AMENDMENT 13

TO THE

SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS

FISHERY MANAGEMENT PLAN

VOLUME 2

APPENDICES

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Mid-Atlantic Fishery Management Council

and the

the Atlantic States Marine Fisheries Commission,

in cooperation with

the National Marine Fisheries Service,

the New England Fishery Management Council,

and

the South Atlantic Fishery Management Council

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APPENDIX A. SUPPLEMENTARY ANALYSIS

Supplementary Analyses - Response to NMFS/NERO Comments on Amendment 13 to Summer Flounder, Scup, and Black Sea Bass

These analyses and commentary supplement the public hearing draft of Amendment 13. This document was drafted in response to the concerns expressed by the Regional Administrator in the comments attached to a letter to Dan Furlong, dated April 15, 2002.

Quota Monitoring

The Amendment contains six general quota programs that would allocate the annual black sea bass quota to the participants in the fishery. NMFS/NERO has requested that the amendment "contain the details of a quota monitoring system and changes to the reporting requirements associated with any new quota program to ensure that the Council and public are made aware of the changes that would be required." Amendment 13 details the system and reporting requirements for the quota alternatives. Additional detail is provided below.

<u>Quarterly Quotas</u> (Alternatives 1, 2a, and 2b)

The quota monitoring system associated with these options would remain unchanged from the current system, i.e., there would be no additional monitoring or reporting requirements.

<u>Quota allocation by permit category</u> (Alternatives 3a, 3b, 3c, and 3d)

This alternative would allocate quota by two or three separate permit categories based on landings data. Fishermen would qualify for each category based on documented landings from 1988 to June 5, 2001. This alternative would require that all fishermen, state and federal, be placed in a category in order for this alternative to be implemented.

Allocations by permit category would have to be further divided to allow for landings to be distributed over the year. Specifically, the Council and Commission could choose to further divide the allocations by permit category into two periods, January through April and May through December, to correspond with patterns in landings by gear type. Possession limits would then be implemented for each category and period.

Based on three permit categories and two periods, the number of reporting cells would be six. During the January to April period, an initial possession limit would be established for each permit category with a trigger to drop the limit to a lower level when 80% of the landings were projected to be reached. During the longer period, May through December, it is probable that two triggers would be required, one at 50% and one at 80% to distribute landings over the year. As such, the burden of monitoring the fishery would increase relative to the current system. Specifically, NMFS and the states would have to monitor the six cells and make fifteen projections (six in the first period and nine in the second) as to when to modify the possession limit or close the fishery for each permit category.

Based on two permit categories and two periods, the number of reporting cells would be four. The system would function as described above. NMFS and the states would have to monitor the four cells and make ten projections (four in the first period and six in the second) as to when to modify the possession limit or close the fishery for each permit category.

Relative to the current system, the reporting requirements would increase for dealers. Federal and state dealers would be required to tabulate weekly landings by permit category and record permit numbers for later verification (monthly). In effect, the addition of three (two) permit categories to the reporting requirements would be analogous to the addition of two (one) other species to dealer reports.

Subregional Quotas (Alternatives 4a and 4b)

This alternative would allocate quota to separate subregions with additional allocations by two time periods; January through April and May through December. As such, the number of reporting cells (temporal and/or spatial units) would be four, two subregions and two periods, the same number associated with the current quarterly system. Allocations to each cell would be based on the allocation formula adopted by the Council and Commission. Allocations in each cell would be controlled with possession limits and triggers. NMFS and the states would have to monitor the four cells and make ten projections (four in the first period and six in the second) as to when to modify the possession limit or close the fishery for each subregion.

Monitoring of the quotas would involve both state and federal cooperation. As in the current system, federally permitted dealers would report landings on a weekly basis to NMFS. Currently, some states supplement landings with landings by state permitted fishermen on a monthly basis. Individual states that do not currently report state landings on a weekly basis would have to implement new data collection and reporting requirements in order to collect and submit weekly data from state permit holders.

State-by-state allocations (Alternatives 5a, 5b, 5c, and 5d)

If this alternative was implemented, a state-by-state system to distribute and manage the annual quota would be implemented by the Council and Commission. The amendment document details how a state by state quota system would work. As has been done for summer flounder, states would develop programs to administer the quota for the state.

NMFS/NERO concerns regarding state-by-state quotas relate to the size of the quota and the fact that a state-by-state system would result in small shares in some states. NMFS/NERO suggests that these small shares could result in overages if states were unable to monitor the quota in a timely fashion and close when necessary to prevent overages. In general, quotas by state would be smaller for black sea bass than summer flounder and bluefish. However, they would be comparable to the quotas initially implemented by NMFS (and later by the states) for scup during the summer period and larger than the quotas currently implemented by some states for tautog and striped bass.

Monitoring of the quotas would involve both state and federal cooperation. As in the current system, federally permitted dealers would report landings on a weekly basis to NMFS. Currently, some states supplement landings with landings by state permitted fishermen on a monthly basis. Individual states that do not currently report state landings on a weekly basis would have to implement new data collection and reporting requirements in order to collect and submit weekly data from state permit holders.

The burden of monitoring the fishery would increase relative to the current system. Specifically, NMFS and the states would have to monitor ten states as to when to modify the possession limit (state action) or close the fishery (state and federal action) in each state.

If NMFS/NERO is unable or unwilling to monitor state-by-state quotas, the Commission could operate a state-by-state system independently. Currently, there are no state-by-state quotas for scup from a federal perspective. However, the Commission implements state-by-state quotas for the summer fishery each year. Under such a system, the states would monitor and close their fisheries when their quota was projected to be reached. NMFS would close the fishery to federal permit holders when the coastwide quota was projected to be reached. As such, the burden on NMFS would be reduced relative to the current system, i.e., they would have to monitor a coastwide fishery on an annual basis with a single notice to permit holders as to when the fishery would close.

Hybrid quota system (Alternatives 6a, 6b, 6c, 7a, and 7b)

These alternatives would implement a hybrid quota system that would implement a coastwide quota from January through April and either a subregional quota or a state-by-state quota from May through December. The allocation by period reflects the landings by gear duing the year, i.e., otter trawls are the predominant gear from January through April and other gears are dominant in the other months.
Many of the comments made above for subregional and state-by-state allocations would apply to this alternative as well.

Monitoring of the quotas would involve both state and federal cooperation. As in the current system, federally permitted dealers would report landings on a weekly basis to NMFS. Individual states that do not currently report state landings on a weekly basis would have to implement new data collection and reporting requirements in order to collect and submit weekly data from state permit holders.

The hybrid subregional alternative would allocate quota to three cells, one from January to April and two (two subregions) from May through December. During the January to April period, an initial possession limit would be established for each permit category with a trigger to drop the limit to a lower level when 80% of the landings were projected to be reached. During the longer period, May through December, it is probable that two triggers would be required, one at 50% and one at 80% to distribute landings over the year. As such, the burden of monitoring the fishery would increase relative to the current system. Specifically, NMFS and the states would have to monitor the three cells and make eight projections (two in the first period and six in the second) as to when to modify the possession limit or close the fishery.

The hybrid state by state alternative would increase the burden of monitoring the quota for NMFS and the states. The number of reporting cells would increase from four to eleven, i.e., one from January through April and ten from May through December.

The data reporting system would remain unchanged for federal dealers. As in the current system, federally permitted dealers would report landings on a weekly basis to NMFS. Individual states that do not currently report state landings on a weekly basis would have to implement new data collection and reporting requirements in order to collect and submit weekly data from state permit holders to support the state by state allocations.

Quota allocation by gear type (Alternative 8)

This alternative would allocated quota by gear type. Specifically, landings data would be used to allocate quota to five separate categories: trawls, pots, gill nets, hook and line, and other. Allocations could be further subdivided into two periods - January through April and May through December.

Based on five categories and two periods, the number of reporting cells would be ten. During the January to April period, an initial possession limit would be established for each gear category with a trigger to drop the limit to a lower level when 80% of the landings were projected to be reached. During the longer period, May through December, it is probable that two triggers would be required, one at 50% and one at 80% to distribute landings over the year. As such, the burden of monitoring the fishery would increase relative to the current system. Specifically, NMFS and the states would have to monitor the ten cells and make twenty-five projections (ten in the first period and fifteen in the second) as to when to modify the possession limit or close the fishery for each gear category.

Relative to the current system, the reporting requirements would increase for dealers. Federal and state dealers would be required to tabulate weekly landings by gear category and record permit numbers for later verification (monthly). In effect, the addition of five gear categories to the reporting requirements would be analogous to the addition of four other species to dealer reports.

Costs associated with changes to quota monitoring and reporting requirements

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the Federal paperwork burden for individuals, small business, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government.

Currently, all black sea bass Federally-permitted dealers must submit weekly reports of fish purchases. The owner or operator of any vessel issued a moratorium vessel permit for black sea bass must maintain on board the vessel, and submit, an accurate daily fishing log report for all fishing trips, regardless of species fished for or taken. These reporting requirements are critical for monitoring the harvest level in this fishery.

None of the evaluated quota allocation systems will affect the existing reporting requirements previously approved under OMB Control Nos. 0648-0202 (Vessel permits) and 0648-0212 (Vessel logbooks). Dealer reporting (OMB Control No. 0648-0229) will not be affected under the evaluated quota allocation systems with the exception of quota allocations by permit categories (3-separate permit categories and 2-separate permit categories) and allocation by gear type (5 separate gear types). Under the current reporting requirements for black sea bass, dealers report on a weekly basics through the IVR system. However, if a dealer is required to report black sea bass weekly by permit category, then the reporting requirement for this species increases by two under the 3-separate permit categories allocation, by one under the 2-separate permit categories allocation, and by four under the gear type allocation. Dealer permit data indicates that 328 dealers held black sea bass dealer permits in 2001. Assuming that 328 dealers hold a federal black sea bass permit and are subject to report under the quota allocation system by permit categories, then, the 3-permit category will have an additional associated 3,408 hours of burden, at a cost of $43,410 to the government and $62,718 to the public. For the 2-permit category, the additional hours burden is 1,704, and the associated costs to the government and public are $21,705 and $31,359, respectively. For the gear type allocation, the additional hours burden is 6,816, and the associated costs to the government and public are $86,820 and $125,436, respectively.

