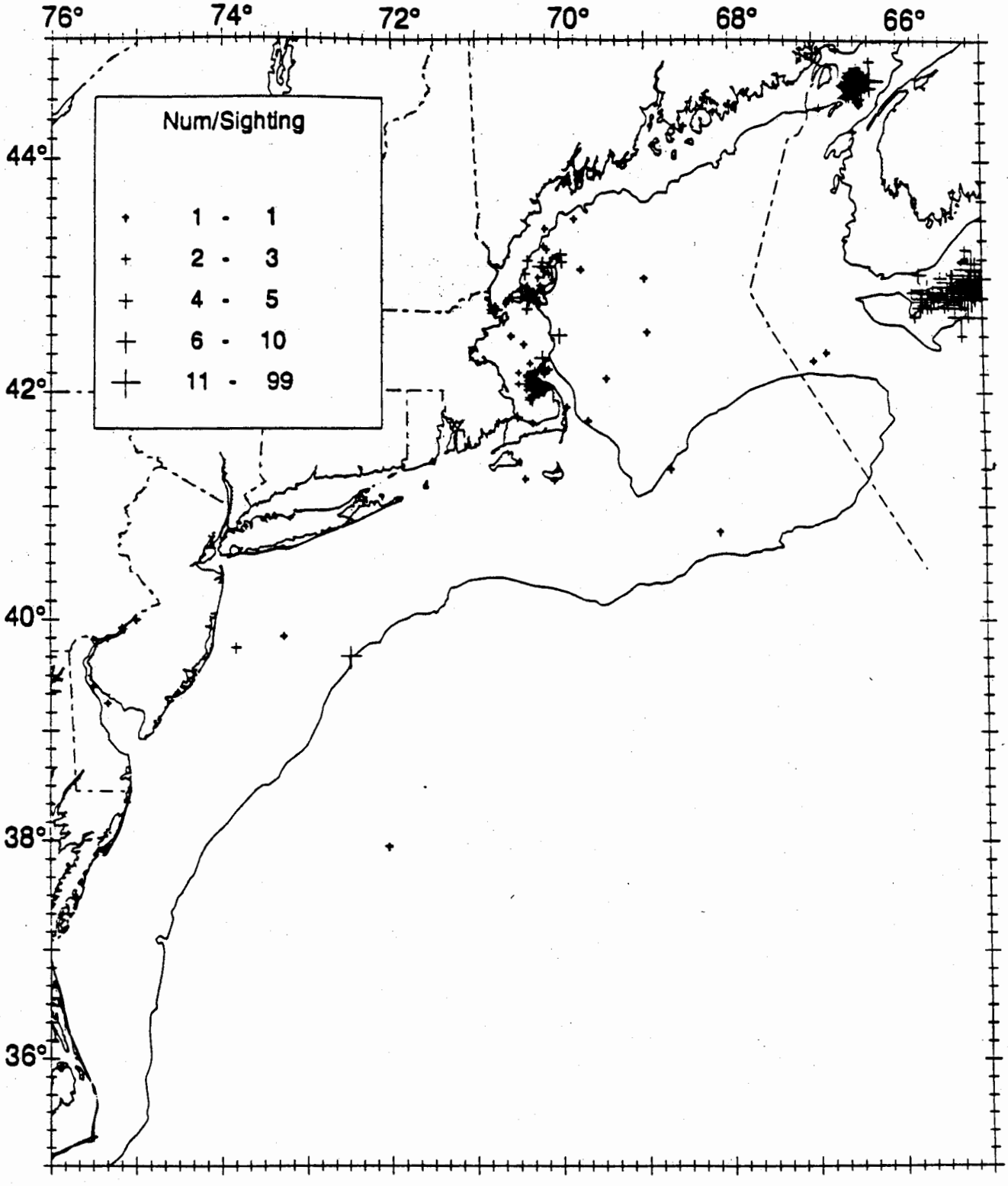
Right whales: July, August, September



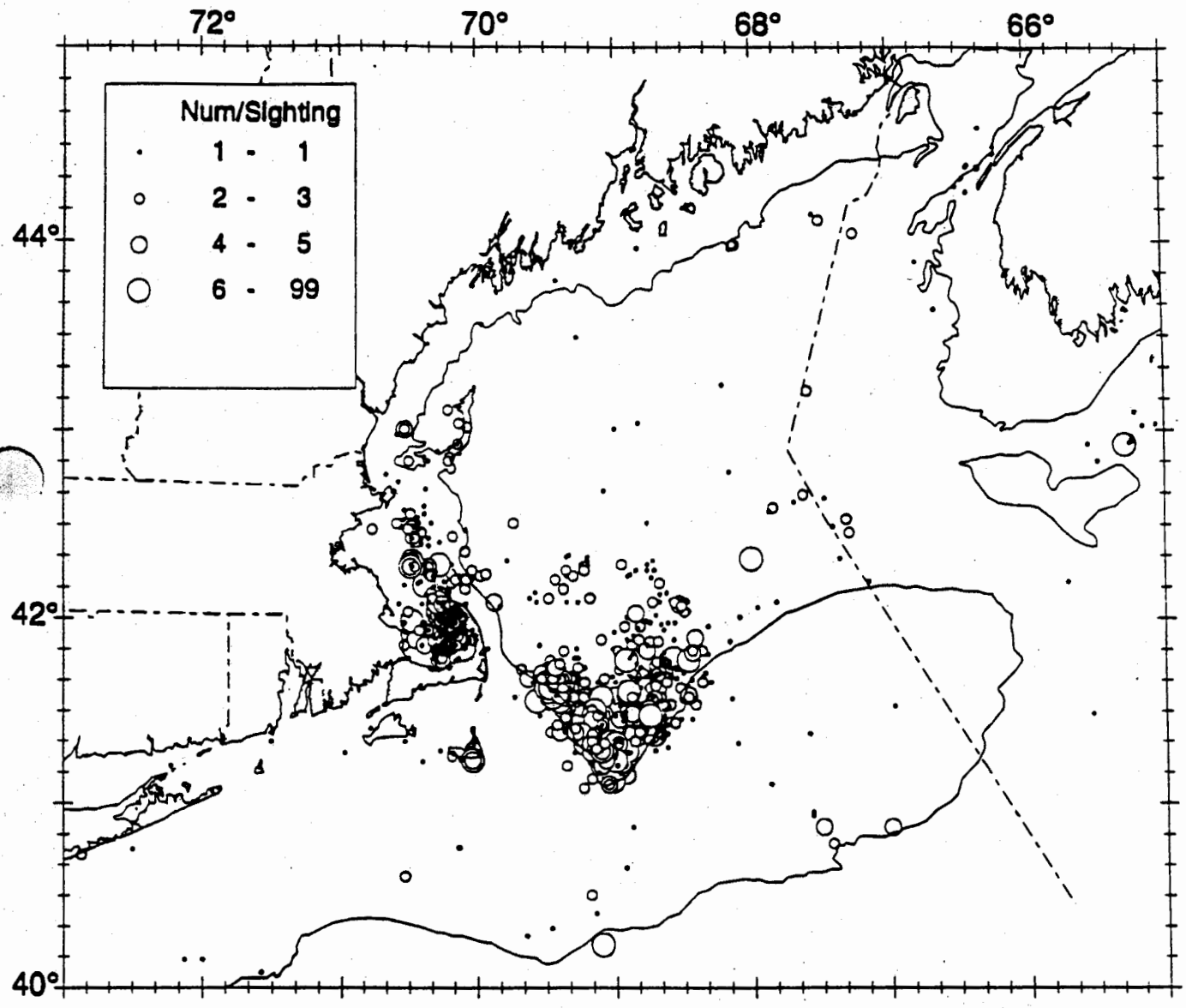
Right whales: April, May, June



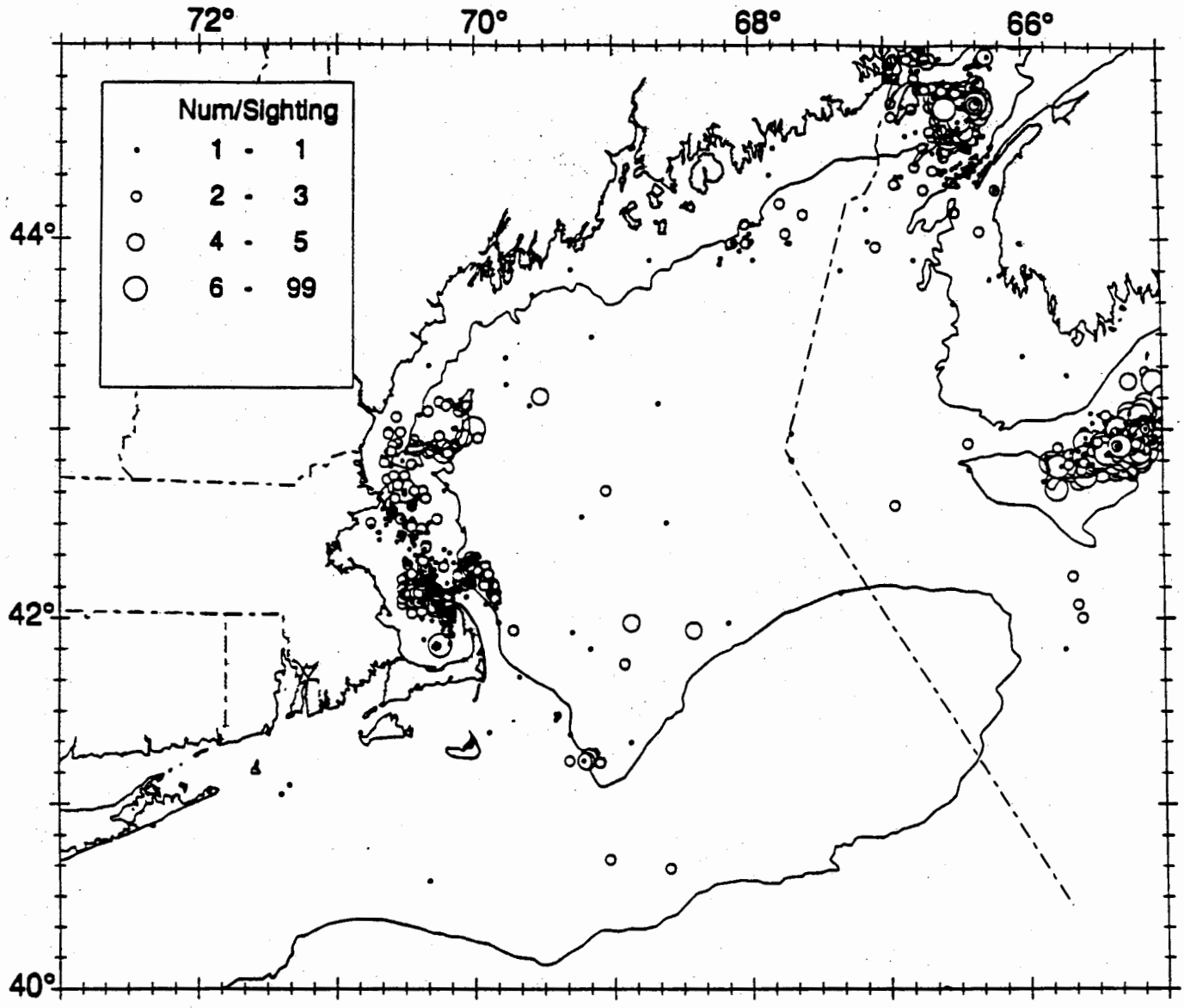
Right whales: Jan, Feb, Mar



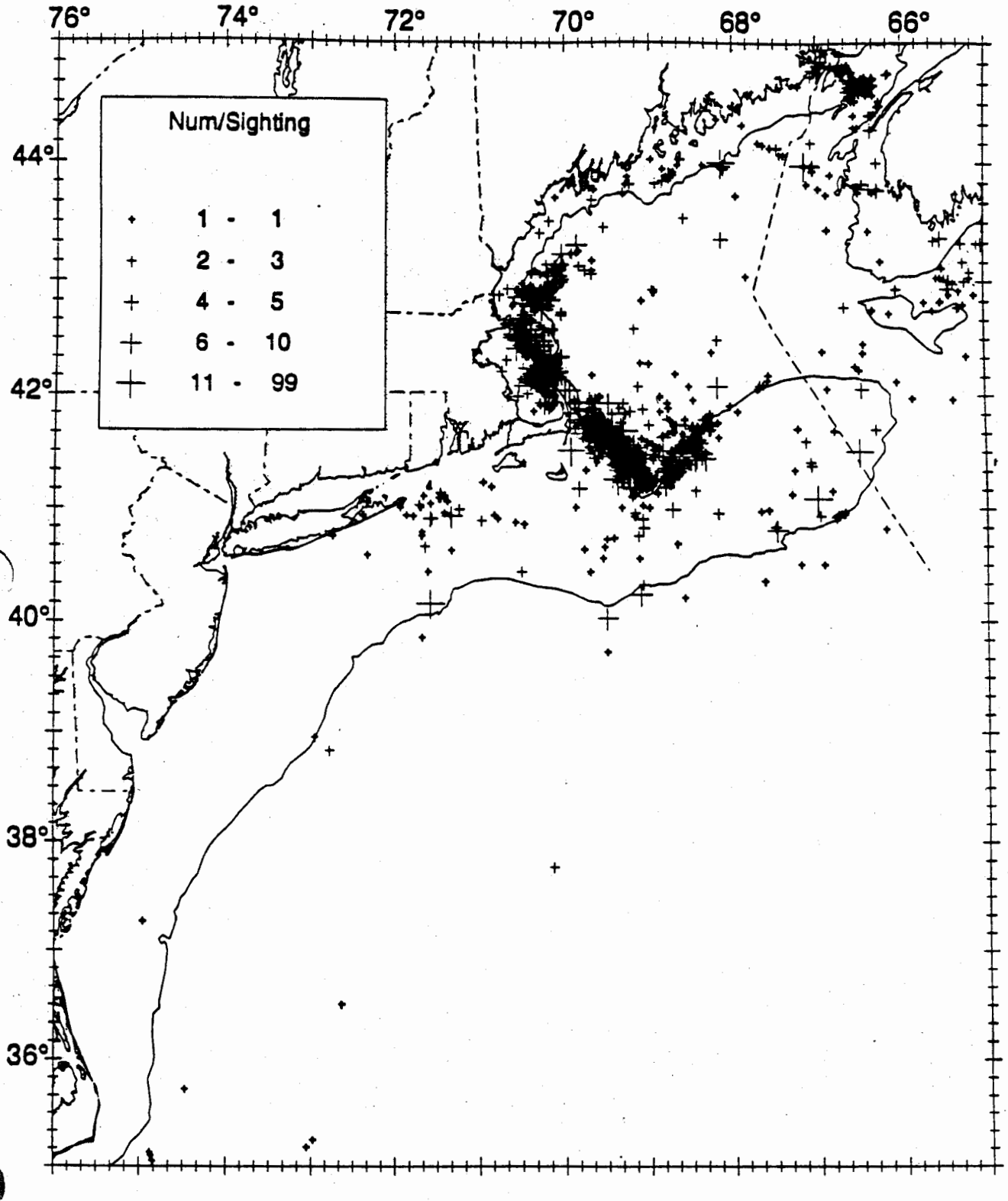
Right whales: Oct, Nov, Dec



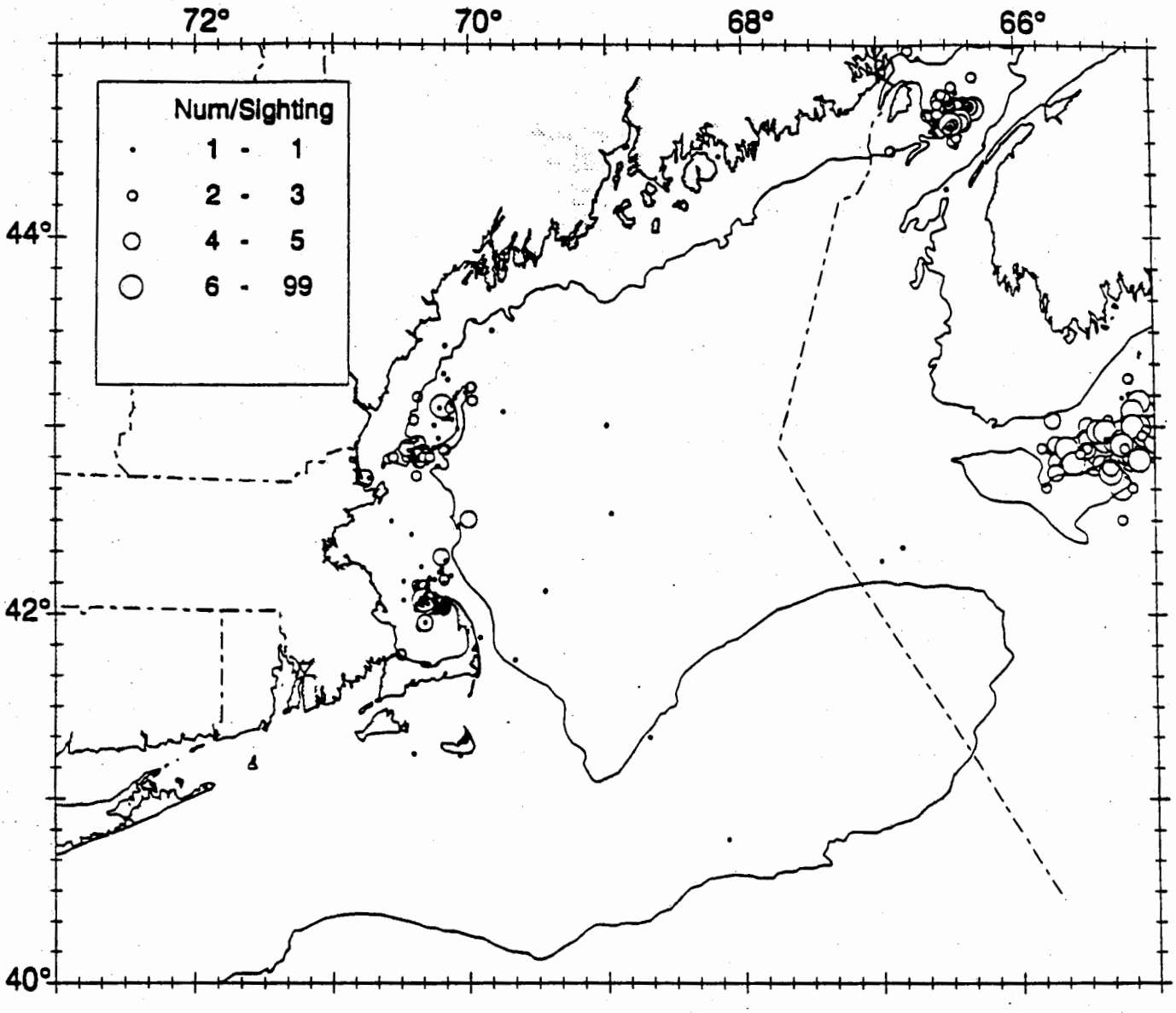
Right whales: April, May, June