In addition to the costs described above, monitoring costs will also be incurred under the various quota systems. These costs will vary depending on the amount of time required to monitor the black sea bass quota under the different quota systems. For example, under the current quarterly quota system, coastwide landings and projections are monitored during four time periods through the year. However, under the state-by-state quota allocation system, landings and projection would have to be monitored for 10 states along the coast (Maine through North Carolina, excluding New Hampshire) through the year. In addition, under the quarterly quota system up to 4 fishery closure notices may be generated throughout the year i.e., one for each quarter, while under a state-by-state quota allocation system up to up to 10 fishery closure notices may be generated throughout the year i.e., one for each estate. It is estimated that approximately 26 hours are required to monitor the black sea bass fishery during any specific quarter (including landings monitoring, landings projections, and the preparation of closure notices).

If it is assumed that 26 hours are required to monitor the fishery for any given "unit period" (e.g., quarter, state, gear type, geographic area) and that the estimated annualized costs to the federal government is $25/hour (wage and overhead cost, on average), then, the associated monitoring costs of the various quota allocation systems are as follow: $1,950 for the 3-permit category allocation (3 permit types x 26 hours per permit x $25/hour); $1,300 for the 2-permit category allocation (2 permit types x 26 hours per permit x $25/hour); $2,600 for the separate subregion allocation (2 regions with 2 time periods each x 26 hours per region/time period x $25/hour); $6,500 for the state-by-state allocation (10 states x 26 hours per state x $25/hour); $7,150 for the hybrid allocation (coastwide from January-April and 10 states from May-December x 26 hours per "unit period" x $25/hour); and $3,250 for the gear allocation (5 gear types x 26 hours per gear type x $25/hour). These estimates incorporate costs associated with the preparation of closure notices. If a closure notice is not required for a specific "unit period," then the associated monitoring cost will be lower than estimated above. The monitoring costs described in this paragraph are costs associated with the implementation of individual quota systems. However, if the Council were to adopt a quota allocation strategy composed of two allocation systems (e.g., subregion allocation combined with gear allocation), then the monitoring costs would depend on the combination of the allocation system adopted.

Essential Fish Habitat (EFH)

In response to the comment regarding the used of best available science to characterize impacts of fishing gear on EFH, the document titled "Workshop on Effects of Fishing Gear on Marine Habitats off the Northeastern United States, October 23-25, 2000, Boston, MA" (NMFS 2002; Appendix B) was incorporated into the discussion on "Fishing Activities that May Adversely Affect EFH" in sections 3.2.7.1 and 3.2.7.2, below. This final document was not available when the public hearing draft was prepared. The final report will be appended to the final amendment.

In response to the comment that the "FEIS must provide a description of the effects of pot and trap gear based on available information," the effects of pot/trap gear were added to section 3.2.7.2. In response to the comment that the "effects of the management alternatives on EFH must include impacts on the EFH of all species," the effects of gear used in the summer flounder, scup, and black sea bass fisheries on EFH of other species was added to section 3.2.7.2. These two issues were not addressed earlier because the EFH provision of the SFA and the Interim Final only required that any gear that impacted the EFH of the species managed under the FMP be addressed. The Final Rule changed these requirements.

NERO also commented that "The FEIS needs to contain an appropriate description of the 'status quo' condition of the fishery, with respect to gear impacts on habitat and the effects of the current management program on EFH. The description contained in the DEIS regarding status quo impacts to EFH indicates that the current fishery may result in reduced or no additional adverse effects on EFH. As identified in the gear impacts section of the DEIS, most bottom tending mobile gears currently in use do have adverse effects on EFH. While recovering stocks may change the way the fishery effects EFH over time, those changing conditions should not be used to characterize the current, status quo effects of fishing on EFH. The analysis portion does not provide the review with the ability to determine what the status quo effect might be. As a suggestion, the description of gear impacts could be considered status quo conditions and be described in the FEIS as such."

According to the Council on Environmental Quality's (CEQs) memorandum titled "Forty Most Frequently Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" dated March 16, 1981 (46 FR18026), section 1502.14(d) [of NEPA] requires the alternatives in the EIS "include the alternative of no action'" and in the case of an action such as updating a plan (CEQ uses the example of a land management plan) it states that:

> "...where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases 'no action' is 'no change' from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the 'no action' alternative may be thought of in terms of continuing with the present course of action until that action is changed. Consequently, projected impacts of alternative management schemes would be compared in the EIS to those impacts projected for the existing plan. In this case, alternatives would include management plans of both greater and lesser intensity, especially greater and lesser levels of resource development."

In the case of FMPs "ongoing programs initiated under existing legislation and regulations" such as the rebuilding schedules, reductions in bycatch, and other measures to conserve fisheries are required by SFA. These measures will continue. As indicated by the CEQ guidance, "To construct an alternative that is based on no management at all would be a useless academic exercise." As such, the description of the impacts of the "status quo" or "no action" alternative on EFH was not revised. However, the description of gear impacts in section 3.2.7 has been revised.

NMFS commented that a practicability analysis must be included for all alternatives to minimize the effects of fishing. It should be noted that a formal practicability analysis was not a requirement under the Interim Final Rule or the SFA, but a requirement under the Final Rule [50 CFR Section 600.815(2)], which was published in the Federal Register on January 17, 2002, after Amendment 13 was prepared. Nonetheless, since a formal analysis is now requested, a practicability analysis of each EFH alternative is included in section 4.2.

3.2.7 Fishing Activities that May Adversely Affect EFH

3.2.7.1 Description of Fishing Gear (Section 2.2.3.6 in Amendment 12)

Only the revised paragraphs under 3.2.7.1 are included in this supplement. Subsections 3.2.7.1.1 - 3.2.7.1.7 were not changed and not included.
Forty-one different kinds of fishing gear were identified in 1999 that land all commercial species along the Atlantic coast, from Maine through North Carolina (Table 31). Two gears combine to

account for almost 50% of the commercial landings (pounds) from Maine through North Carolina menhaden purse seines and bottom otter trawls. No other gear besides these two gear account for more than 8% of the total landings along the coast. A total of 21 of the 41 gear accounted for 1% or more of the total landings from Maine through North Carolina.

The 41 different fishing gears identified in Table 31 can be combined into groups as to their potential impact to EFH. For example, "otter trawl bottom, fish," "otter trawl bottom, shrimp," "otter trawl bottom, crab," and "otter trawl bottom, scallop" can be combined and examined, as bottom otter trawls. The following description is a general characterization of the consolidated groups of gear that were used to commercially harvest fish along the Atlantic coast in 1999. The following descriptions of gear used within the jurisdiction of the Northeast Region are taken from the Tilefish FMP unless otherwise noted. More detailed gear descriptions can be found in the report, "The Effects of Fishing on Marine Habitats of the Northeastern United States" (NMFS 2001 draft; Appendix A).

3.2.7.2 Fishing impacts to EFH (Section 2.2.3.7 in Amendment 12)

This section was completely revised to meet the requirements of the EFH Final Rule.

3.2.7.2.1 Statutory Requirements

The EFH Final Rule [50 CFR Section 600 (a)(2)(i)] indicates that:

"Each FMP must contain an evaluation of the potential adverse effects of fishing on EFH designated under the FMP, including effects of each fishing activity regulated under the FMP or other FMPs. This evaluation should consider the effects of each fishing activity on each type of habitat found within each FMP. FMPs must describe each fishing activity, review and discuss all available relevant information (such as information regarding the intensity, extent, and frequency of any adverse effect on EFH; the type of habitat within EFH that may be affected adversely; and the habitat functions that may be disturbed), and provide conclusions regarding whether and how each fishing activity adversely affects EFH."

Fishing effort data are the only way to gauge the intensity and severity of fishing activity that is required to be evaluated. Some minimal effort information, such as number of trips by area (ten minute square or statistical area), is available in the VTR data. However, area information in the VTR data has limitations because trip location is required to be reported as one location or statistical area for a trip or each time a vessel changes statistical areas, as opposed to reporting tow-by-tow or set information. Thus, available data on a vessel's trip location may represent a larger geographical area than indicated (Colosi pers. comm.). Fishermen can also be resistant to reporting effort based on location of individual tow or sets (for the obvious reason of divulging productive location to competitors and regulators). The best available information on fishing activity, for all gear used in the Northeast Region, is presented in Figures 10-29 in Appendix A (NMFS 2001).

The various types of habitat in which these gears are fishing and with what kind of intensity is largely unquantified. The best available information on the habitat characteristics of the North and Mid-Atlantic are described in Section 3.2.1 and Appendix A, and mapped in Figures 1 through 7 of Appendix A (NMFS 2001).

Studies indicate that stationary and mobile gear that come into contact with the bottom may adversely impact physical habitat structure, community structure, and ecosystem processes (Auster and Langton 1998). These types of impacts are presented in Tables 33-35 (Auster and Langton 1998). They also cite several conceptual models to predict the impacts of gears on different types of habitat. However, without high resolution data on fishing effort and the habitat complexity it is difficult to predict impact of these gears. It is not the alteration or impact to the habitat that is unpredictable or unidentifiable, but the ecosystem impacts and fisheries productivity impacts that are unpredictable or unidentifiable given the current level of information.

When considering impacts, recovery of the habitat must be considered. Recovery is difficult to predict as well. Recovery is dependent on: 1) timing, severity, and frequency of the impacts (Watling and Norse 1997); 2) natural history of the affected epibenthic fauna, i.e. recovery may depend on growth and recruitment rates; and 3) substrate type and depth of the impact. Much of the gear impact/habitat research describes the differences in impacts and recovery rates between shallow high energy sand habitats (indicative of disturbance tolerant species) versus live bottom habitats (indicative of disturbance intolerant species).

For example, sand waves may not be reformed until storm energy is sufficient to produce bedform transport of coarse sand grains (Valentine and Schmuck 1995), and storms may not be common until a particular time of year or may infrequently reach a particular depth, perhaps only on decadal time scales. DeAlteris *et al.* (1998) studied the impacts of mobile gear in Narragansett Bay, RI, and found that recovery time was influenced by depth and substrate. Sand substrates in shallow water recovered more quickly than mud substrates in deep water, where gear scars were detectable by side-scan sonar for much longer periods of time.

Sponges are particularly sensitive to disturbance because they recruit aperiodically and are slow growing in deeper waters (Reiswig 1973; Witman and Sebens 1985; Witman *et al.* 1993). In the outer shelf-upper slope waters south of New England where these three species often overwinter, patches of branching soft corals, such as *Paragorgia arborea, Primnoa resedaeformis, and Pennatula aculeata* (Wigley and Theroux 1981 and Theroux and Wigley 1998), are capable of providing biogenic structure; the first two species can grow relatively large. These branching soft corals are also relatively fragile (and probably slow growing in this plankton-poor environment) and may thus be easily damaged by mobile gear. Many species, such as hydroids and ampelescid amphipods, reproduce once or more annually, and their stalks and tubes provide cover for the early benthic phases of many fish species and their prey (Auster *et al.* 1996 and 1997b). Where fishing effort is constrained within particular fishing grounds, and where data on fishing effort are available, studies which compare similar sites along a gradient of effort have produced the types of information on effort-impact that will be required for effective habitat management (e.g., Collie *et al.* 1996 and 1997; Thrush *et al.* in press). Unfortunately, this type of analysis is not available for summer flounder, scup and black sea bass habitat.

3.2.7.2.2 Evaluation of Gear Impacts on EFH

According to the EFH Final Rule, gear that is utilized in the summer flounder, scup, and black sea bass fisheries, must be evaluated relative to impacts on habitat. NMFS weighout data indicate that bottom otter trawls and pots/traps are the major gear that landed summer flounder, scup, and black sea bass, in 2000. Additionally, gear that may adversely impact summer flounder, scup, and black sea bass EFH must also be evaluated. The predominant bottom tending mobile gear that is used in summer flounder, scup, and black sea bass EFH by federal permit holders includes bottom otter trawls, and scallop and clam dredges.

Summer flounder, scup, and black sea bass are demersal species that have associations with substrates, SAV, and structured habitat (Packer and Griesbach 1998, Steimle *et al.* 199a-b). Specific habitats that are designated as EFH (Section 2.2.2 in Amendment 12, MAFMC 1998) include:

1) Summer flounder: pelagic waters, demersal waters, saltmarsh creeks, seagrass beds, mudflats, and open bay areas;

2) Scup: demersal waters, sands, mud, mussel, and seagrass beds;

3) Black sea bass: pelagic waters, structured habitat (e.g. sponge beds), rough bottom shellfish, sand and shell.

Bottom otter trawls, pots/traps, and scallop and clam dredges were evaluated for adverse impacts to EFH. In October 2001, NOAA/NMFS, NEFMC, and MAFMC convened a workshop, hereafter referred to as gear workshop (NMFS 2002, Appendix B), to assist NEFMC and MAFMC with: 1) evaluating the existing scientific research on the effects of fishing gear on benthic habitats; 2) determining the degree of impact from various gear types on benthic habitats in the Northeast; 3) specifying the type of evidence that is available to support the conclusions made about the degree of impact; 4) ranking the relative importance of gear impacts on various habitat types; and 5) providing recommendations on measures to minimize those adverse impacts. The workshop consisted of a panel of experts in the fields of benthic ecology, fishery ecology, geology, fishing gear technology, and fisheries gear operations. When drawing conclusions on the degree and duration of the impacts of gear, the panelists relied on peer reviewed literature, grey literature, and professional judgement. These are noted in the tables of impacts for each gear type in Appendix B.

At the conclusion of the workshop, participants were asked to participate in an exercise to rank the relative importance of various gear impacts on habitat. The panelists considered the three general habitat types of mud, sand and gravel, and within those habitat types four impacts: 1) removal of major physical features, 2) impacts to biological structure, 3) impacts to physical structure, and 4) changes in benthic prey. The results of this exercise are presented in Tables 8 and 9 of Appendix B and the conclusions are stated as follows:

> "Several conclusions can be drawn from this evaluation. First of all, gravel habitat was clearly considered to be most at risk, followed by sand and mud (Figure 3 of Appendix B). Secondly, impacts to biological structure were of greatest concern, particularly in gravel habitat, followed by any impacts to gravel habitat (Figure 4 of Appendix B). Impacts to physical structure ranked third and removal of major physical features ranked fourth. Thirdly, otter trawls and scallop dredges were of much greater concern than clam dredges, gill nets and longlines, and pots and traps (Figures 5 of Appendix B). Otter trawls and scallop dredges were judged to have the greatest impacts on gravel habitat (Figure 6 of Appendix B). Additionally, otter trawl effects were of concern in all three habitat types, whereas scallop dredge effects are limited to gravel and sand, and clam dredging impacts are limited to sandy bottom. Sink gill nets and bottom longlines were only of concern in gravel. Changes in benthic prey received no votes at all and only one vote was cast for pots and traps. Overall, the panelists stated that this was a valuable exercise and that the results were consistent with their discussions throughout the workshop."

The following descriptions of impacts of fishing gear are synthesized from NMFS (2001and 2002; Appendices A and B) on the impacts of specific gear types on habitats designated as EFH in the North and Mid-Atlantic. Additional documented impacts of fishing gear on the structural components of habitat and community structure are presented in Tables 33-35. It should be noted that the impacts described are considered the baseline of fishing gear impacts on habitat. As such, when describing the impacts of alternatives relative to the status quo, impacts are described relative to the management measures currently in place.

Bottom otter trawls: NMFS weighout data indicate that bottom trawls accounted for 41% of the landings of MAFMC-managed species, from Maine through North Carolina, in 2000. In 2000, bottom otter trawls from Maine through North Carolina accounted for 18% of bluefish, 91% of butterfish, 91% of summer flounder, 81% of Atlantic mackerel, 64% of scup, 30% of black sea bass, 33% of spiny dogfish, 9% of tilefish, 98% of *Loligo*, and almost 100% of *Illex*. A total 209,486 bottom otter trawl trips reported a point location in VTR data from 1995-2000. The distribution of bottom otter trawl trips is presented in Figure 10 of Appendix A. Fishing trips are the only effort data currently available to evaluate the frequency and intensity of fishing activity, and therefore the extent of fishing gear impact. The limitations of these data are stated in section 3.2.7.2.1.

Based upon the existing information presented in Appendix A, bottom otter trawls have the potential to adversely affect EFH. Fish bottom otter trawls were the most widely used gear from Maine through Cape Hatteras, from 1995 to 2000. The distribution of otter trawl trips closely resembles the distribution of summer flounder, scup, and black sea bass EFH (Figure 10 of Appendix A). Appendix A indicates that studies, specifically in the Northeast Region, indicate that the impacts of bottom otter trawls include ecological and physical impacts. The ecological impacts are exposure of prey and attraction of predators. The physical impacts are the loss of diatom mats, the reduction of total organic carbon and nitrogen in the sediment-water interface, and the reduction of mud and epifauna in a boulder habitat. Similar biological and physical impacts were observed in national and international studies.

The panel from the gear workshop (Appendix B) concluded that "the greatest impacts from otter trawls occur in low and high energy gravel habitats and in hard clay outcroppings (Table 5 of Appendix B). In gravel, the greatest effects were determined to be on major physical features, and physical and biological structure of the habitat."

"In gravel and other hard bottom habitats, the degree of impact of otter trawls on major physical features, physical structure, and biological structure were all considered to be high in both low and high energy environments. Major physical features in this habitat type are boulder mounds, which can be knocked down by trawls. Once this happens, the mounds can never be re-formed, and the resulting changes are permanent. Trawls also cause alterations to physical structure by redistributing cobbles and boulders and breaching gravel pavement. Impacts to biological structure in gravel were of greater concern to the panel than impacts to biological structure in other habitats because structural biota is more abundant on gravel bottom. Effects to physical and biological structure of these habitats were judged to last from months to years."

"Changes to benthic prey caused by trawling were considered to be unknown. In mud habitats, the panel distinguished between hard clay outcroppings that occur in deep water on the outer continental shelf and soft mud (silt and clay) sediments found in deep water basins in the Gulf of Maine and many shallower locations on the shelf. Bottom trawling takes place in both of these habitat types."

"Clay outcroppings are found on the slopes of submarine canyons that intersect the shelf on the southern edge of Georges Bank and the New York Bight. These outcroppings provide important habitat for tilefish (*Lopholatilus chamaelonticeps*) and other benthic organisms which burrow into the clay. Based on the panel's professional judgement, removal of this material by trawls was considered to be a permanent change to a major physical feature, and was rated as a high degree of impact. The panel determined that trawls could also cause a high degree of impact to the physical structure of hard clay habitat that could last from months to years."

"The panel did not reach consensus on the degree to which otter trawls affect physical and biological structure in soft mud habitats. However, most panelists agreed that impacts to biological structure (including worm tubes and burrows) and physical structure were moderate. Panelists agreed that these impacts would be expected to last from months to years."

"There was no consensus on the degree of impact to biological or physical structure, or to benthic prey, in high and low energy environments. However, with one exception, the panelists agreed that these impacts were moderate. Trawl induced changes to physical structure in high energy sand were rated as low. Recovery times for biological structure and prey were considered to range from months to years, and for physical structure from days to months."

"There was a general consensus that the acute impacts of bottom trawls (i.e., impacts caused by a single tow) on physical and biological structure are less severe than for a scallop dredge, but the chronic impacts resulting from repeated tows are more severe for trawls because a greater bottom area is affected by trawling than is affected by scallop dredging. Additionally, otter trawls are towed repeatedly in the same locations, much more so than scallop dredges and clam dredges. One panel member pointed out that the only part of a trawl that disturbs the bottom in the same manner as a scallop dredge is the door - the rest of the trawl behaves very differently. Another panel member reiterated that there are a large variety of trawls in use in the Northeast U.S. Some (squid nets, high rises) are very light trawls that barely contact the bottom at all, whereas others (flatfish nets) "hit hard" which makes it difficult to generalize the impacts associated with this gear."

A study on the lobster fishery in the Connecticut waters of the Long Island sound (Smith *et al.* 1985) draws the following conclusions regarding trawling impacts to benthic habitats: 1) minor disturbance to surface sediment (less than 1" in depth) because of "light contact with the bottom" (a study of heavily rigged gear in the UK reported similar results); 2) a possible increase in sea floor productivity due to sediment disturbance related to "wake turbulence" which suspended epifauna and flocculent material, rather than direct physical contact with the bottom, resulting in a "chumming effect that attracted motile predators;" 3) "notable" evidence of trawl passage was limited to 4-10" wide, and 2-6" deep trawl door depressions; 4) furrows created by trawls doors in soft mud substrate did not cause habitat loss and "may increase excavation sites for formation of mud lobster shelters or 'burrows'"; 5) minor alteration of mud burrows which "appeared easily reconstructable by resident lobsters." Smith *et al.* (1985) concluded that the success of trawling for lobster was dependent upon the soft sediment substrate in Long Island Sound rather than "any special gear modifications that result in a disruption or extraction for the sea bed." Smith *et al.* (1985) and others observed no evidence of mortality to lobsters or crabs by the net path or trawl riggings.