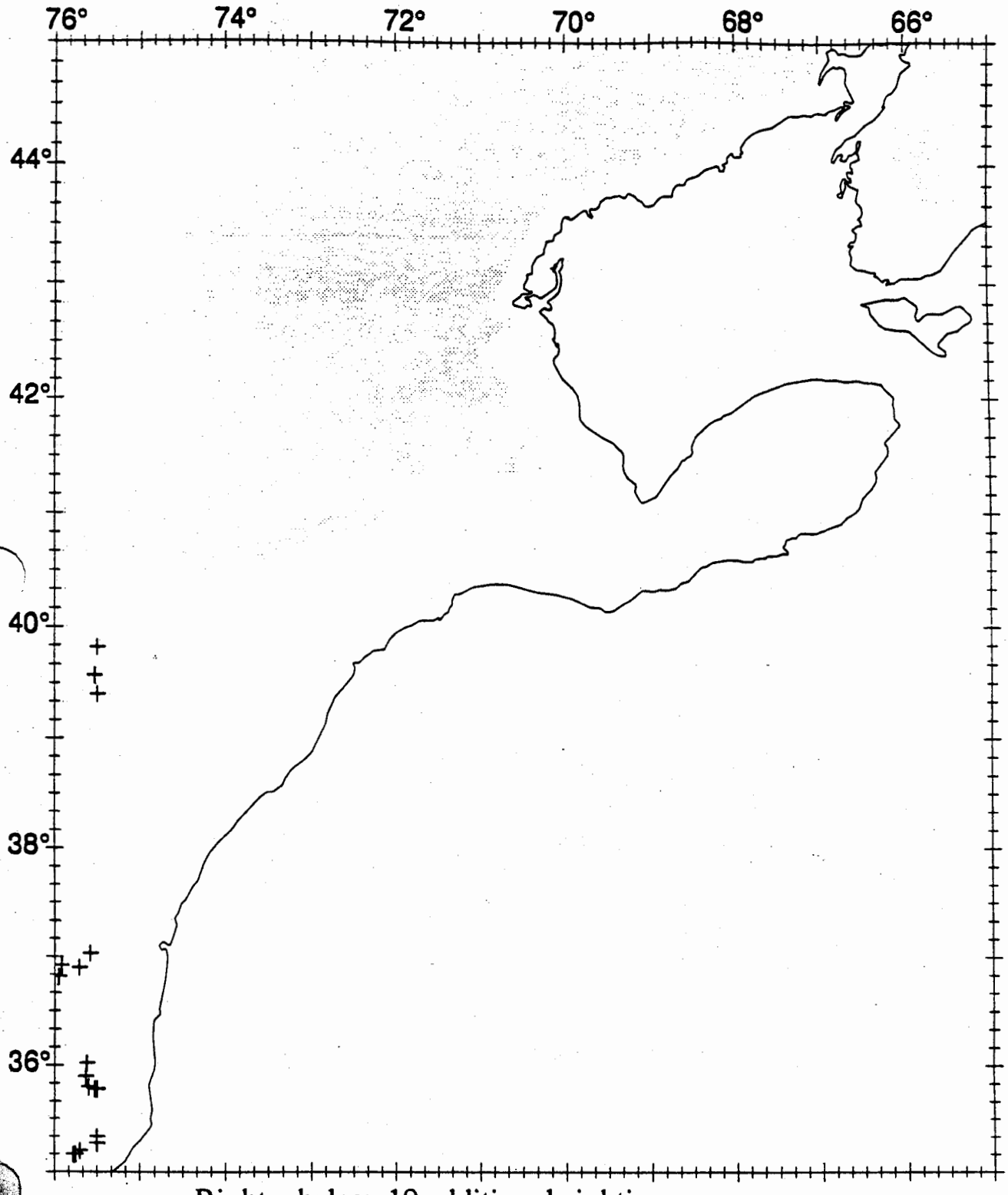
Right whales: July, August, September



Humpback whales: All data



Right whales: October, November, December



Right whales: 19 additional sightings
previously omitted from W of 75 30

Additional Right Whale Sightings Information for Large-whale TRT 18-19 November 1996

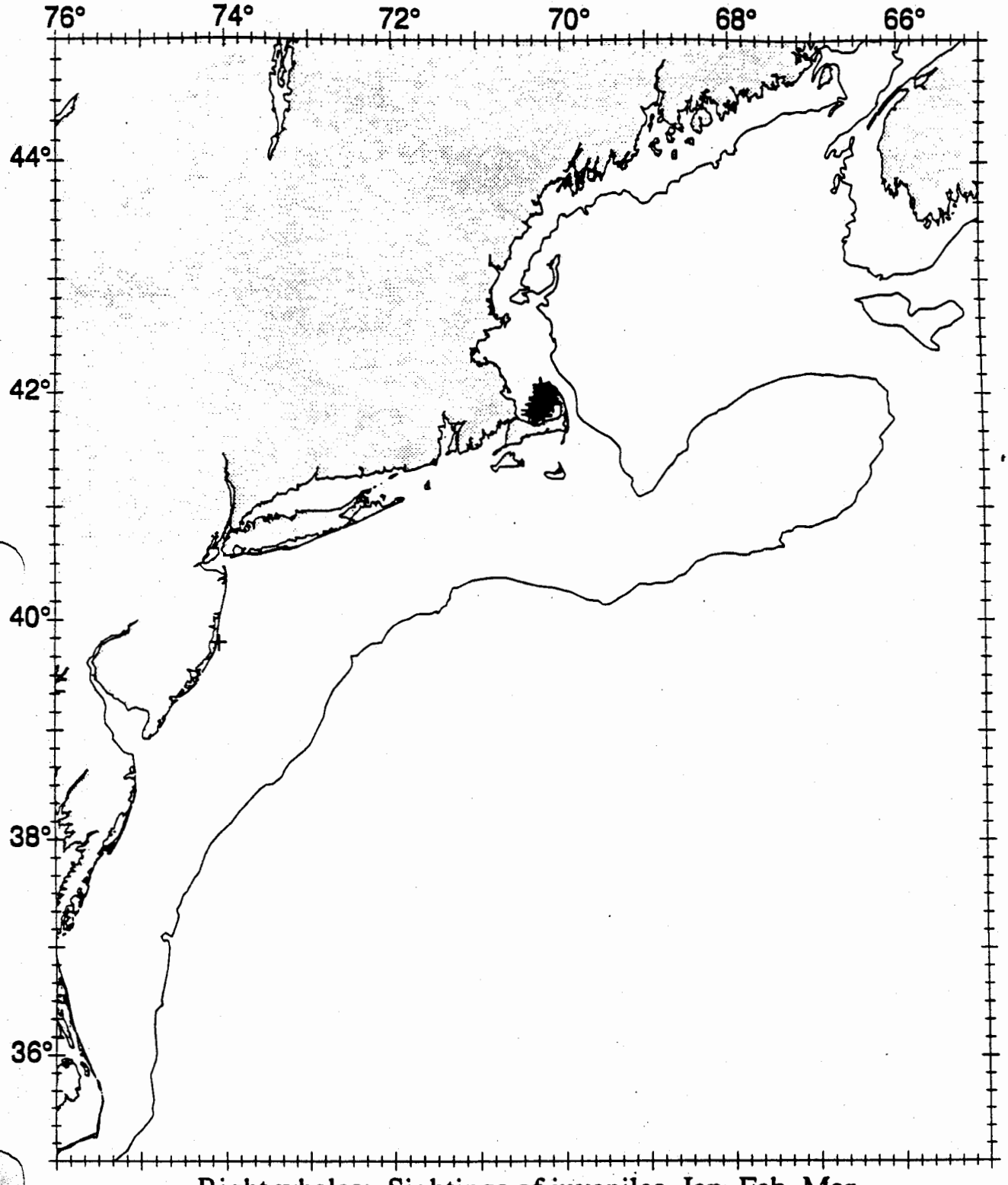
J. Hain
NEFSC/NMFS
Woods Hole, MA 02543

Contents:

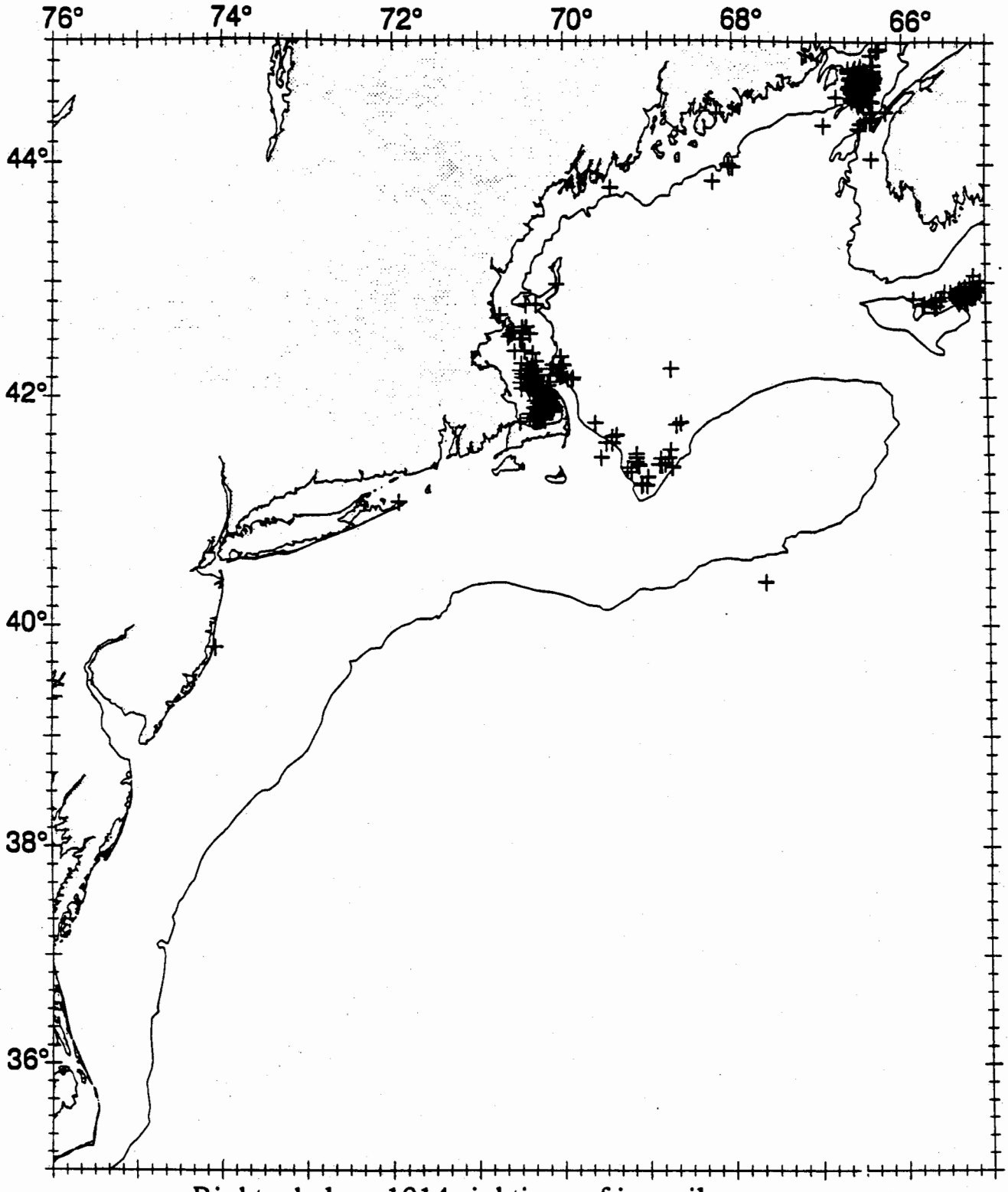
1. 19 sightings from W of 75°30', previously omitted
   (1-3 per month for every month except Jul, Aug, Sept)

2. 1,014 sightings of juveniles (age 1,2, & 3)

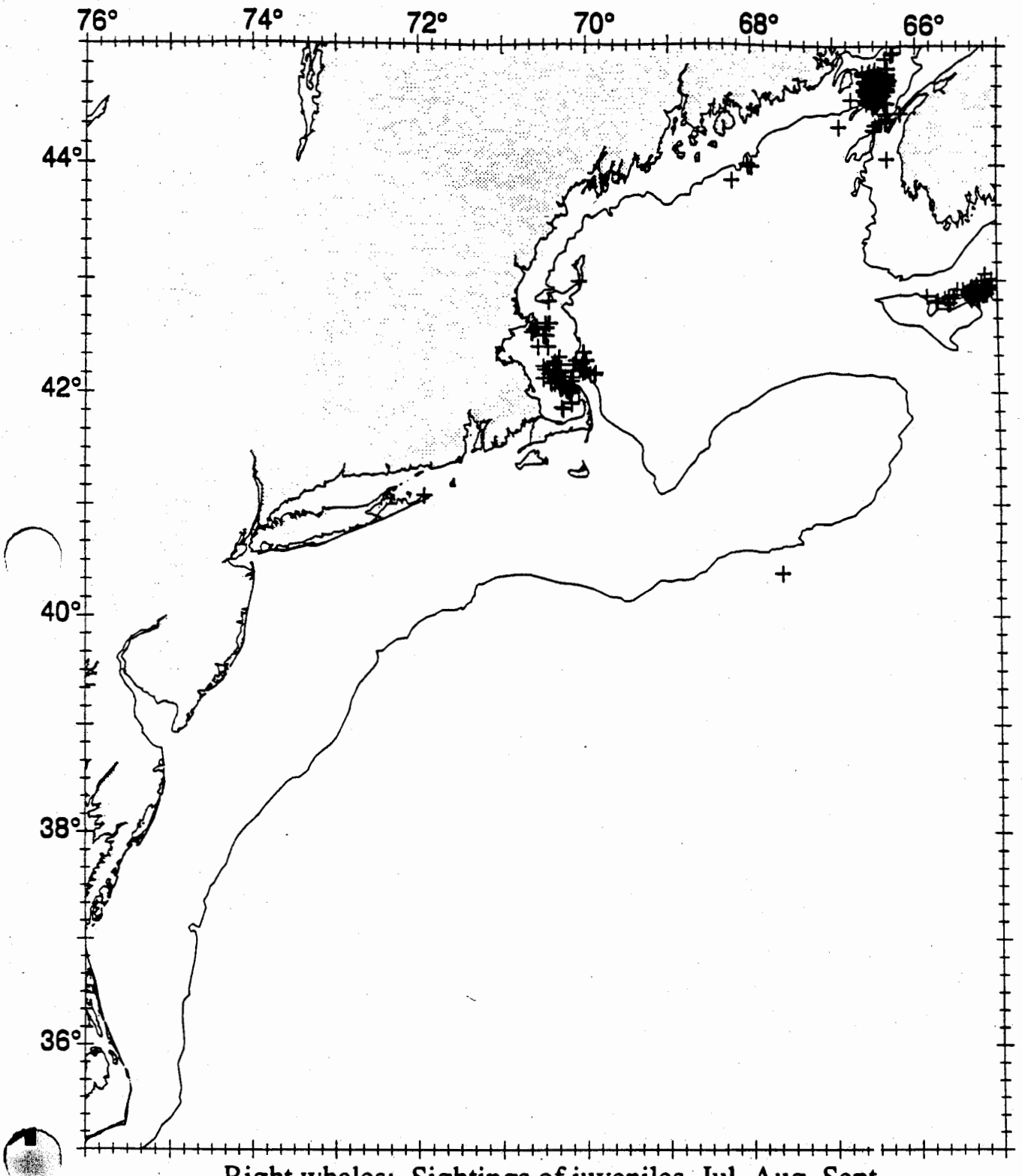
3. Sightings of juveniles by quarter



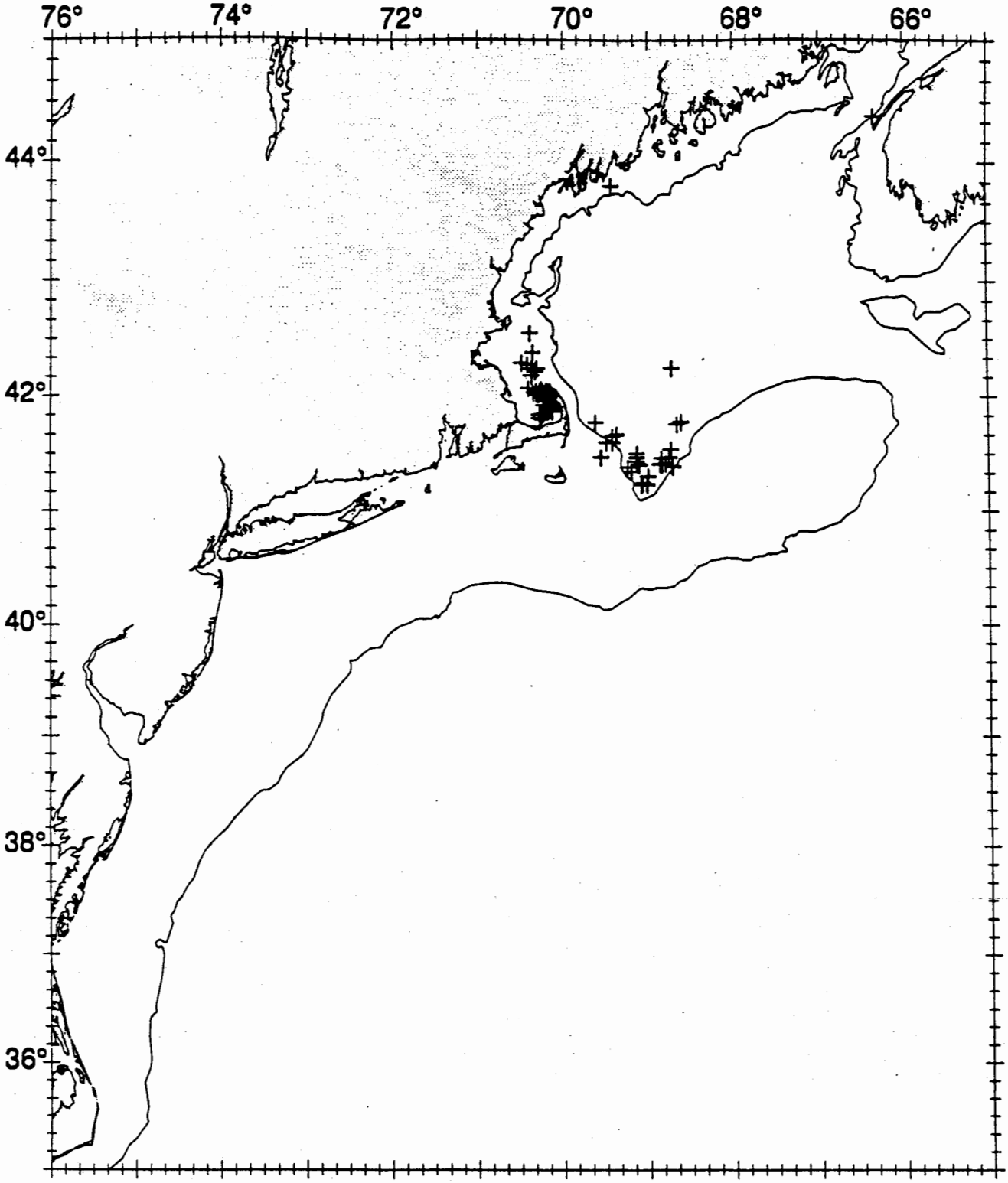
Right whales: Sightings of juveniles, Jan, Feb, Mar
(sightings distribution influenced by sighting effort)