<u>Dredges</u>: Weighout data indicate that dredges accounted for 47% of the commercial landings of MAFMC species, from Maine through North Carolina in 2000. These data indicate that dredges harvested 100% of the surfclam and ocean quahog landings in 2000. Additionally, clam and scallop dredges accounted for 6% and 2%, respectively, of state and federal landings in 1999 (Table 6 in Appendix A). NMFS (2001) reports that, "Dredging (all gears) was dominated by scallop dredges, which accounted for 81.5% of all the trips that were included in this analysis. Surfclam and ocean quahog dredges accounted for an additional 13.7%." Based upon the existing information presented in Appendix A (detailed below by specific dredge type), dredges have the potential to adversely affect EFH.

Clam dredges: NMFS (2001; Appendix A) reviewed four regional studies that address the impacts of hydraulic clam dredges in the Northeast Region. These studies indicate that disruptions of the benthic communities, sediments, bottom water turbidity, hypoxia, and an increase in predators in silt, sand, mud, and muddy sand habitats, were short-term in nature. The longest recovery time reported was 3-10 months in muddy sand. Other national and international studies yielded similar results, with a few exceptions. One study in Florida reported that sea grasses took longer than one year to recolonize. Studies in Scotland indicated that dredging in mud, "breaks down the cohesive bonds in sediments, thus increasing the likelihood of resuspension with future disturbances, can lead to large scale redistribution of fine sediments and resorting of sediments by grain size."

Estimated fishing effort of clam dredges in presented in Table 2 of Appendix B. The distribution of dredge trips is presented in Figures 18 and 19 of Appendix A. The limitations of these data are stated in section 3.2.7.2.1.

Fishing effort is the only data currently available to evaluate the frequency, intensity, and therefore extent of fishing gear impact. The panel from the gear workshop concluded that "the habitat effects of hydraulic dredging were limited to sandy substrates, since the gear is not used in gravel and mud habitats (Table 3 of Appendix B)." The panel also indicated "that the temporal scale of the effects varies depending on the background energy of the environment. Recovery of physical structure can range from days in high energy environments to months in low energy environments, whereas biological structure can take months to years to recover from dredging, depending on what species are affected." The panel concluded that in cases of severe biological impacts only a small area is affected by this gear type.

Scallop dredges: NMFS (2001; Appendix A) reviewed two regional studies that address the impacts of scallop dredges. These studies indicate disruption of amphipod tube mats and decline in megafaunal species, although one study indicated that scallop dredges resulted in less short-term impacts than clam dredges, although increased predation seemed to be an important impact with scallop dredges. International studies yielded similar results as the clam dredge studies.

The panel from the gear workshop concluded that "the effects of scallop dredging were of greatest concern in the following three habitat types: high and low energy sand and high energy gravel. Scallop fishing does not generally occur in deep water, low energy gravel habitats (Table 4 of Appendix B; NMFS 2002). Low energy sand habitat occurs in deeper water, where the bottom is unaffected by tidal currents and where the only natural disturbance is caused by occasional storm currents. In this habitat type, the primary physical bottom features are shallow depressions created by scallops and other benthic organisms. Reduction of biological structure and changes in physical structure were both considered to occur at a high level as a result of scallop dredging (Table 4 of Appendix B)." "In high energy sand habitats, effects on biological structure were considered to be low, since organisms in this environment would be adapted to a high degree of natural disturbance. Changes to physical structure such as smoothing out of sand ripples, sand waves, and sand ridges were rated as high."

A total 23,206 scallop dredge trips reported a point location in VTR data from 1995-2000. The distribution of dredge trips is presented in Figure 15 of Appendix A. Fishing trips are the only effort data currently available to evaluate the frequency and intensity of the fishing gear, and therefore, extent of the fishing gear impact. The limitations of these data are stated in section 3.2.7.2.1.

Other (Non-Hydraulic) Dredges: NMFS (2001; Appendix A) reviewed four regional studies that address the impacts of other nonhydraulic dredges in mud, seagrass, SAV, and oyster bed habitats in the Northeast Region. These studies indicate that disruptions in mud habitats were very short-term (1-3 months), while disruption of seagrass and SAV lasted from 2-5 years. While one study reported that oyster dredging flattens and eventually removes oyster reefs, another study indicated that there was very little difference between invertebrates in dredged and non-dredged sites.

A total 14,008 mussel and sea urchin dredge trips reported a point location in VTR data from 1995-2000. The distribution of dredge trips is presented in Figures 18 and 19 of Appendix A. Fishing trips are the only effort data currently available to evaluate the frequency and intensity of the fishing gear, and therefore, extent of the fishing gear impact. The limitations of these data are stated in section 3.2.7.2.1.

Pots and Traps: According to NMFS weighout data 48% of black sea bass and 7% of scup, landed from Maine through North Carolina were caught by pots and traps in 2000. A new literature review conducted by NMFS (2001; Appendix A) indicates that the stationary nature of pots and traps result in less damage to benthic habitat than mobile gear. For the most part, these gear have less bottom area contact. They do cause some bottom damage when settling on the bottom and when hauled back to the surface. Some gear configurations can also result in bottom contact, i.e., bouy lines of insufficient length and traps strung together by trotlines can cause movement along the bottom. Physical damage is highly dependent on bottom type. Three dimensional structure such as reef building corals, sponges, and gorgonians is more likely to be negatively impacted pots and traps.

The panelist from the gear workshop concluded that "the degree of impact caused by pots and traps to biological and physical structure and to benthic prey in mud, sand and gravel habitats was low (Table 6 in Appendix B). In both mud and sand, the duration of impacts to biological structure could last for months to years, whereas physical structure and benthic prey should recover in days to months... In gravel, reduction of structural biota and changes in seafloor structure and benthic prey could all persist for months to years...In all three habitats, changes in benthic prey could be negative, due to damage by the gear, and may be positive or negative due to nutrient enrichment or food availability from bait. "

A total 197,732 pot/trap trips reported a point location in VTR data from 1995-2000. The distribution of dredge trips is presented in Figure 22 of Appendix A. Fishing trips are the only effort data currently available to evaluate the frequency and intensity of the fishing gear, and therefore, extent of the fishing gear impact. The limitations of these data are stated in section 3.2.7.2.1.

Conceptual models to predict the impact of fishing gear on habitat are set forth in Auster and Langton (1998). Table 37 is a representation of the impacts of fishing gear on habitat types that are designated as EFH for summer flounder, scup, and black sea bass. This table demonstrates that not enough information is available to determine to what extent habitats are impacted by fishing gear.

3.2.7.2.3 Determination of Adverse Effects from Fishing

Under the EFH Final Rule "Councils must act to prevent, mitigate, or minimize any adverse effect from fishing, to the extent practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature..." "Adverse effect" means any impact that reduces the quality or quantity of EFH. Based on the above evaluation, evidence is presented that indicates that otter trawls and scallop dredges have the potential to impact EFH in a manner that is "more than minimal and not temporary in nature" (section 3.2.7.2.2). This is the baseline impact of fishing gear. Therefore the Council must: 1) propose alternatives to prevent, mitigate or minimize adverse effects from these gear (section 2.2), and 2) evaluate those alternatives for practicability (section 4.2). The Final Rule states, "In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with National Standard 7." The alternative proposed for minimizing adverse effects from fishing are evaluated for practicability under the subsections "Effects on Essential Fish Habitat" in Section 4.2.

In Amendment 13 to the Surfclam and Ocean Quahog FMP, the Council concluded, based upon evidence from the gear workshop (Appendix B), that clam dredges do not have an identifiable adverse effect on EFH. Impacts from this gear are temporary and minimal, as the fishery is currently prosecuted. If the gear is fished improperly or in the wrong sediment clam dredges could have a negative impact. However, the clam resources are concentrated in sandy sediment. The fishing gear has evolved over the past five decades to fish most efficiently in this type of sediment. The overall effect of clam dredges is to a small area, relative to a sandy habitat that is spread over a large uniform area.

4.2 OPTIONS FOR MANAGING ADVERSE EFFECTS FROM FISHING

According to the Final Rule [50 CFR Section 600.815 (2)(ii)], "...FMPs should identify a range of potential new actions that could be taken to address adverse effects on EFH, include an analysis of the practicability of potential new actions, and adopt any new measures that are necessary and practicable...." Thus, a "Practicability Analysis" was added as a subsection to each section of "Impacts on EFH" for each EFH alternative.

Section 600.815(2)(iii) states that "In determining whether it is practicable to minimize and adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and long-term and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with National Standard 7...."

4.2.1 Status Quo: current management measures (EFH Alternative 1: No Action)

Practicability Analysis

While it is true that fishing gear, especially, bottom tending mobile gear, as described in section 3.2.7.1, may adversely impact habitat, the status quo condition relates to the current conditions in the fishery. Each FMP, for overfished species, managed by MAFMC includes a rebuilding schedule that reduces fishing mortality in a stepwise fashion. The reduction in fishing mortality results in a decrease in fishing effort, which translates in an overall reduction in impacts of fishing gear on the EFH of managed species, as well as other species' EFH. Once a stock is rebuilt, the fishing mortality will remain at F_{MSY} (or a proxy such as F_{MAX}). As stock size increases, quotas will increase under this fishing mortality. However, catchability will also increase. While an increase in participation in the fishery due to latent effort is possible with higher quotas, a higher catchability of the same target fishing mortality should mean that overall fishing effort will not increase.

The EFH Final Rule [50 CFR Section 600.10] states that "*Essential fish habitat (EFH)* is those waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity," where "'necessary' means habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem." Under the current management regime, summer flounder, scup, and black sea bass biomass is increasing. This indicates that a sustainable fishery is possible without creating additional measures to protect EFH, i.e. the measures that are currently in place are sufficient to achieve a sustainable fishery.

To date, improving stock status for summer flounder, scup, and black sea bass is evidence of positive cumulative biological impacts resulting from the current management system. In addition, the Council has implemented many regulations, that have indirectly acted to reduce fishing gear impacts on EFH. Cumulatively, many of the current regulations have restricted fishing effort and thus reduced gear impact on bottom habitat. Such regulations include restrictive harvest limits, gear restricted areas, and restriction on roller rig gear to 18" for scup and black sea bass. These measures helped to improve the status of the stocks while conserving marine habitat.