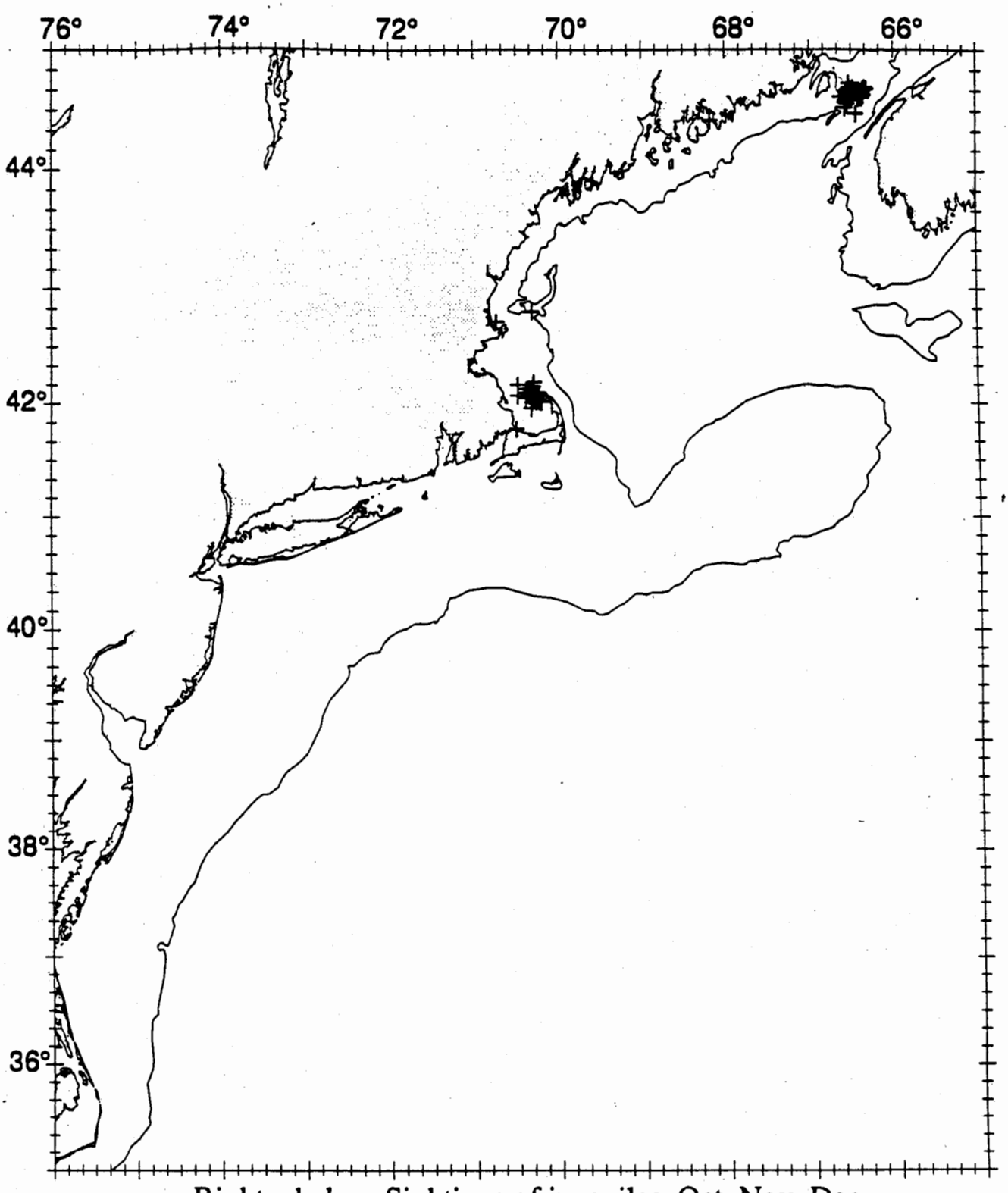
Right whales: 1014 sightings of juveniles
(sightings distribution influenced by sighting effort)



Right whales: Sightings of juveniles, Jul, Aug, Sept
(sightings distribution influenced by sighting effort)



Right whales: Sightings of juveniles, Apr, May, June
(sightings distribution influenced by sighting effort)



Right whales: Sightings of juveniles, Oct, Nov, Dec
(sightings distribution influenced by sighting effort)

APPENDIX 10

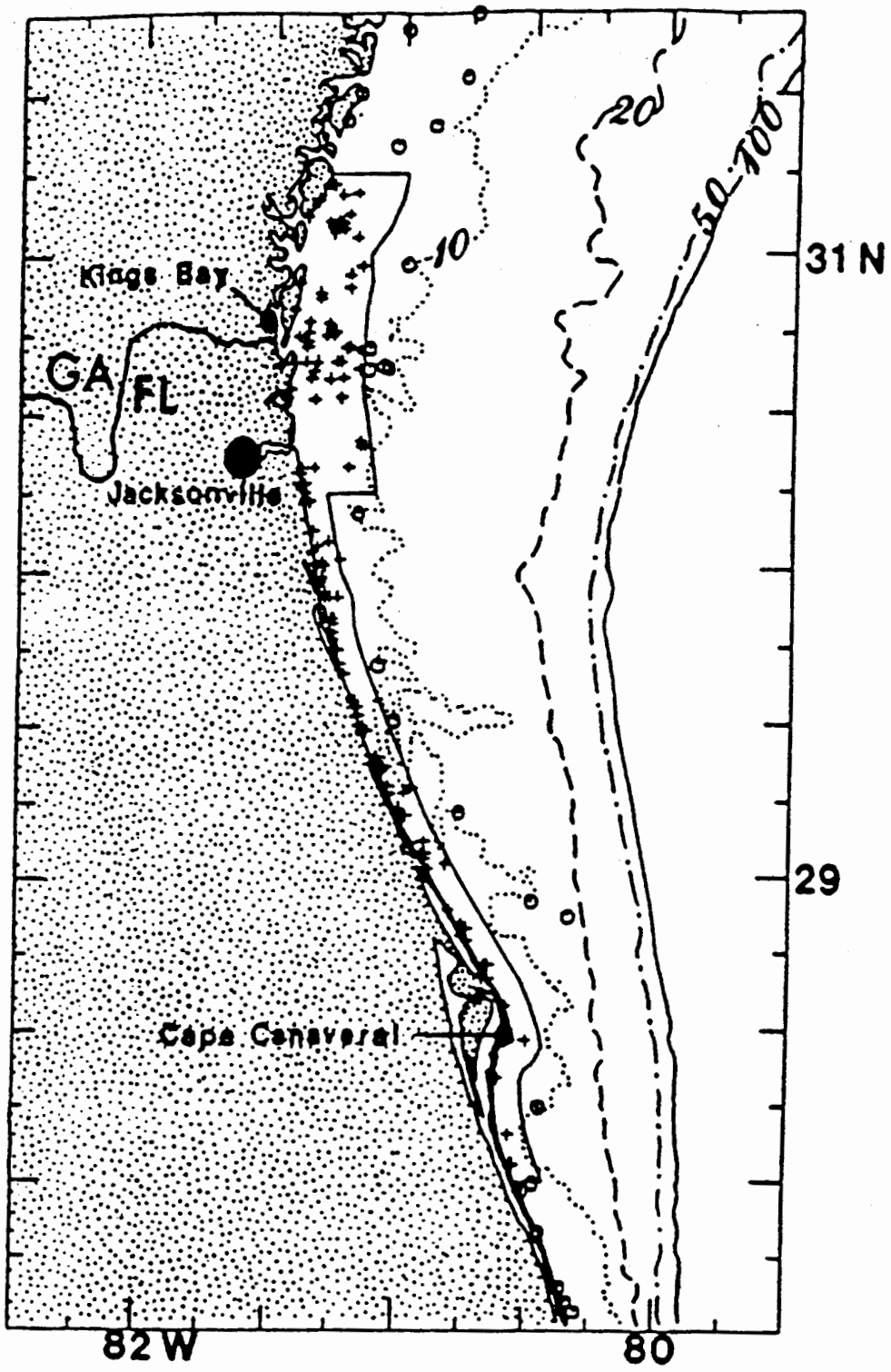
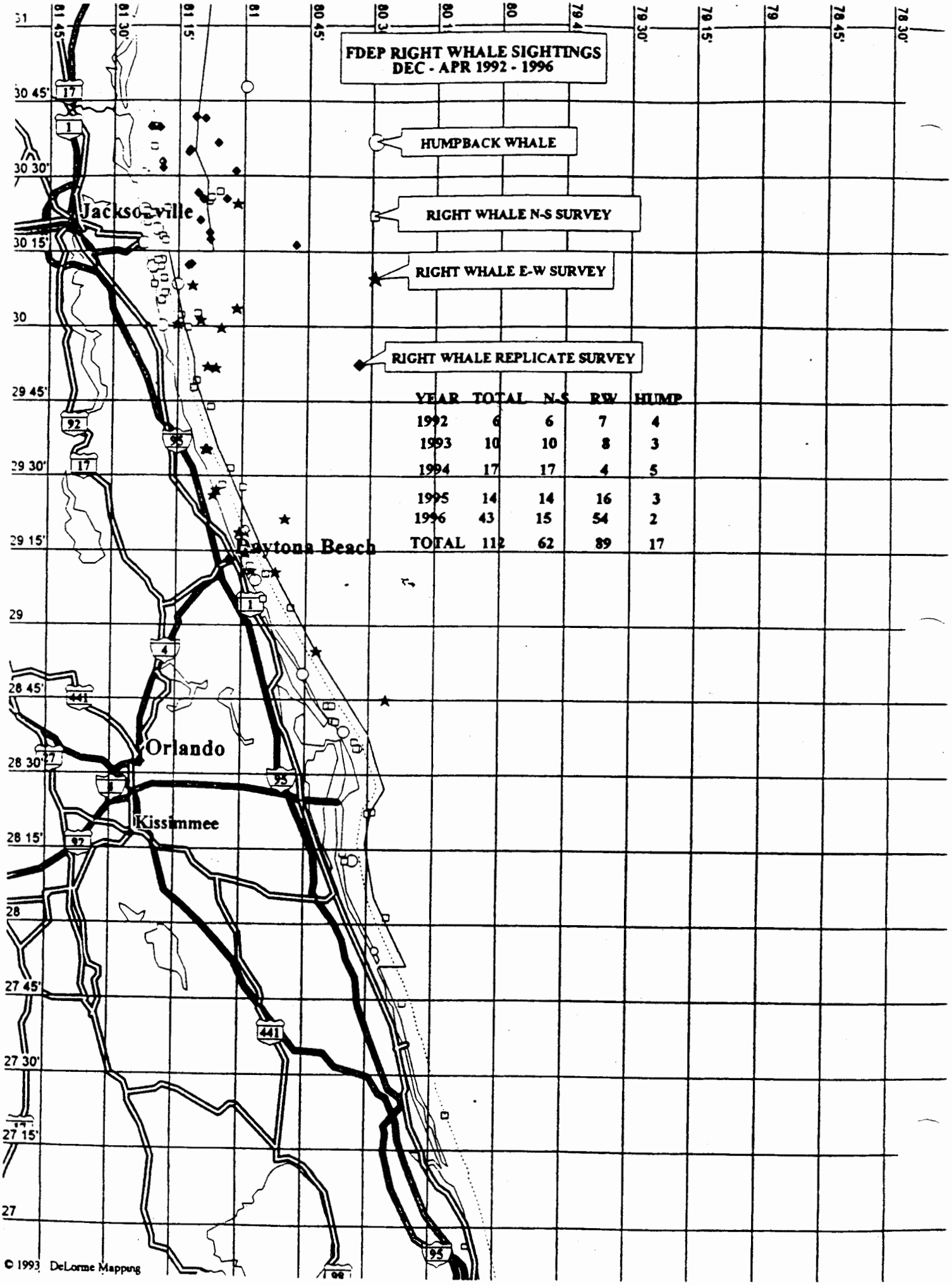


Figure 1. All right whale sightings in and near the proposed southeastern United States critical habitat between 1950 and 1989. Sightings within the proposed critical habitat are shown by '+'; sightings outside by 'o'. Bathymetry shown is in fathoms; N=303 sightings. The proposed critical habitat is defined in terms of distance from shore.



YEAR	TOTAL	N-S	RW	HUMP
1992	6	6	7	4
1993	10	10	8	3
1994	17	17	4	5
1995	14	14	16	3
1996	43	15	54	2
TOTAL	112	62	89	17

APPENDIX 11

Areas of Potential Interaction Between the Sink Gillnet Fishery and Right and Humpback Whales

J. Hain and L. Hendrickson
Large-whale TRT meeting
8-10 January 1997
(rev. 1/6)

For the purposes of the final Take Reduction Plan, this material contains summary material only, extracted from the full report (i.e., not all tables and figures are included).

Objective

Using the best available data, identify areas where right and humpback whales are most likely to co-occur with sink gillnet fishing gear

Methodology

Right whale sightings. Analyses were based on 9,778 sightings between 35 00 and 45 00 N latitude and 65 00 and 76 00 W longitude from the University of Rhode Island's Right Whale Consortium database.

Humpback whale sightings. Analyses were based on 2,026 sightings between 35 00 and 45 00 N latitude and 65 00 and 76 00 W longitude from the University of Rhode Island's Right Whale Consortium database; 272 sightings from the Years of the North Atlantic Humpback (YONAH) program Gulf of Maine cruises; and 351 sightings from the data gathered by Manomet observers aboard NEFSC/NMFS groundfish surveys. The total number of sightings included in the analyses was 2,649.

Fishing Effort. Several measures of sink gillnet fishing effort were retrieved from the NEFSC commercial weighout database for the time period 1991-1993 in order to prepare monthly effort distribution maps. Effort mapping variables included days fished, days absent, and total number of trips. Days fished (based on a 24-hour clock) represents gear soak time (in tenths of hours) and days absent represents the days that a vessel was not in port and presumably fishing. The total number of trips is represented for tonnage vessels only since vessels less than 5 GRT which fished in Federal waters did not have to obtain Federal fishing permits until 1994. We focused our analyses on the time period 1991-1993 since the number of sink gillnet vessels and number of trips remained fairly constant during this time, whereas prior to and following this time period the number of trips and vessels appear to gradually increase. In addition, use of the 1991-1993 data satisfied our objective of defining the maximum spatial extent of sink gillnet effort. After 1993, a decrease in the size of the overall sink gillnet fishing area would have been likely due to the 1994 exclusion of this gear type in several closure areas. Furthermore, we prepared a series of

annual maps which indicated that spatial trends in sink gillnet effort during 1991-1993 were similar and were not atypical. Therefore, the three years of data were combined to produce monthly effort distribution maps.