Maintaining the status quo will not require the industry to incur any additional short or long-term costs. The short-term benefit of current regulations is that stock biomass is increasing which will allow quotas to increase. The long-term benefit of maintaining the current regulations will allow the stock to rebuild with additional protection to habitat. This management alternative is consistent with National Standard 7 which requires that management measures "minimize costs and avoid unnecessary duplication."

It is the determination of Council staff that this management measure is practicable, relative to the criteria set forth in the Final Rule [50 CFR Section 600.815 (2) (iii)].

4.2.2 Prohibit bottom tending mobile gear from the nearshore areas surrounding estuaries (EFH Alternative 2)

Practicability Analysis

As described above, this alternative may result in some long-term benefits to EFH. However, the benefits to EFH or to stocks are unquantifiable for two reason: 1) the importance of these areas to stocks cannot be quantified, and 2) the extent of the impacts cannot be quantified. Economic analyses indicate that this alternative will result in short-term costs to the fishing industry, especially those deploying scallop dredges and bottom otter trawls. These costs are described completely above.

This management alternative is not consistent with National Standard 7 which requires that management measures "minimize costs and avoid unnecessary duplication." It results in extreme costs to the fishery and is unnecessarily duplicative of the status quo management measures, which have resulted, and will continue to result in a decrease in fishing impacts to habitat.

It is the determination of Council staff that this management measure is not practicable, relative to the criteria set forth in the Final Rule [50 CFR Section 600.815 (2) (iii)].

4.2.3 Prohibit bottom tending mobile gear in the area surrounding the Hudson Canyon (EFH Alternative 3)

Practicability Analysis

As described above, this alternative may result in some long-term benefits to EFH. However, the benefits to EFH or to stocks are unquantifiable for two reason: 1) the importance of this area to stocks cannot be quantified, and 2) the extent of the impacts cannot be quantified. Economic analyses indicate that this alternative will result in significant short-term costs to the fishing industry. These costs are described completely above.

This management alternative is not consistent with National Standard 7 which requires that management measures "minimize costs and avoid unnecessary duplication." It results in extreme costs to the fishery and is unnecessarily duplicative of the status quo management measures, which have resulted, and will continue to result in a decrease in fishing impacts to habitat.

It is the determination of Council staff that this management measure is not practicable, relative to the criteria set forth in the Final Rule [50 CFR Section 600.815 (2) (iii)].

4.2.4 Roller rig and rock hopper gear restrictions (EFH Alternative 4)

Biological Impacts

In general, 10-12" diameter rollers can be used for fishing over rough bottom that can include ledges and cliffs (MAFMC 1996). However, limitations on roller size will make some areas of the ocean inaccessible to trawls by preventing fishermen from trawling in the harder, rough bottom areas (MAFMC 1996). Such structured habitat is more complex and thus more vulnerable to fishing gear. Restricting these gear may help to improve the status of the stocks, leading to recovery, while conserving marine habitat. Gear modifications/restrictions offer the possibility of reducing impacts to EFH throughout the entire region, rather than just in closed areas.

Roller diameter is correlated with vessel size and the ability of vessels to fish rough, hard bottom areas. Larger roller sizes require larger engine sizes to pull the net. An engine size with an associated horsepower of 800-900 hp is required to tow a net with 18" to 24" rollers, whereas 10" to 12" rollers can be pulled by a boat using a 175 to 200 hp engine (D. Simpson pers. comm.).

Information is lacking as to the relationship between roller diameter and the size of the obstruction that it can clear. In general 10" to 12" diameter rollers can be used for fishing over rough bottom that includes ledges and cliffs (MAFMC 1996).

There is some concern as to the effect of roller rig and rock hopper gear on mud bottom areas in the Mid-Atlantic Bight. However, roller rig and rock hopper gear are predominantly used to fish in rough and structured hard bottom areas (NMFS 2001). Additionally, NMFS (2001) states that, "Mud is rare over most of the shelf, but is common in the Hudson valley. Occasionally relic estuarine mud deposits are re-exposed in the swales between sand ridges."

Limitations on roller size will make some areas of the ocean inaccessible to trawls by preventing fishermen from trawling in the harder, rough bottom areas. In addition to protecting the habitat, such measures would afford additional protection to target and non-target species in those areas. However, smaller rollers may be more damaging in some areas of the ocean because smaller rollers result in less of a "bouncing" motion off of structured habitat and cause more of a shearing or crushing effect. As such, it is unknown whether restrictions on roller rig and rock hopper gear would result in positive biological impacts, relative to the status quo.

Effects on Essential Fish Habitat

The restrictions proposed under this alternative may be an effective means of reducing impacts to habitat that is important to summer flounder, scup, and black sea bass. This alternative would make some vulnerable areas inaccessible to trawling. However, some anecdotal evidence indicates a small roller size could result in a negative impact to EFH. As such, it is unknown whether or not this alternative would have a positive impact on essential fish habitat, relative to the status quo.

Practicability Analysis

As described above, it is unknown whether or not this alternative would result in a positive impact to EFH. The short and long-term costs to the industry are also unknown. Public comment was specifically requested on the size of use of roller and rock hopper gear, yet the only additional information that was received is that roller gear larger than 12" in diameter is not allowed in the western Gulf of Maine to the beach, and no roller gear greater than 24" to fish in the EEZ. This management alternative is consistent with National Standard 7 which requires that management measures "minimize costs and avoid unnecessary duplication."

With such little information available, it is the determination of Council staff that this management measure is not practicable, relative to the criteria set forth in the Final Rule [50 CFR Section 600.815 (2) (iii)].

4.2.5 Prohibit street-sweeper gear (EFH Alternative 5)

Practicability Analysis

As described above, this alternative is expected to have a positive impact to EFH. The short and long-term costs to the industry are unknown. Public comment was specifically requested on the use of street sweeper gear, yet no additional information was received. Anecdotal evidence indicates that this gear is not currently used in the Mid-Atlantic and has already been prohibited by NEFMC. As such the economic impact of this alternative is unknown, but expected to be low. This management alternative is consistent with National Standard 7 which requires that management measures "minimize costs and avoid unnecessary duplication."

It is the determination of Council staff that this management measure is not practicable, relative to the criteria set forth in the Final Rule [50 CFR Section 600.815 (2) (iii)].

Shifts in Fishing Effort

NMFS commented that the "DEIS does not describe adequately potential shifts of fishing efforts from current conditions. A better characterization of how effort may shift between areas, gear types, and seasons in the quota alternatives and the removal of the permit restriction alternative would provide the Council with a comparison to current conditions. It would also provide more ability to determine the impacts on habitat and protected species. There is an inconsistency in many of the alternatives with respect to both EFH and protected species where the document describes potential shifts of fishing effort, but the description of the effects on EFH and protected species imply that no shifts in fishing effort are expected. If the conclusion remains that there are no fishing effort shifts, information must be supported that supports this conclusion." Council staff addressed this comment by including a description of how shifts in landings (described in the economic subsections in section 4.1) could relate to shifts in fishing effort by season, area, and gear. Although, as previously stated in the document, no overall increase in fishing effort is expected, there could be shifts in fishing effort by season, area, and gear under some alternatives. These are addressed in the subsections on "Impacts on Marine Mammals, Sea Turtles, and Sea Birds" and "Effects on Essential Fish Habitat." The prior conclusions related to impacts on protected resources and EFH only change for the alternative on allocation of the quota by gear type (section 4.1.8).

4.1 BLACK SEA BASS COMMERCIAL QUOTA ALTERNATIVES

4.1.2 Quarterly quota systems with a rollover provision (Alternatives 2a and 2b)

Effects on Marine Mammals, Sea Turtles, and Sea Birds

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. The Mid-Atlantic coastal gill net fishery is a category II fishery causing occasional serious injuries and mortalities to marine mammals. As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns throughout the year. For example, if landings are decreased in the first quarter and increased in the second quarter, then it is possible that fishing effort could follow the same pattern. Such a shift in effort is not expected to adversely impact marine mammals, sea turtles, and sea birds, relative to the status quo, since overall effort would not increase.

Effects on Essential Fish Habitat

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. Adding a rollover provision to the status quo measures and changing the base years is not expected to increase fishing effort or redistribute effort by gear type. The systems proposed under this alternative are just as likely to achieve the rebuilding schedule as the current system (Alternative 1: status quo). This assumption is based the redistribution of the quarterly quotas under both allocation formulas and the fact that the first three quarters in 2001 closed early. However, this alternative may result in changes in landings patterns throughout the year. For example, if landings are decreased in the first quarter and increased in the second quarter, then it is possible that fishing effort could follow the same pattern. However, such a shift in effort is not expected to adversely impact EFH, relative to the status quo, since overall effort would not increase.

4.1.4 Quota allocation to separate subregions (Alternatives 4a and 4b)

4.1.5.1 State-by-state allocation alternatives (Alternatives 5a, 5b, 5c, and 5d)

Effects on Marine Mammals, Sea Turtles, and Sea Birds

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. The Mid-Atlantic coastal gill net fishery is a category II fishery causing occasional serious injuries and mortalities to marine mammals. As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns along the coast. For example, landings are decreased in the northern subregion and increased in southern subregion, it is possible that fishing effort could follow the same pattern. However, such a shift in effort is not expected to adversely impact marine mammals, sea turtles, and sea birds, relative to the status quo, since overall effort would not increase.

Effects on Essential Fish Habitat

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. This set of alternatives is not expected to increase fishing effort or redistribute effort by gear type. This alternative is expected to have a greater probability of achieving the annual quota relative to the current system (Alternative 1: Status quo). As such, this alternative is more likely to achieve the target mortality rates. As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns along the coast. For example, if landings are decreased in the northern subregion and increased in southern subregion, it is possible that fishing effort could follow the same pattern. However, such a shift in effort is not expected to adversely impact EFH, relative to the status quo, since overall effort would not increase.

4.1.6 Hybrid quota system: coastwide quota from January through April and state-by-state quotas May through December (Alternatives 6a, 6b, and 6c)

4.1.7 Hybrid quota system: coastwide quota from January through April and subregional quotas May through December (Alternatives 7a and 7b)

Effects on Marine Mammals, Sea Turtles, and Sea Birds

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. The Mid-Atlantic coastal gill net fishery is a category II fishery causing occasional serious injuries and mortalities to marine mammals. As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns throughout the year and along the coast. For example, if landings are decreased in the first quarter and increased in the second quarter, then it is possible that fishing effort could follow the same pattern. However, such a shift in effort is not expected to adversely impact marine mammals, sea turtles, and sea birds, relative to the status quo, since overall effort would not increase.