Identification of potential interaction areas. An Arc/Info geographic information system (GIS) was used to map monthly trends in the spatial distribution of sink gillnet effort by quarter-degree square. These 'quarter-degree squares' are defined as four squares to one degree of latitude and longitude and are 30 x 30 minutes in size. Quarter-degree squares represent the best degree of spatial resolution available in the weighout database for mapping the distribution of sink gillnet effort from all trips (interviewed and uninterviewed trips). The number of days fished was summed over all trips taken within each quarter-degree square, during the three-year study period, and mapped by month. An average, monthly quartile range was computed for the twelve-month effort time series. This quartile range was used to shade the quarter-degree squares for each month in order to scale all months similarly for the purpose of month-to-month map comparisons. Each of the four quartile ranges represent approximately 25% of the effort observations. The point locations of whale sightings during each respective month, for right and humpback whales separately, were also plotted on these effort maps and the number of individual whales at each sighting location was indicated. Quarter-degree squares which contained ten or more individuals of either whale species (summed over all years for the sightings data used) and in which the effort exceeded 3 days summed over the 3-year 1991-1993 period (maximum value in lowest quartile range) were identified as potential whale-sink gillnet interaction areas and were shaded with horizontal lines as shown on the enclosed maps. Maps showing the monthly distribution of the two other meaures of effort, days fished and number of trips, are not presented herein. However, these maps exhibited temporal and spatial effort trends similar to those apparent in the monthly maps of days fished, thereby corraborating the use of the latter measure of effort to determine whale-sink gillnet interaction areas.

Results

Tables 1 and 2 show the number of whale sightings and number of individuals by year. In the case of right whales, most data are from 1979-1995, and for humpback whales most data are from 1977-1993. Figures 1-12 show the potential interaction areas for right whales, by month, using the criterion described above, and Figures 13-25 show the potential interaction areas for humpback whales by month. These potential interaction areas are summarized in Tables 3,4 and 5 by quarter-degree square and month. Should the Team desire to examine potential interaction areas using only the upper two quartiles (50-100% of the effort observations) of fishing effort, Table 6 presents a summary of the number of potential interaction areas by month and quartilelisting of quartiles by month. The monthly plots can correspondingly be re-evaluated.

Interpretation Considerations

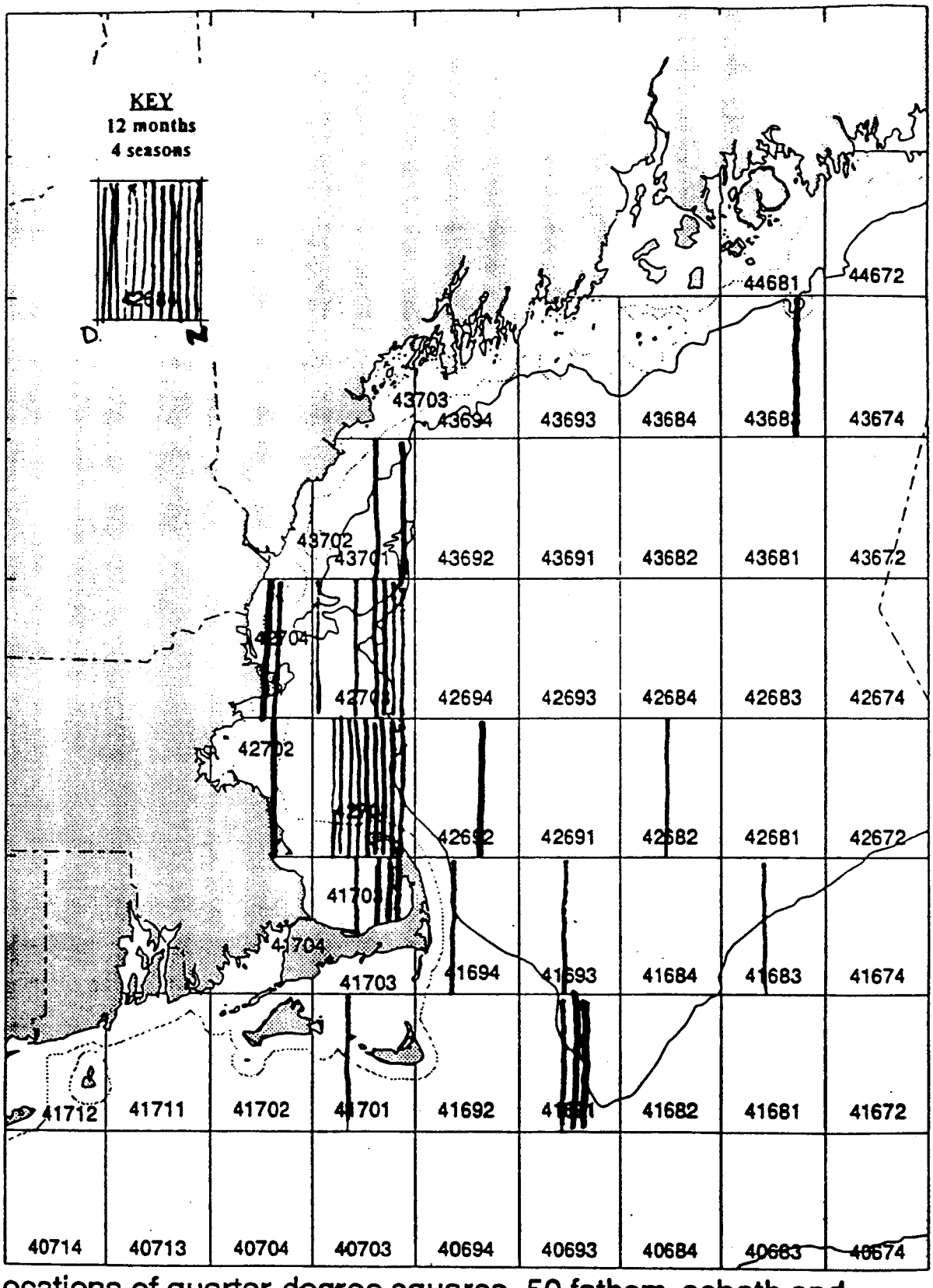
Whale sightings. These sightings data are uncorrected for sighting effort, and the plotted

sightings distributions to some measure reflect sighting effort. In general, sighting effort is greatest in a number of research-intensive areas (Cape Cod and Massachusetts bays, Great South Channel, and the Bay of Fundy). While some general patterns may exist, there is intra- and inter-annual variability in distribution and abundance for given times and areas.

Whale movements. As demonstrated by Mate et al. (1992), Slay et al. (1996), and Goodyear et al. (TRT presentation, 19 November 1996) whales may undertake wide-ranging movements within and between habitats.

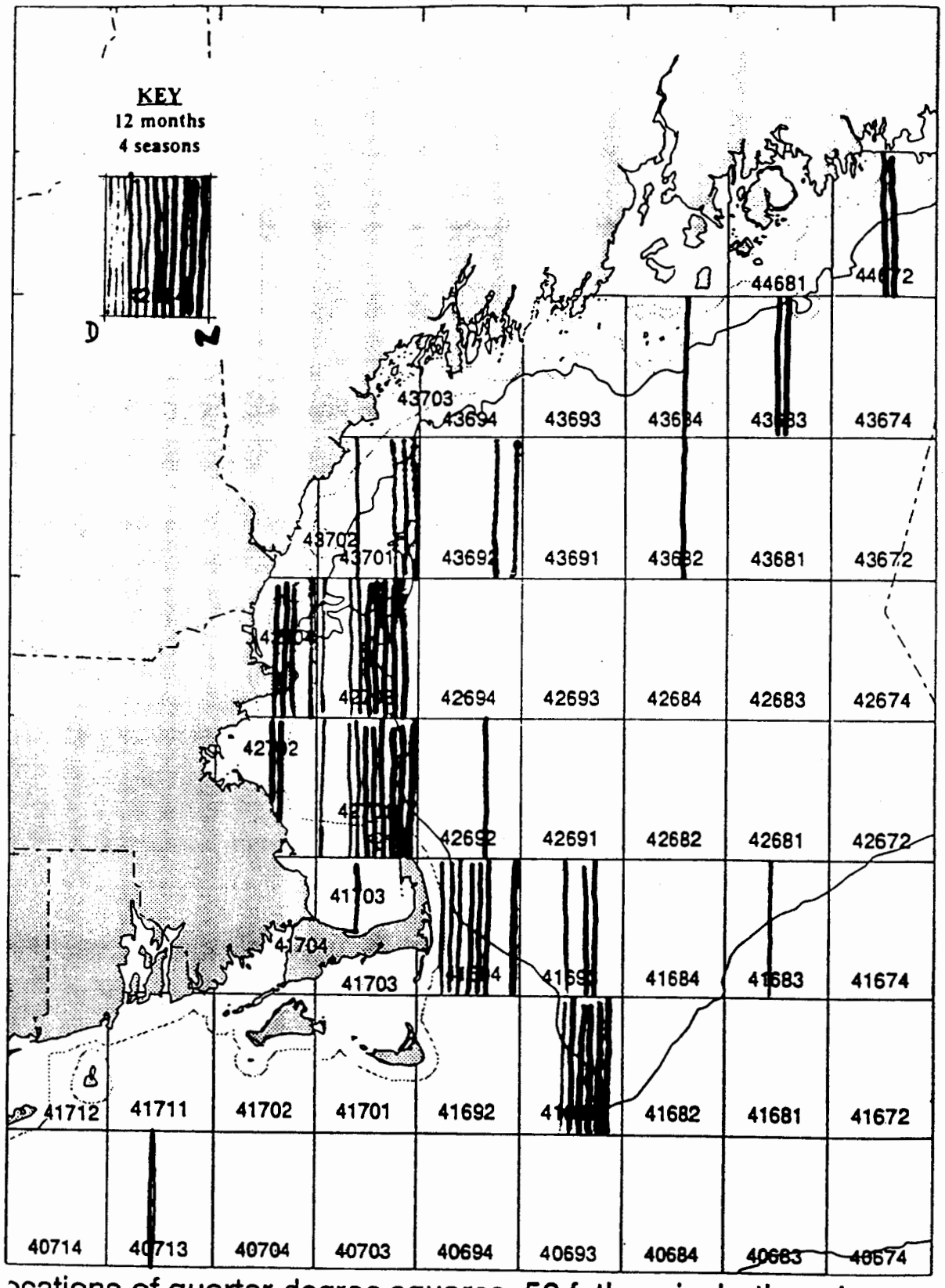
Fishing effort. These effort maps indicate general trends in the spatial distribution of sink gillnet effort. A large portion of this effort data represents uninterviewed trips, for which effort and fishing location data are determined by port agents based on their knowledge of fishing vessel patterns. Only a small fraction of the day boat trips which occurred in state waters were interviewed by port agents. During interviews, effort and fishing location data is obtained, by ten-minute square, from fishing vessel captains. Two areas not well-addressed by these analyses are: a.) effort in state waters and b.) quarter-degree squares with no fishing effort indicated and ten or more whales present. Observed sea sampling trips and additional state effort data in these areas can be examined. All quarter-degree squares with ten or more whales, by month, are appended for use in selecting squares for further examination.

RIGHT WHALES: Potential interaction areas with sink gillnet fishery based on sightings of 10 individuals summed over all data years and fishing effort summed over years 1991-93 indicated by color-coded bars corresponding to season and month (see key).



Locations of quarter-degree squares, 50 fathom .sobath and three-mile boundary line.

HUMPBACK WHALES: Potential interaction areas with sink gillnet fishery based on sightings of 10 individuals summed over all data years and fishing effort summed over years 1991-93 indicated by color-coded bars corresponding to season and month (see key).



Locations of quarter-degree squares, 50 fathom isobath and three-mile boundary line.

Table 5. Quarter degree squares by month, where 10 or more whales were sighted and sink gillnet effort exceeded 3 days fished. Shaded squares highlight areas where both humpback and right whales co-occured and fishing effort was in top three quartiles.

RIGHT AND HUMPBACK WHALES

SQ	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct.	Nov	Dec
Southwest Gulf of Maine												
43692 *									H		H	
43701					H		R		H	RH	H	
42704							RH	RH	H		H	
42703				H	RH	H	RH	RH	RH	RH		RH
42702							H	RH				
42701		R	R	RH	RH	RH	RH	RH	RH	RH	H	H
41703					RH			R	R	R		
Great South Channel												
42692							RH					
42682+					R							
41694			H	H	RH	H	H	H			H	
41693					RH		H	H				
41691					RH	RH	RH	H	H	H		
41683					RH							
Northwest gulf of Maine												
44672 *							H	H				
43683						H	H		R			
43684 *							H					
43682*							H					
South of Martha's Vineyard												
40713*						H						
41701+				R								

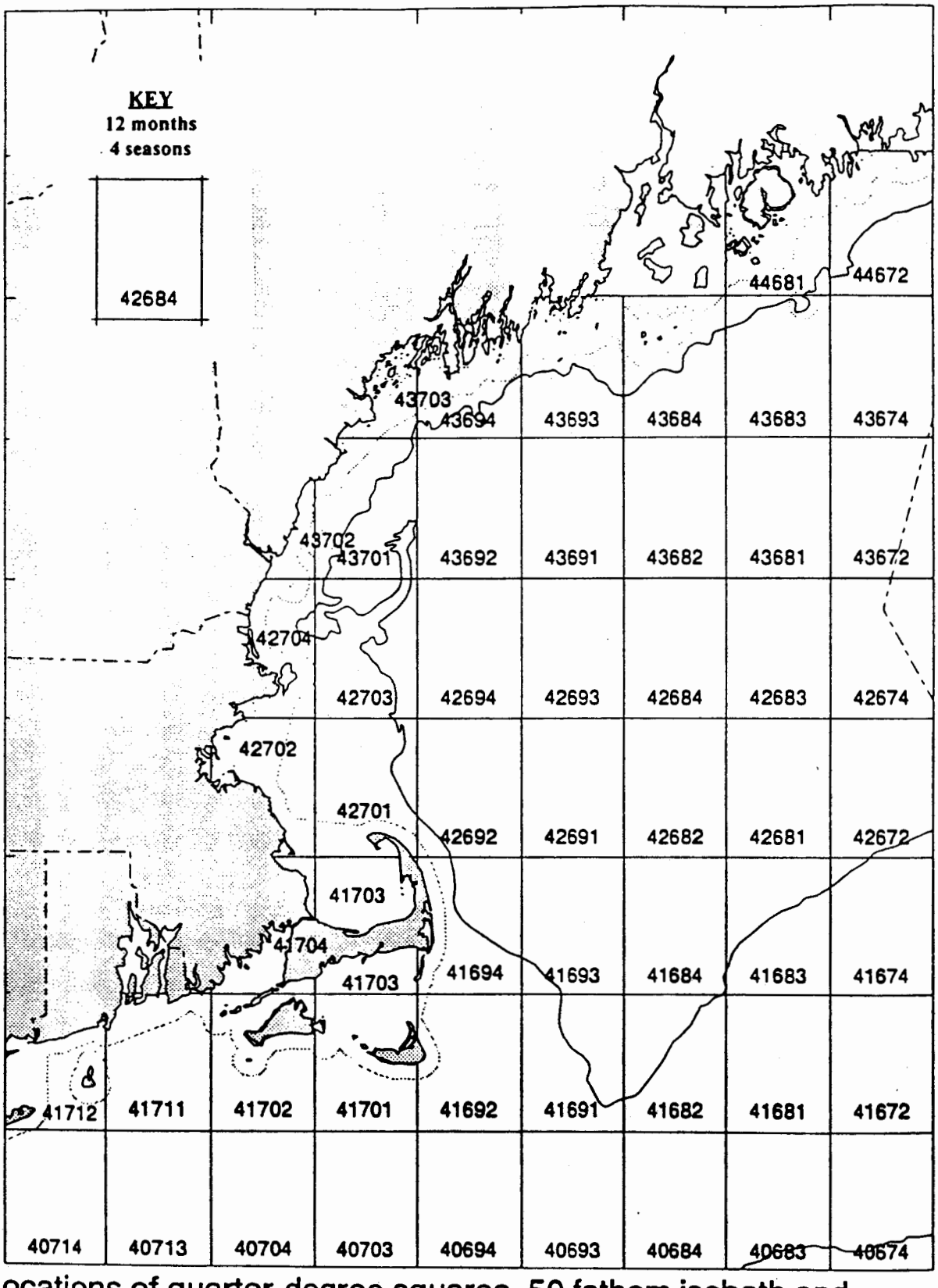
+ Squares unique to right whales, no humpbacks reported

* Squares unique to humpback whales, no right whales reported

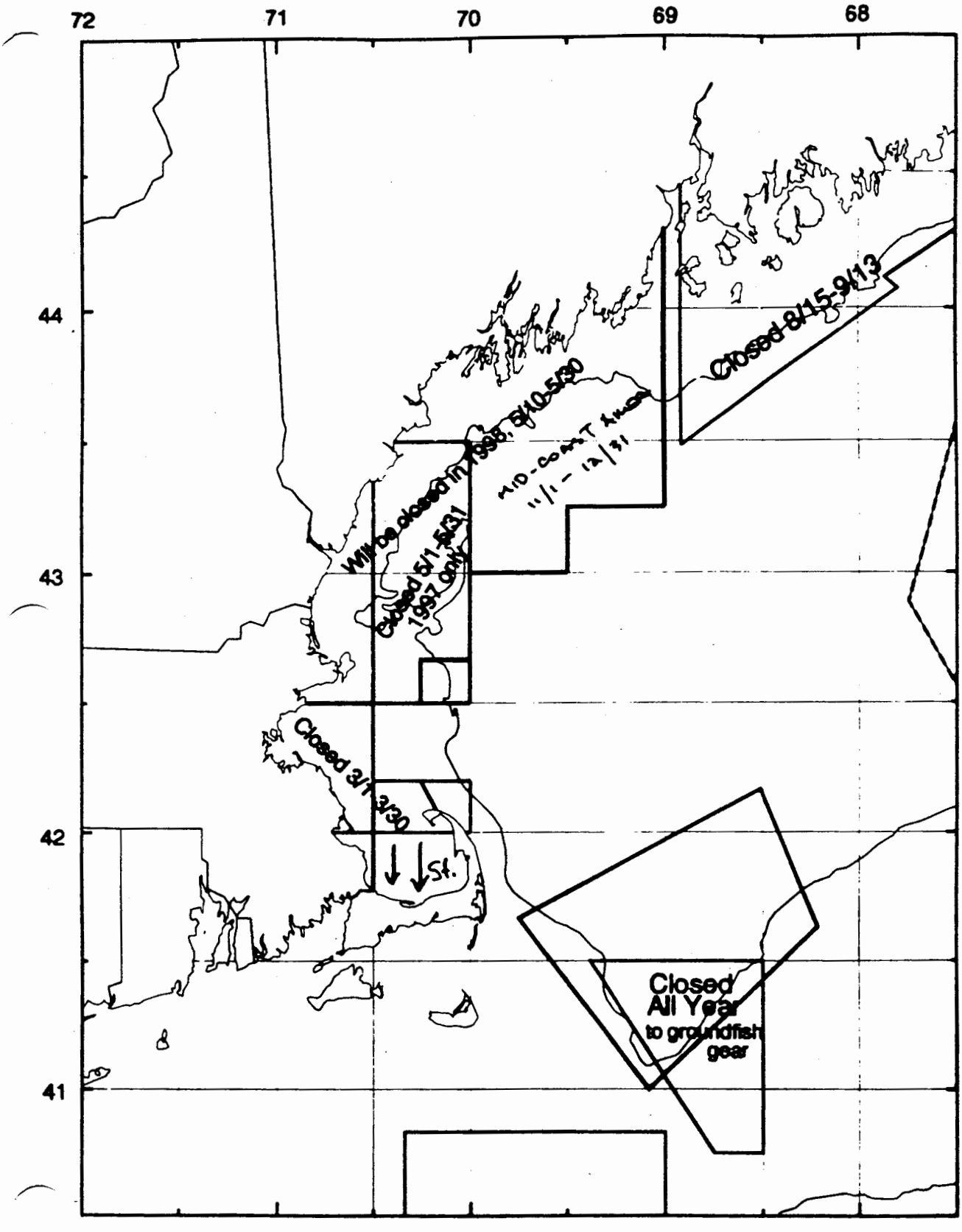
Table 6. Potential interaction areas with monthly breakout for top three quartiles of fishing effort, along with summaries for top two and all three.

	Quartile			Top 2 quartiles	Top 3 quartiles
Right whales	1	2	3		
Jan				0	0
Feb			1	0	1
Mar			1	0	1
Apr		1	1	1	2
May	3	1	4	4	8
June	1	1		2	2
July	4	1		5	5
Aug	4	1		5	5
Sept	2	2		4	4
Oct	3	1		3	4
Nov				0	0
Dec	1			1	1
Subtotal	18	8	7	25	33
Humpback whales					
Jan				0	0
Feb				0	0
Mar		1		1	1
Apr	1	2		3	3
May	4		4	4	8
June	4	1	1	5	6
July	8	2	2	10	12
Aug	6	1	1	7	8
Sept	4	1	1	5	6
Oct	2	1	1	3	4
Nov	5			5	5
Dec	1	1		2	2
Subtotal	35	10	10	45	55

BLANK CHART FOR REFERENCE



Locations of quarter-degree squares, 50 fathom isobath and three-mile boundary line.



Locations of closure areas (black) and right whale critical habitat areas (purple).

APPENDIX 12

Analysis of Northern Right Whale Serious Injury/Mortality Entanglements Relative to PBR (PBR = 0.4 per year)

(Revised 27 January 1997)

Five-Year (1991-1995) Average Annual Per Fishery Take in U.S. Waters

Fishery	Average*	Range*	Minimum % of PBR
Sink Gillnet	0	N/A	0 %
Lobster	0.40	(0-2)	100 %
Mid-Atlantic Gillnet	0	N/A	0 %
Shark Net	0.20	(0-1)	50 %
Unknown/Other**	0.60	(0-2)	150 %

Ten-Year (1987-1996) Average Annual Per Fishery Take in U.S. Waters

Fishery	Average*	Range*	Minimum % of PBR
Sink Gillnet	0	0	0 %
Lobster	0.30	(0-2)	75 %
Mid-Atlantic Gillnet	0	0	0 %
Shark Net	0.10	(0-1)	25 %
Unknown/Other**	0.40	(0-2)	100 %**

* ***These numbers are absolute minimum numbers which cannot be extrapolated to total estimates of serious injury and mortality for any of the above fisheries.***

** ***Does not include non-U.S. fisheries or other types of human interactions such as vessel strikes. Most of these entanglements involved "unknown" gear rather than "other" gear.***

Analysis of Humpback Whale Serious Injury/Mortality Entanglements Relative to PBR (PBR = 9.7 per year)

(Revised 27 January 1997)

Five-Year (1991-1995) Average Annual Per Fishery Take in U.S. Waters

Fishery	Average*	Range*	Minimum % of PBR
Sink Gillnet	1.8	(0-4)	19 %
Lobster	1.6	(0-4)	16 %
Mid-Atlantic Gillnet	0.4	(0-2)	4 %
Shark Net	0	N/A	0 %
Unknown/Other**	4.8	(5-8)	49 %

Ten-Year (1987-1996) Average Annual Per Fishery Take in U.S. Waters

Fishery	Average*	Range*	Minimum % of PBR
Sink Gillnet	1.2	(0-4)	12 %
Lobster	1.5	(0-4)	15 %
Mid-Atlantic Gillnet	0.3	(0-2)	3 %
Shark Net	0	N/A	0 %
Unknown/Other**	4.2	(1-8)	43 %

* ***These numbers are absolute minimum numbers which cannot be extrapolated to total estimates of serious injury and mortality for any of the above fisheries.***

** ***Does not include non-U.S. fisheries or other types of human interactions such as vessel strikes. Most of these entanglements involved "unknown" gear rather than "other" gear.***

APPENDIX 13

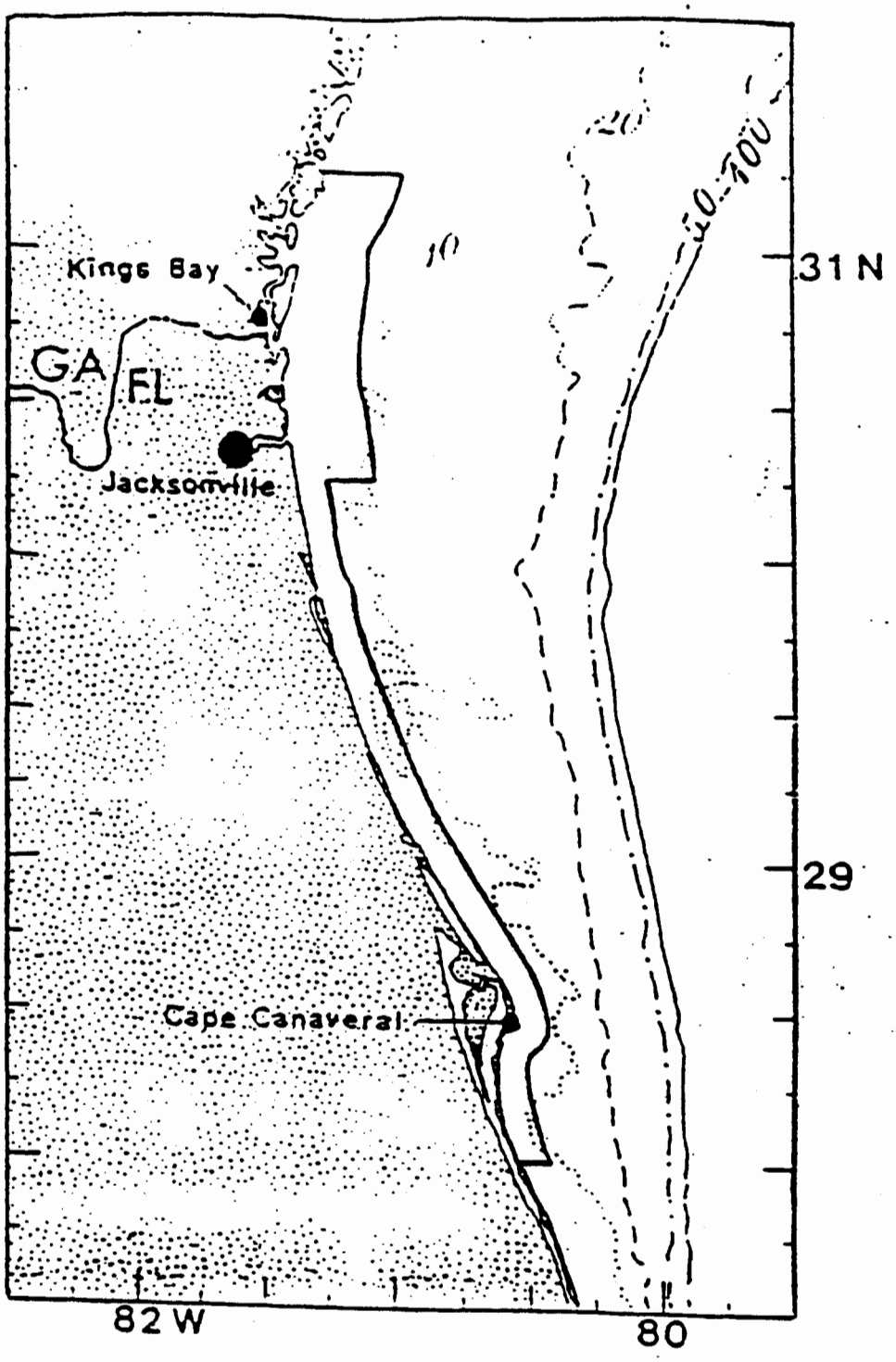


Figure 8. The area designated as critical habitat in the Southeastern United States includes waters between 31°15'N (approximately located at the mouth of the Altamaha River, GA) and 30°15'N (approximately Jacksonville, FL) from the shoreline out to 15 nautical miles offshore, and the waters between 30°15'N and 28°00'N (approximately Sebastian Inlet, FL) from the shoreline out to 5 nautical miles.