Effects on Essential Fish Habitat

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. This set of alternatives is not expected to increase fishing effort or redistribute effort by gear type. This alternative is expected to have a greater probability of achieving the annual quota relative to the current system (Alternative 1: Status quo). As such, this alternative is more likely to achieve the target mortality rates. As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns throughout the year. For example, if landings are decreased in first quarter and increased in the second quarter, then it is possible that fishing effort could follow the same pattern. Such a shift in effort is not expected to adversely impact EFH, relative to the status quo, since overall effort would not increase.

4.1.8 Allocation by gear type (Alternatives 8a and 8b)

Effects on Marine Mammals, Sea Turtles, and Sea Birds

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. The Mid-Atlantic coastal gill net fishery is a category II fishery causing occasional serious injuries and mortalities to marine mammals.

As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns among fishing gear type. For example, if landings increase for bottom otter trawls and pots and traps and decrease for gill nets, lines, and other gear, it is possible that fishing effort could follow the same pattern. Such a shift in effort may have a positive impact on protected resources, relative to the status quo, because the pot/trap and mixed trawl fisheries are category III fisheries while the gill net fishery is a category II fishery (as described above).

Effects on Essential Fish Habitat

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. This set of alternatives is not expected to increase fishing effort or redistribute effort by gear type. This alternative is expected to have a greater probability of achieving the annual quota relative to the current system (Alternative 1: Status quo).

As discussed in the economics subsection (above) this alternative would not result in an overall increase in quota, or an increase in overall fishing effort. However, this alternative may result in changes in landings patterns among fishing gear type. For example, if landings increase for bottom otter trawls and pots and traps and decrease for gill nets, lines, and other gear, it is possible that fishing effort could follow the same pattern. Such a shift in effort may have a negative impact on EFH, relative to the status quo, because, as described in section 3.2.7.1, the bottom otter trawl fishery is a bottom tending mobile gear and is may have a greater adverse impact on benthic habitat relative to gill nets.

4.1.9 Permit requirements for fishermen that have both a Northeast Black Sea Bass commercial permit and a Southeast Snapper/Grouper permit (Alternatives 9a and 9b)

4.1.9.2 Remove the permit restriction on fishermen with both a Northeast Black Sea Bass commercial permit and a Southeast Snapper/Grouper permit (Alternative 9b)

Effects on Marine Mammals, Sea Turtles, and Sea Birds

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. The Mid-Atlantic coastal gill net fishery is a category II fishery causing occasional serious injuries and mortalities to marine mammals. This alternative only affects 5 fishing vessels and is not expected to increase fishing effort or redistribute effort by gear type. As such, this set of alternatives is not expected to impact species of marine mammals, sea turtles, and sea birds, relative to the status quo.

Effects on Essential Fish Habitat

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, gill nets, and lines. This alternative only affects 5 fishing vessels and is not expected to increase fishing effort or redistribute effort by gear type, relative to the current system (Alternative 1: Status quo). As such, this alternative is not expected to increase existing impacts on essential fish habitat.

De Minimus specifications

As indicated in the comment letter, NMFS has disapproved *de minimus* specifications for summer flounder, scup, and black sea bass. However, the states have adopted this measure in the implementation of state quotas. Council staff have nothing to add beyond the discussion and analyses included in the draft Amendment.

National Standards

As noted in the comment, Council staff will completely address the National Standards when the Council and Commission choose a preferred alternative. This was discussed with NMFS/NERO prior to the completion of the draft amendment. In addition, once the Council and Commission decide on a preferred alternative, Council staff will respond to all public comments including those from Massachusetts and Rhode Island.

Other Issues

One of the alternatives considered but rejected for further analysis in the draft Amendment was the use of base years before 1988 or after 1997 in the allocation formulas for the quota options. At the public hearings, there was public comment that in fact the use of the years after 1997 would be preferred given that federal permit holders were required to report landings beginning in 1997. Specifically, Amendment 9 implemented reporting requirements that improved data collection and increased the accuracy of the landings data. As such, in response to public comment, Council staff prepared a number of additional tables that incorporate landings data from the years 1997 through 2000. These tables are attached.

Table A. Black sea bass allocation by period and region (second period allocation) - - hybrid allocation system.

Period	% Allocation Based on 1988 to 1997 Landings	% Allocation Based on 1993 to 1997 Landings	% Allocation Based on 1997 to 2000 Landings
January-April	45.23% coastwide	43.32% coastwide	34.20% coastwide
May-December	54.77% regional	56.68% regional	65.80% regional

Assuming a hypothetical[1] commercial TAL of 3,024,742lbs.

January-April	1,368,091 lbs	1,310,318 lbs	1,034,462 lbs
May-December	1,656,651 lbs	1,714,424 lbs	1,990,280 lbs

Allocating the May-December quota component to regions based on 1988-1997 landings, 1993-1997, and 1997-2000 landings would yield the following regional allocations:

Region	% Years 1988-1997	Lbs	% Years 1993-1997	Lbs	% Years 1997-2000	Lbs
North	16.56%	274,278	14.92%	255,865	34.28%	682,268
South	83.44%	1,382,373	85.08%	1,458,559	65.72%	1,308,012
Total	100.00%	1,656,651	100.00%	1,714,424	100.00%	1,990,280

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.

Table B. Potential changes in black sea bass landings associated with the hybrid allocation system during the second period (May-December) -- by region -- for a hypothetical[1] overall commercial TAL of 3,024,742 pounds for 2002.

Region	2000 Landings[2]	2002 Allocation Based on 88-97 Landings	% Change	2002 Allocation Based on 93-97 Landings	% Change	2002 Allocation Based on 97-00 Landings	% Change
North	1,012,604	274,278	-72.91%	255,865	-74.73%	682,268	-32.62%
South	575,400	1,382,373	140.25%	1,458,559	153.49%	1,308,012	127.32%
Total	1,588,004	1,656,651	4.32%	1,714,424	7.96%	1,990,280	25.33%

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.
[2]Preliminary Dealer Data.

Table C. State-by-state allocations based on black sea bass commercial landings for various time periods and a hypothetical[1] commercial TAL of 3,024,742 pounds for 2002.

State	% Years 1988-1997	Lbs	% Years 1993-1997	Lbs	% Best 5-Years[2] 1980-1997	Lbs	% Best 5-Years[3] 1988-1997	Lbs	% Years 1997-2000	Lbs
ME	0.02553	772	0.00078	24	0.05442	1,646	0.04009	1,213	0.00008	3
MA	6.02379	182,204	1.75622	53,121	8.43915	255,262	8.48876	256,763	14.59063	441,329
RI	5.30718	160,529	5.53435	167,400	11.54037	349,066	5.43565	164,415	5.47869	165,716
CT	0.48724	14,738	0.34728	10,504	0.71951	21,763	0.59939	18,130	0.46642	14,108
NY	4.87516	147,461	7.32968	221,704	4.77150	144,326	5.14870	155,735	6.97196	210,884
NJ	34.95525	1,057,306	38.24540	1,156,825	24.65877	745,864	32.17333	973,160	22.02745	666,274
DE	4.98318	150,728	4.83627	146,285	3.72852	112,778	4.70218	142,229	4.66821	141,201
MD	13.25920	401,057	14.69033	444,345	10.04929	303,965	12.75725	385,874	15.02861	454,577
VA	20.99862	635,154	21.24519	642,612	22.71508	687,073	20.59599	622,976	25.27154	764,399
NC	9.08484	274,793	6.01449	181,923	13.32338	402,998	10.05866	304,249	5.49639	166,252
Total	100.00000	3,024,742	100.00000	3,024,742	100.00000	3,024,742	100.00000	3,024,742	100.00000	3,024,742

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.
[2]Best 5-years commercial landings for each state during the 1980 to 1997 period.
[3]Best 5-years commercial landings for each state during the 1988 to 1997 period.

Table D. Potential changes in black sea bass landings associated with four state-by-state quota allocations and a hypothetical[1] commercial TAL of 3,024,742 pounds for 2002 compared to the based year.

State	2000 Landings[2]	2002 Quota Based on 1988-1997 Landings	% Change	2002 Quota Based on 1993-1997 Landings	% Change	2002 Quota Based on Best 5-Years[3] 1980-1997	% Change	2002 Quota Based on Best 5-Years[4] 1988-1997	% Change	2002 Quota Based on 1997-2000 Landings	% Change
ME	9	772	8480.55%	24	161.55%	1,646	18189.26%	1,213	13372.75%	3	-71.91%
MA	626,012	182,204	-70.89%	53,121	-91.51%	255,262	-59.22%	256,763	-58.98%	441,329	-29.50%
RI	101,494	160,529	58.17%	167,400	64.94%	349,066	243.93%	164,415	61.99%	165,716	63.28%
CT	14,795	14,738	-0.39%	10,504	-29.00%	21,763	47.10%	18,130	22.54%	14,108	-4.64%
NY	134,960	147,461	9.26%	221,704	64.27%	144,326	6.94%	155,735	15.39%	210,884	56.26%
NJ	588,110	1,057,306	79.78%	1,156,825	96.70%	745,864	26.82%	973,160	65.47%	666,274	13.29%
DE	55,283	150,728	172.65%	146,285	164.61%	112,778	104.00%	142,229	157.27%	141,201	155.42%
MD	304,927	401,057	31.53%	444,345	45.72%	303,965	-0.32%	385,874	26.55%	454,577	49.08%
VA	648,118	635,154	-2.00%	642,612	-0.85%	687,073	6.01%	622,976	-3.88%	764,399	17.94%
NC	185,334	274,793	48.27%	181,923	-1.84%	402,998	117.44%	304,249	64.16%	166,252	-10.30%
Total	2,659,042	3,024,742	13.75%	3,024,742	13.75%	3,024,742	13.75%	3,024,742	13.75%	3,024,742	13.75%

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.
[2]Preliminary Dealer data.
[3]Best 5-years commercial landings for each state during the 1980 to 1997 period.
[4]Best 5-years commercial landings for each state during the 1988 to 1997 period

Table E. Black sea bass allocation by period and by state (second period allocation)- - hybrid allocation system.

Period	% Allocation Based on 1988 to 1997 Landings	% Allocation Based on 1993 to 1997 Landings	% Allocation Based on 1980 to 1997 Landings	% Allocation Based on 1997 to 2000 Landings
January-April	45.23% coastwide	43.32% coastwide	50.18% coastwide	34.20% coastwide
May-December	54.77% state-by-state	56.68% state-by-state	49.82% state-by-state	65.80% state-by-state

Assuming a hypothetical[1] commercial TAL of 3,024,742 lbs.