[FR Doc. 94-13500 Filed 6-2-94; 8:45 am]
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APPENDIX 14

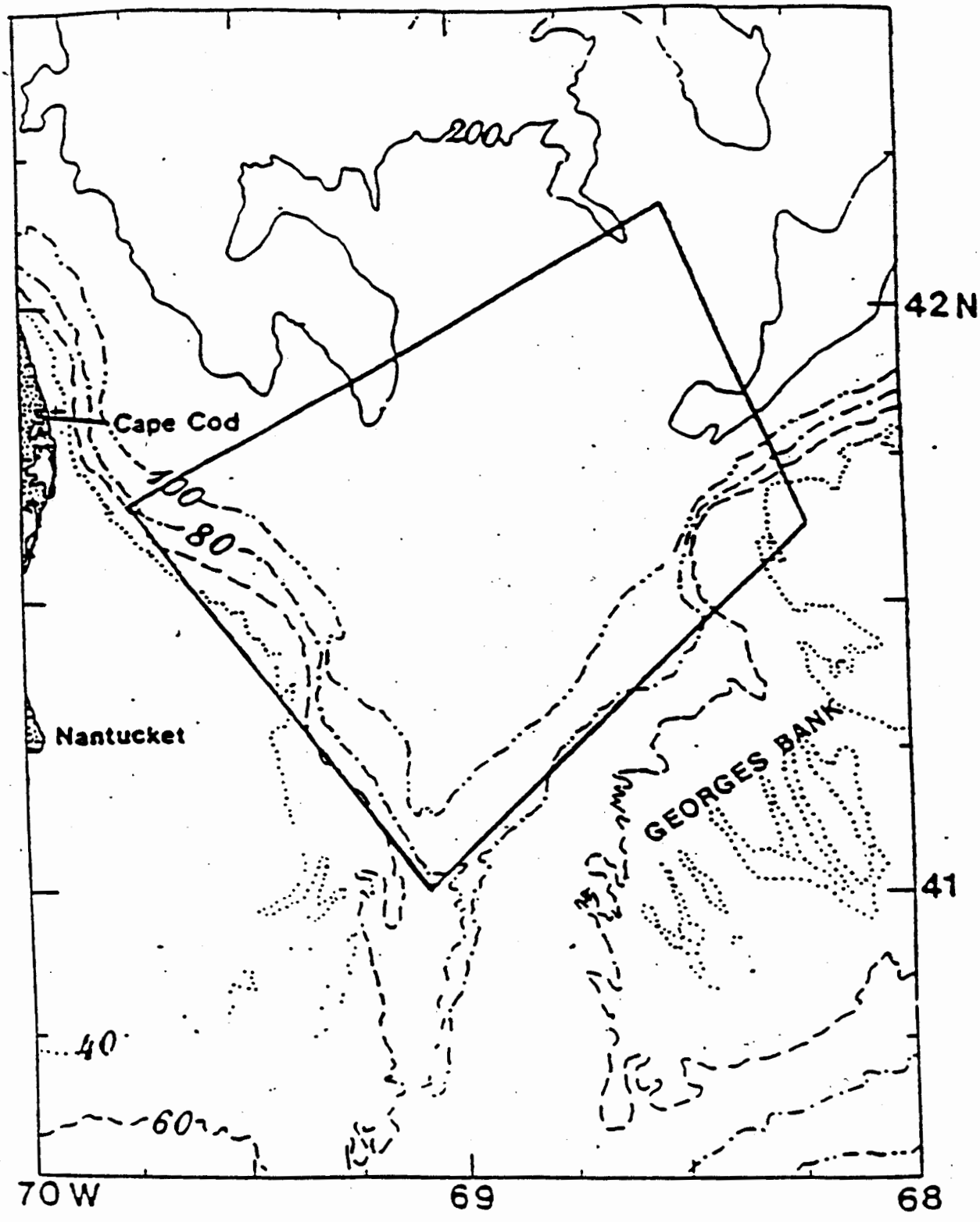


Figure 6. The area designated as critical habitat in the Great South Channel includes the area bounded by 41°40'N/69°45'W; 41°00'N/69°05'W; 41°38'N/68°13'W; and 42°10'N/68°31'W.

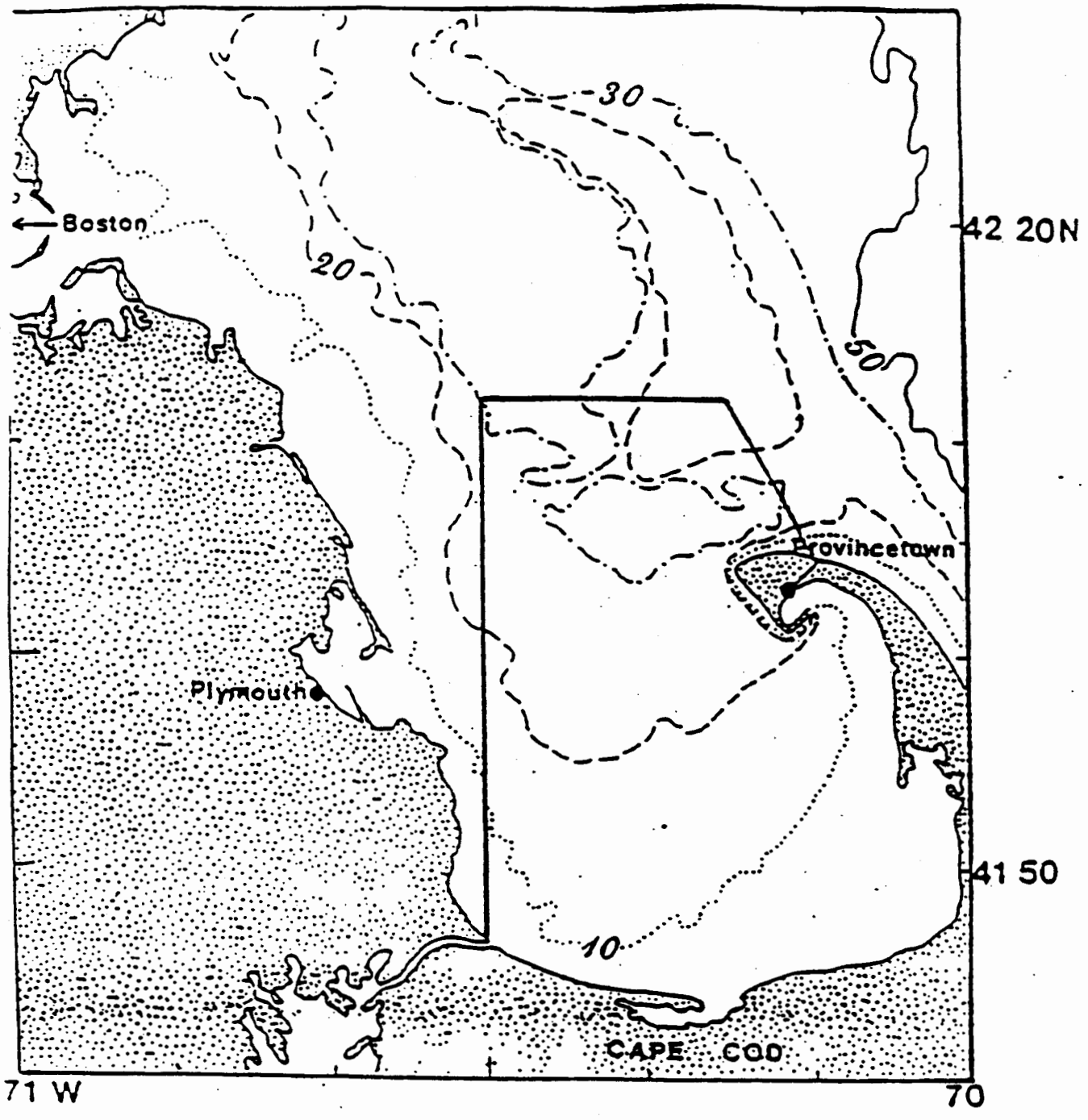


Figure 7. The area designated as critical habitat in Cape Cod Bay/Massachusetts Bay includes the area bounded by 42°04.8'N/70°10'W; 42°12'N/70°15'W; 42°12'N/70°30'W; 41°46.8'N/70°30'W; and on the south and east by the interior shore line of Cape Cod, MA.

Brief Review of Duties and Authorities Relevant to Whale Conservation

The Endangered Species Act (ESA or Act) - 16 U.S.C. 1531-1543; Public Law 93-205, as amended - was enacted in 1973 to provide for the conservation of species which are in danger of extinction throughout all or a significant portion of their range. The National Marine Fisheries Service (NMFS) has jurisdiction under the ESA for marine species.

The Act provides that anyone may petition to have a species (here defined by the ESA as a species, a subspecies, or, for vertebrates only a distinct population) considered for listing as endangered or threatened, which provides increased protective measures. Within 90 days of a listing petition's filing, an agency decision is made to reject or accept the petition. If accepted a status review of the species is conducted with a public solicitation of information and data concerning the species. An important consideration for a listing decision is the determination of the abundance threshold for threatened and endangered status, and determination of the cause for decline. The agency may also propose a listing on its own without a petition.

Economic considerations are legally not relevant to the listing decision; the decision is made solely on the basis of the best biological data available. Generally, a one-year time limit is placed on the decision to propose listing.

A species must be listed if it is found to be threatened or endangered on any of the following five factors:

* present or threatened destruction, modification, or curtailment of its habitat or range;
* over utilization for commercial, recreational, scientific, or educational purposes;
* disease or predation;
* inadequacy of existing regulatory mechanisms; and
* other natural or manmade factors affecting its continued existence.

At the same time that species is considered for listing, critical habitats believed necessary for the continual survival of species are designated. For this decision, economic impacts must be considered. If insufficient information is available to designate critical habitats at the time of listing, the agency may take an additional year to identify the area. The Secretary may revise such designations on the basis of the best scientific data available (Section 4a)(3) and (b)(2) as he deems appropriate or in response to petitions. Thus, in regard to whales, those without can receive such designations and those with designated habitat could see that habitat revised.

With regard to critical habitat, the statute requires in section 7 (a)(2) that each agency, in consultation with the Secretary, to insure that any agency action, (such as the granting of permits to fish,) will not be likely to result in adverse modification of critical habitat. Some have collapsed this duty into the duty not to jeopardize but although related, it is a separate duty. Unlike incidental taking, the statute does not provide for incidental modification of critical habitat as the duty to avoid it is on the agency and not private parties. The question then becomes what level or nature of permitted modification is

actually adverse and if determined to be adverse, whether to eliminate it or seek an exemption from the Act through the exemption committee process which is rarely used.

Once a species is listed, the Secretary must review the status of the species at least every five years, to see whether it should be reclassified or delisted (4 (c). For those with recovery plans, every two years the Secretary must report to the Congress on their status as part of a report on the recovery planning and implementation process required by the 1988 amendments to Section 4(f).

Section 4(f) requires that the Secretary develop and implement a recovery plan unless he finds that it will not promote the recovery of the species. The 1988 amendments provided for more public input into recovery plans and required a report to Congress every two years on the progress of planning and implementing recovery and the status of species subject to them.

Section 5 requires the Secretary (defined in section 3 as the Secretary of Interior or Commerce depending on which has jurisdiction over the species) to develop and implement a program for the conservation of fish, wildlife, and plants. By 1980 this section had been amended so as to include all fish, wildlife and plants and not just those listed under the ESA. The Secretary is instructed to use land acquisition and an array of other authority to implement the program. This broad conservation mandate has virtually never been used but could be used in conjunction with other authority to "get ahead of the curve" and plan in cooperation with state and local interests for the conservation of biological diversity generally while management options are numerous.

Section 6 authorizes a match of federal money at the rate of 75% or 90% when two states are involved with state money for the conservation of listed species in cooperation with states whose legal and technical capacity is found each year to be adequate to carry out conservation management programs. In 1988, Congress greatly increased the size of the fund but the Congress has not increased the appropriation to reflect the amount authorized – approximately $20 million per year at this point. The amount authorized is based on an indexing to the Federal aid to wildlife restoration fund and the Dingell-Johnson Sport Fishing Restoration Account. However, the Secretary of the Interior has general jurisdiction over most of the funds, and these funds have never been made available to NMFS.

Section 7(a)(1) requires that each Secretary review his or her programs and use them in furtherance of the ESA, and that all other federal agencies, in consultation with the Secretary (of Commerce in this case) use their authorities to carry out programs to further the conservation of listed species. Again, this is an underutilized element that could leverage considerable avoidance of harm, as well as positive work on behalf of whales through other agencies. NMFS may want to set up a schedule of consultations concerning 7(a)(1) and the duty of agencies to "carry out programs" to help implement recovery plans and carry out other actions on behalf of whales. Recovery plans could be revised with the interagency leverage of this section in mind as well.