January-April	1,368,091 lbs	1,310,318 lbs	1,517,816 coastwide	1,034,462 coastwide
May-December	1,656,651 lbs	1,714,424 lbs	1,506,926 state-by-state	1,990,280 state-by-state

Allocating the May-December quota component to states based on 1988-1997, 1993-1997, 1980-1997, and 1997-2000 landings would yield the following state-by-state allocations:

State	% Years 1988-1997	Lbs	% Years 1993-1997	Lbs	% Years 1980-1997[2]	Lbs	% Years 1997-2000	Lbs
ME	0.02017	334	0.00000	0	0.01240	187	0.00013	3
MA	5.87660	97,355	2.96464	50,826	10.03248	151,182	22.21251	442,091
RI	5.26069	87,151	4.64630	79,657	13.56661	204,439	5.32553	105,993
CT	0.15373	2,547	0.32472	5,567	0.08752	1,319	0.30516	6,074
NY	5.24499	86,891	6.98859	119,814	6.45691	97,301	6.43430	128,061
NJ	39.29247	650,939	39.27077	673,267	33.39988	503,312	18.08033	359,849
DE	5.33329	88,354	4.42180	75,808	1.90153	28,655	6.93763	138,078
MD	23.68344	392,352	25.58454	438,627	20.51459	309,140	21.85468	434,969
VA	10.92528	180,994	11.98461	205,467	10.39684	156,673	16.03791	319,199
NC	4.20933	69,734	3.81403	65,389	3.63115	54,719	2.81182	55,963
Total	99.99999	1,656,651	100.00000	1,714,424	100.00000	1,506,926	100.00000	1,990,280

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.
[2]New Hampshire would received 0.00009% of allocation.

Table F. Potential changes in black sea bass landings associated with the hybrid allocation system during the second period (May-December) --state-by-state -- for a hypothetical[1] overall commercial TAL of 3,024,742 pounds for 2002.

State	2000 Landings[2]	2002 Allocation Based on 88-97 Landings	% Change	2002 Allocation Based on 93-97 Landings	% Change	2002 Allocation Based on 80-97 Landings	% Change	2002 Allocation Based on 97-00 Landings	% Change
ME	9	334	3612.74%	0	-100.00%	187	1976.73%	3	-71.77%
MA	625,459	97,355	-84.43%	50,826	-91.87%	151,182	-75.83%	442,091	-29.32%
RI	67,790	87,151	28.56%	79,657	17.51%	204,439	201.58%	105,993	56.36%
CT	3,266	2,547	-22.02%	5,567	70.46%	1,319	-59.62%	6,074	85.96%
NY	76,929	86,891	12.95%	119,814	55.75%	97,301	26.48%	128,061	66.47%
NJ	239,151	650,939	172.19%	673,267	181.52%	503,312	110.46%	359,849	50.47%
DE	51,567	88,354	71.34%	75,808	47.01%	28,655	-44.43%	138,078	167.76%
MD	281,473	392,352	39.39%	438,627	55.83%	309,140	9.83%	434,969	54.53%
VA	202,404	180,994	-10.58%	205,467	1.51%	156,673	-22.59%	319,199	57.70%
NC	39,956	69,734	74.53%	65,389	63.65%	54,719	36.95%	55,963	40.06%
Total	1,588,004	1,656,651	4.32%	1,714,424	7.96%	1,506,926	-5.11%	1,990,280	25.33%

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.
[2]Preliminary Dealer Data.

Table G. Black sea bass landings (percentage) by gear type and month, Maine to Cape Hatteras, North Carolina, 1997-2000, combined.

	MONTH											
Gear	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bottom/Mid water trawls	69.48	83.01	86.23	70.29	10.62	3.96	2.86	3.86	4.59	3.62	17.68	18.96
Pot/Traps	13.91	4.98	1.98	17.10	77.17	77.72	76.17	70.34	64.35	74.30	68.97	73.51
Gill Nets	0.25	0.04	0.16	2.77	0.49	0.47	2.02	0.79	1.14	1.24	0.88	0.32
Lines	16.24	11.93	10.16	9.02	7.92	10.18	16.47	24.40	28.56	16.42	12.02	7.15
Other	0.13	0.03	1.47	0.83	3.80	7.67	2.47	0.61	1.36	4.42	0.46	0.06
Total	100.01	99.99	100.00	100.01	100.00	100.00	99.99	100.00	100.00	100.00	100.01	100.00

Table H. Black sea bass landings (percentage) by gear type, Maine to Cape Hatteras, North Carolina, for various time periods.

Gear Type	88-97	93-97	00	97-00
Bottom/Mid water trawls	45.82%	45.51%	29.88%	32.37%
Pot/Traps	44.72%	43.14%	48.82%	51.82%
Gill Nets	0.40%	0.65%	1.56%	0.81%
Lines	7.75%	8.37%	13.67%	12.62%
Other	1.31%	2.33%	6.07%	2.37%

Table I. Potential changes in black sea bass landings associated with gear allocation for a hypothetical[1] TAL of 3,024,742 pounds for 2002.

Gear Type	2000 Landings[1]	2002 Allocation Based on 88-97 Landings	% Change	2002 Allocation Based on 93-97 Landings	% Change	2002 Allocation Based on 97-00 Landings	% Change
Bottom/Mid water trawls	794,461	1,385,937	74.45	1,376,560	73.27	979,109	23.24
Pot/Traps	1,298,031	1,352,665	4.21	1,304,874	0.53	1,567,421	20.75
Gill Nets	41,534	12,099	-70.87	19,661	-52.66	24,500	-41.01
Lines	363,511	234,418	-35.51	253,171	-30.35	381,722	5.01
Other	161,505	39,624	-75.47	70,476	-56.36	71,686	-55.61
Total	2,659,042	3,024,742	13.75	3,024,742	13.75	3,024,742	13.75

[1]Preliminary Dealer Data.

Table J. Commercial landings and permit statistics by vessel category (GRT) for the black sea bass fishery, 2000.

					UNKNOWN VESSELS			
	<5 GRT	5-50 GRT	51-150 GRT	>150 GRT	GRT ?	<5 GRT	>5 GRT	Grand Total
BLACK SEA BASS								
Total pounds landed[1,2]	265,082	885,187	733,452	256,104	19,849	457,283	40,609	2,657,566
# of vessels that landed	97	280	282	64				723
# of vessels w/ Black Sea Bass limited access permit	171	355	360	91				977
# of vessels that landed w/permit	55	169	241	60				525
-lbs landed	200,756	727,153	724,479	255,347				1,907,735
# of vessels that landed w/out permit	42	111	41	4				198
-lbs landed	64,326	158,034	8,973	757				232,090

[1]Maine through North Carolina
[2]Live pounds

APPENDIX B. AMENDMENT 1 TO THE BLACK SEA BASS FISHERY MANAGEMENT PLAN (ASMFC 2002)

August 19, 2002

Fishery Management Report

of the

Atlantic States Marine Fisheries Commission

Amendment 1 to the Interstate Fishery Management Plan for Black Sea Bass

August 2002

1 EXECUTIVE SUMMARY

This Amendment to the Fishery Management Plan (FMP) for the Black Sea Bass fishery, prepared by the Mid-Atlantic Fishery Management Council (Council) and Atlantic States Marine Fisheries Commission (Commission), is intended to manage the black sea bass (*Centropristis striata*) fishery pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSFCMA), as amended by the Sustainable Fisheries Act (SFA) in 1996. This amendment is designed to revise the quarterly commercial quota system for black sea bass implemented in Amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan.

The management unit for black sea bass remains unchanged in this amendment. Specifically, the management unit is in US waters in the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US-Canadian border.

The objectives of the FMP are:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass.

3. Improve the yield from these fisheries.

4. Promote compatible management regulations between state and federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

The following is a brief description of the management measures adopted by the Commission for the black sea bass fishery. These measures will be in place for 2003 and 2004, at which time their effectiveness will be evaluated and any changes to the management plan will be made (a complete description of the adopted management measures is in Section 7)

Black Sea Bass Commercial Management

State-by-state allocations

The Summer Flounder, Scup and Black Sea Bass Management Board approved a state-by-state allocation program for 2003 and 2004 based on recent landings trends. The National Marine Fisheries Service will approve a coastwide black sea bass quota, which the states will allocate using the following percent shares:

State	Percent of Coastwide Quota
Maine	.5
New Hampshire	.5
Massachusetts	13
Rhode Island	11
Connecticut	1
New York	7
New Jersey	20
Delaware	5
Maryland	11
Virginia	20
North Carolina	11

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2 INTRODUCTION

The management measures implemented by this amendment will be in place for 2003 and 2004. The effectiveness of the program will be evaluated in preparation for the 2005 specification setting process, at which time the Commission and Council will determine if the program should be continued, modified or terminated. If the Commission and Council terminate this management program, or take no action, the commercial management measures described in Section 9.1.2.3.6 of the 1996 Black Sea Bass FMP will prevail beginning in 2005.

2.1 DEVELOPMENT OF THE PLAN

The black sea bass fishery is managed under the Summer Flounder (*Paralichthys dentatus*), Scup (*Stenotomus chrysops*) and Black Sea Bass (*Centropristis striata*) Fishery Management Plan (FMP) that was prepared cooperatively by the Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (Commission).

This amendment is designed to revise the quarterly commercial quota system for black sea bass implemented in Amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan.

2.2 PROBLEMS FOR RESOLUTION

This management program was approved to remedy a number of problems related to the commercial management system currently in place for black sea bass. Specifically, the quarterly quota system implemented in Amendment 9 was designed to allow for black sea bass to be landed during the entire 3 months in each quarter. However, the black sea bass fishery experienced early closures during the last three quarters in 1999 and 2000. In fact, in quarters 3 and 4 of 2000 the quarterly allocation was harvested within one month, leaving the fishery closed for the remaining two months of those quarters. In 2001, the quarters 1 through 4 also experienced early closures and quarter 3 of 2001 was closed in less than three weeks.

Long closures have obvious economic consequences to fishermen and processors. A market glut at the beginning of the quarter allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the additional economic concerns of no or reduced income.