Section 7(a)(2) requires consultation between agencies when agency actions or those permitted, funded, or carried out in whole or in part may affect a listed species to insure that no such action is likely to jeopardize the continued existence of the species. This of course reaches such actions as those undertaken by fishery management councils, the Navy, the Departments of Treasury and Transportation, etc. The only rulings on the merits also found that this duty also includes actions affecting listed species overseas (*Defenders v. Lujan*, 8th Cir., 1991) as expressly required under the original regulations of 1978. This, the MMPA, and the Pelly Amendment to the Fishermen's Protective Act of 1967 help reach actions such as those concerning the permits for importation of fish caught in Canadian waters where whales are found.

Section 7(b)(4) provides for incidental taking in a manner that has been somewhat less demanding than that required under section 10 for totally private or state driven actions that result in takings. Conservationists are urging the Congress to put stricter limits on both although the whale related provisions of the MMPA are less likely to be superseded.

On the cooperative side, Section 8 provides for agreements with other nations for the conservation of listed species. These include some financing, personnel sharing, investigative, and other cooperation and makes particular reference to the Western Hemisphere Convention and the Convention on Trade in Endangered Species.

Section 9 prohibits taking and other acts potentially harmful to listed species, such as the importation and sale of or the violating of regulations promulgated under the Act. The taking prohibition reaches US nationals, corporate citizens and agencies on the high seas as well as in US and state waters but not in the waters of another country, unlike Section 7's duty to consult, to avoid jeopardy and to avoid degrading critical habitat which by statute, but not by the current Reagan-era current regulations, can as noted above, reach US agency actions wherever they take place if they may affect listed species anywhere.

Section 10 provides for scientific and other similar permits under section 10(a)(1) and incidental taking permits under (2). The latter require what is known as habitat conservation plans or agreements requiring mitigation and limitations on non-federal actions likely to incidentally take listed species. These may be required for actions likely to take whales in state-regulated waters depending on how much authority is deemed delegated under section 6.

Section 11 provides civil and criminal penalties that can be enforced or applied by the Secretary and authorizes citizen suits to enjoin actions in violation of the Act. The Act like most federal law assumes that prosecutorial discretion rests with the Secretary who can adopt guidelines which in turn can be made public. These could provide that normally any sanction for entangling a whale would be waived for those reporting it assuming certain good faith behavior. Regulations could also provide for specific penalties for failure to report and closures of larger areas where unreported entangled

whales are found by non-fishermen until the point of initial entanglement is determined so that a smaller closure or other steps could be taken.

Section 11(d) requires rewards for persons who furnish information which leads to an arrest for any violation of the Act or regulation issued thereunder.

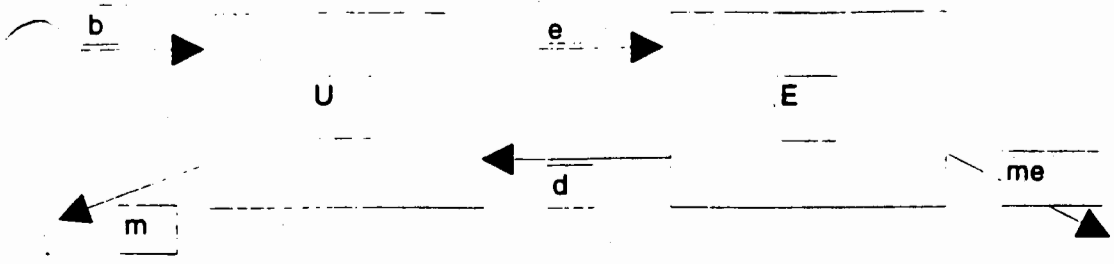
Section 11(e) provides among other things for the potential forfeiture of fish, vessels, nets, and other equipment involved in the taking of listed species upon a criminal conviction.

Section 11(f) provides that the Secretary may charge reasonable fees for expenses to the government concerning permits or certificates authorized by the Act .

Section 15 authorizes funds to be appropriated to implement the Act. It will be revised when Congress "reauthorizes" the Act which may also involve substantial changes and parallel changes in tax law to provide incentives for conservation.

The conservation community, Congressional Committees of jurisdiction and others are proposing various amendments to the Act. They are also proposing tax code changes keyed to some of the proposed ESA amendments which would recognize and reward federal - private conservation agreements. The Congress is likely to consider them this year.

APPENDIX 15



Tu = b + d = e + m (at steady state)
Te = e = me + d (at Steady State)

b= 12
me= 1.2

Scott guessed that e = 10.
The number of animals that have scars is about 57% of the population. If we ignore population growth for a moment, and assume steady state, then
d = 8.8 (= 10 -1.2) d= e-me
m = 10.8 m=b+d-e=b-me

What is the percent of the population that has been entangled, assuming this model?
A total of 20.8 whales per year enter box U. Of this 10 become entangled, so 10/20.8 or 48% of the whales entering U eventually become entangled. Of the 10 whales per year that become entangled, 1.2 die, and 8.8/10.8 or 81.5% disentangle themselves and return to the unentangled box.

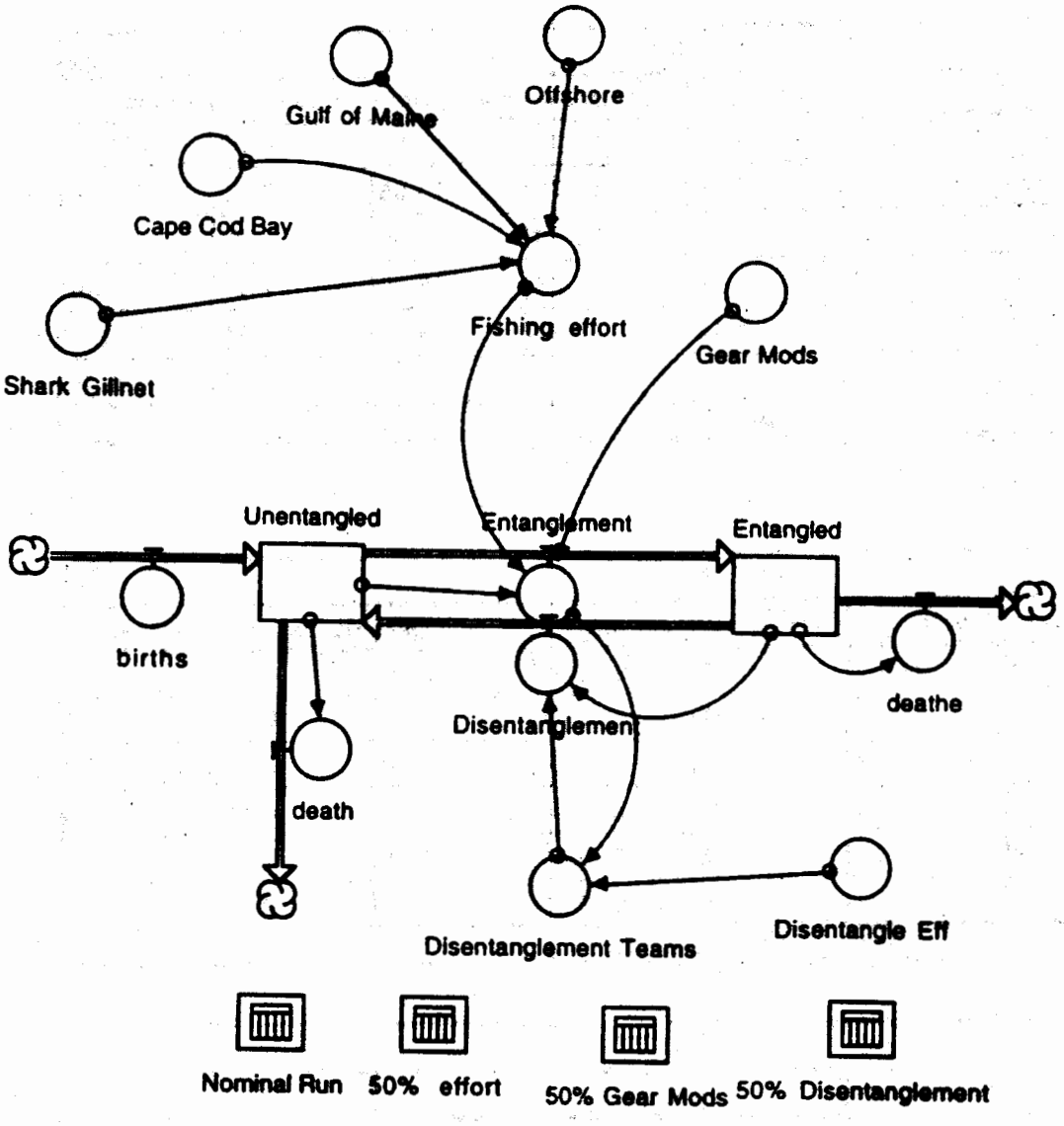
)076923 0.88 0.42307692

If every entangled whale carries a scar, the proportion of whales with scars in U will be 0.48*0.88 = .42. A table showing how this changes with entanglement rate follows:

e	d	Tu	qe	qd	%Scarred in U
10	8.8	20.8	0.48076923	0.88	42.31
11	9.8	21.8	0.50458716	0.89	44.95
12	10.8	22.8	0.52631579	0.90	47.37
13	11.8	23.8	0.54621849	0.91	49.58
14	12.8	24.8	0.56451613	0.91	51.61
15	13.8	25.8	0.58139535	0.92	53.49
16	14.8	26.8	0.59701493	0.93	55.22
17	15.8	27.8	0.61151079	0.93	56.83
18	16.8	28.8	0.625	0.93	58.33
19	17.8	29.8	0.63758389	0.94	59.73
20	18.8	30.8	0.64935065	0.94	61.04

To get 57% of U with scars, there must be 17 entanglements per year. If the 6-8 animals in E are included in the 57%, the % of whales in U that need to be entangled to have 57% of the population entangled is 55.8%. To get 55.8% of whales in U with scars, there must be between 16 and 17 entanglements per year.

Allocation of Entanglement Risk by Fishery					
	% of Whales	# months	%Whale-month	% risk	Est. Mort.
Shrk Gillnet	15	3	45	8.17	0.65
MDA	1	1	1	0.18	0.01
CCB	50	3	195	35.39	2.83
	5	9			
Gulf of Mair	80	2	210	38.11	3.05
	5	10			
Offshore	10	10	100	18.15	1.45
		TOTALS	551	100	8


Gulf of Maine
Offshore
Cape Cod Bay
Fishing effort
Shark Gillnet
Gear Mods
Unentangled
Entanglement
Entangled
births
deathe
Disentanglement
death
Disentanglement Teams
Disentangle Eff
Nominal Run
50% effort
50% Gear Mods
50% Disentanglement

4:01 PM 1/23/97 Nominal Run

Years	births	death	deathe	Disentanglen	Entanglemen	Entangled	Unentangled
.0	12.00	10.80	1.20	14.80	15.95	8.00	292.00
1.0	12.00	10.80	1.20	14.76	15.95	7.98	292.02
2.0	12.00	10.80	1.20	14.76	15.95	7.98	292.03
3.0	12.00	10.80	1.20	14.76	15.95	7.98	292.03
4.0	12.00	10.80	1.20	14.76	15.95	7.98	292.03
Final						7.98	292.03

Untitled Table: (1)

4:02 PM 1/23/97 50% effort

Years	Entanglemen	Disentanglen	Entangled	Unentangled	Disentanglen	Fishing effo	Gear Mods
.0	7.99	14.06	8.00	292.00	0.00	0.50	1.00
1.0	8.08	8.36	4.57	295.68	0.00	0.50	1.00
2.0	8.10	7.61	4.12	296.54	0.00	0.50	1.00
3.0	8.11	7.52	4.06	297.00	0.00	0.50	1.00
4.0	8.12	7.51	4.06	297.41	0.00	0.50	1.00
Final			4.06	297.79		0.50	1.00

Untitled Table: (1)

4:02 PM 1/23/97 50% effort

Years	deathe
.0	1.14
1.0	0.68
2.0	0.62
3.0	0.61
4.0	0.61
Final	

Untitled Table: (2)

4:05 PM 1/23/97 50% Gear Mods

Years	Entangled	Unentangled	births	death	Entanglemen	Disentanglen	deathe
.0	8.00	292.00	12.00	10.81	7.99	14.06	1.14
1.0	4.57	295.68	12.00	10.94	8.08	8.36	0.68
2.0	4.12	296.54	12.00	10.97	8.10	7.61	0.62
3.0	4.06	297.00	12.00	10.99	8.11	7.52	0.61
4.0	4.06	297.41	12.00	11.00	8.12	7.51	0.61
Final	4.06	297.79					

Untitled Table: (1)

4:09 PM 1/23/97 50% Disentanglement

Years	Entangled	Unentangled	births	death	Entanglemen	Disentanglen	deathe
.0	8.00	292.00	12.00	10.81	15.97	22.04	1.14
1.0	4.57	295.68	12.00	10.94	16.16	16.44	0.68
2.0	4.12	296.54	12.00	10.97	16.20	15.71	0.62
3.0	4.06	297.00	12.00	10.99	16.23	15.63	0.61
4.0	4.06	297.41	12.00	11.00	16.25	15.64	0.61
Final	4.06	297.79					

Untitled Table: (1)