In addition to early closures, the quota in the first quarter was not taken in 1998, 1999, and 2000. This relates to the fact that the allocation percentages are based on historic landings during a period of time when the mesh size for summer flounder was smaller and the fishery was mixed, i.e., fishermen targeting summer flounder with 4" mesh landed significant quantities of black sea bass as bycatch from January through March. As a result of the quota system and minimum mesh sizes for summer flounder, the flounder fishery is now very direct and fewer sea bass were landed in the winter fishery in 1999 and 2000.

Possible inequities were also been created by the current management system as landings have shifted to the north. In fact, preliminary data for quarter 4 in 2000 indicate that 41% of the landings for that quarter occurred in one state, Massachusetts. A shift in abundance of black sea bass to the north may account for these higher landings. However, some fishermen have also indicated that more restrictive possession limits have favored fishing operations in the north where black sea bass are caught closer to shore.

2.3 MANAGEMENT OBJECTIVES

The objectives of the FMP are:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass.

3. Improve the yield from these fisheries.

4. Promote compatible management regulations between state and federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

2.4 MANAGEMENT UNIT

The management units for summer flounder, scup and black sea bass remain unchanged in this amendment. Specifically, the management unit is summer flounder in US waters in the western Atlantic Ocean from the southern border of North Carolina northward to the US-Canadian border, and scup and black sea bass in US waters in the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US-Canadian border.

2.5 MANAGEMENT STRATEGY

This amendment modifies the quota system for black sea bass by implementing a state-by-state allocation system for 2003 and 2004. This modification will allow for a more equitable allocation of the quota and increase the probability that exploitation targets will be met by allowing states to craft regulations that best meet the needs of their fishermen. The Council and Board intend to continue the management programs detailed in the black sea bass FMP to reduce overfishing and rebuild the black sea bass.

3 DESCRIPTION OF THE STOCK

3.1 SPECIES DESCRIPTION AND DISTRIBUTION

The following information on black sea bass range is taken directly from the document "FMP-EFH Source Document, Black Sea Bass: Life History and Habitat Requirements" (Steimle *et al.* 1999b). This document is referred to hereafter as the black sea bass EFH background document.

Black sea bass are basically warm-temperate in distribution, and usually strongly associated with structured, sheltering continental shelf and coastal habitats, such as reefs and wrecks. Black sea bass have been collected or reported from southern Nova Scotia and Bay of Fundy (Scott and Scott 1988) to southern Florida (Bowen and Avise 1990) and into the Gulf of Mexico. The management unit is black sea bass in the western Atlantic Ocean from the US-Canadian border southward to Cape Hatteras, North Carolina. South of there, black sea bass are managed by the South Atlantic Fishery Management Council. Beebe and Tee-Van (1933) also reported that they were once introduced to Bermuda; but the status of that introduction is unknown. Brown *et al.* (1996) reported that the summer migrant fish assemblage, that black sea bass is associated with, has also been reported from scattered sites on the Grand Banks of Canada; however, it is rarely found in the cool waters north of Cape Cod and into the Gulf of Maine (Scattergoode 1952, DeWitt *et al.* 1981, Short 1992). Over this wide distribution, the species is considered as three populations or stocks (northern, southern, Gulf of Mexico), with the northern stock, occurring north of Cape Hatteras, being the focus of this summary review. The life history and habitat uses of the southern and Gulf of Mexico populations, occurring south of Cape Hatteras, are covered in the Southeast Fishery Management Council's Snapper/Grouper FMP.

Beginning with the eggs and larvae of this species, they are generally collected on midshelf to coastal waters in the late spring to late summer (see below for details). Larvae are believed to settle in coastal waters and then as early juveniles move into estuarine or sheltered coastal nursery areas. Boehlert and Mundy (1988) suggest that this may be a two-step process of nearshore accumulation and estuarine passage. During the warmer months, juveniles are found in estuaries and coastal areas, and adults are found in slightly deeper coastal areas, between North Carolina and Massachusetts, often near some kind of shelter. Adults summer in coastal areas, usually containing some structured habitat, along the Middle Atlantic Bight and into the Gulf of Maine. As coastal waters cool in the fall, the population gradually migrates south and offshore to winter on the slightly warmer outer continental shelf off and south of New Jersey. Temperature appears to be the limiting factor in black sea bass distribution, not the availability of structured habitat, north of Cape Cod. In Middle Atlantic Bight waters they are usually the most common fish found on these structured habitats, especially south of New Jersey where the abundance of cunner, *Tautogolabrus adspersus,* declines. These structured habitats have been reported to include shellfish (oyster and mussel) beds, rocky areas, shipwrecks and artificial reefs (Verrill 1873, Bigelow and Schroeder 1953, Musick and Mercer 1977, Steimle and Figley 1996).

One major distinguishing characteristic of the Middle Atlantic Bight population is that it migrates south and offshore to winter in deeper waters between central New Jersey and North Carolina, generally, as bottom water temperatures decline below about 57° F (14° C) in the fall. This population then migrates inshore to reside in southern New England and Middle Atlantic Bight coastal areas and bays as bottom waters warm again above about 45° F (7° C) in the spring (see juvenile and adult distribution discussions below for details). The southern population is not known to make this extensive migration but may move away from shallow coastal areas during periods of cold winter conditions, especially in the Carolinas. Larger fish are commonly found in deeper waters and usually associated with rough bottom (Smith 1907, Hildebrand and Schroeder 1928, Bigelow and Schroeder 1953). Black sea bass have been reported to attain lengths of over 24 inches (60 cm) and weights of 7.7 pounds (3.5 kg) or greater in the Middle Atlantic Bight (Bigelow and Schroeder 1953) and live to up to 20 years; these largest and oldest fish being almost always males.

As previously mentioned, one of the characteristics of this population of black sea bass is its seasonal migrations. The summer coastal population migrates in scattered aggregates in the fall (Musick and Mercer 1977) by generally unknown routes across the continental shelf from the inshore areas to the outer continental shelf wintering areas south of New Jersey as bottom temperatures decline. The locations of a time series of tag returns from adult fish tagged in Nantucket Sound, Massachusetts suggests that this local group of fish migrates directly south to the outer shelf near Block Canyon and moves southwest along this outer shelf zone to the vicinity of Norfolk Canyon, and returned by the same route (Kolek 1990). Offshore migrations are stimulated in the fall as coastal bottom water temperatures approach 45° F (7° C) and the return inshore migration begins in the spring (about April) as inshore bottom water temperatures rise above this 45° F (7° C) level (Nesbit and Neville 1935, June and Reintjes 1957, Colvocoresses and Musick 1984, Chang 1990, Shepherd and Terceiro 1994). Larger fish (again with a high proportion of males) begin migrating offshore sooner than smaller fish (Kendall 1977).

Black sea bass appear to be part of a migratory group of warm temperate species that are intolerant of colder inshore winter conditions. These migrant associate species can include scup, summer flounder, northern sea robin, spotted hake, butterfish and smooth dogfish (Musick and Mercer 1977, Colvocoresses and Musick 1984). The composition of the seasonally migrating group that typically contains black sea bass is reported to vary inshore between spring-summer and fall (Phoel 1985). Any interactions among these species and their shared use of the habitat they transit are unknown, although juvenile-subadult black sea bass could be preyed upon by larger summer flounder and dogfish (see above). All other species, except butterfish, would be competitors for food and perhaps shelter, even if it were only a depression in the sediment or a exposed clam shell.

3.2 ABUNDANCE AND PRESENT CONDITION

The most recent assessment on black sea bass, completed in June 1998, indicates that black sea bass are over-exploited and at a low biomass level (SAW 27). Fishing mortality for 1997, based on length based methods, was 0.73. The complete assessment is detailed in the "Report of the 27th Northeast Regional Stock Assessment Workshop" (NEFSC 1998b).

The NEFSC has provided spring survey results for 2000. Amendment 12 to the Summer Flounder, Scup and Black Sea Bass FMP, which was partially approved by NMFS in 1999, established a biomass threshold based on this survey. Specifically, the biomass threshold is defined as the maximum value of a three-year moving average of the NEFSC spring survey catch-per-tow (1977-1979 average of 0.9 kg/tow).

Survey results indicate black sea bass biomass has increased in recent years; the 1999 value was the highest value in the series since 1979. However, the 1999 index is large because of a single tow that caught a large number of black sea bass in an area slightly north of Cape Hatteras. If that tow is removed from the estimate, the index drops from 0.433 to 0.093 for 1999.

Because of the potential influence of extremely small or large number for a single tow, Gary Shepherd (pers. comm.) has suggested that the survey indices be log transformed to give a better indication of stock status. The transformed series indicates a general increase in the exploitable biomass since 1993. The preliminary index for 2000 of 0.322 is the highest in the time series since 1976 and would substantiate fishermen's observations that black sea bass have become more abundant in recent years. The three-year moving average for 1998-2000 of 0.2011 is a 42% increase relative to the 1997-1999 average.

The spring survey can also be used as an index of recruitment. The survey indicates good year classes were produced from 1988 to 1992 (0.2 to 0.76 fish per tow), with a moderate year class in 1995, and poor year classes in 1993, 1994, 1996 and 1997. The 1999 index was about three times the average for the period 1968-1998 and the fourth largest value since 1968. Preliminary results for 2000 indicate a strong year class; the index is 1.135, the highest in the time series.

Relative exploitation based on the total commercial and recreational landings and the moving average of the transformed spring survey index indicates a significant reduction in mortality in 1998 and 1999 relative to 1996 and 1997 levels. Based on length frequencies from the spring survey, and assuming length of full recruitment at 25 cm, the average F based on two length based methods was 0.75 (48% exploitation rate) in 1998 (Shepherd pers. comm.). Length based estimates are very sensitive to changes in the length used for full recruitment; average F's were 0.51 (37% exploitation) or 1.25 (66% exploitation) if a length of 23 or 27 cm was used in the calculations. Based on the relative index, exploitation rates in 1999 were nearly identical to those estimated for 1998.

3.3 STOCK CHARACTERISTICS AND ECOLOGICAL RELATIONSHIPS

3.3.1 Spawning and early life history

Studies on age at maturity indicate that most black sea bass reach sexual maturity between ages 1 and 4 with 50% mature by age 2 (NEFSC 1993). The length at which 50% of the black sea bass are sexually mature is about 7.7 inches TL (NEFSC 1993).

The following discussion is taken from the black sea bass EFH source document. Like most of the Serranidae family, black sea bass are protogynous hermaphrodites. This means that most black sea bass function first as females, then undergo sexual succession and become functional males (Lavenda 1949). Cochran and Greir (1991) identified the hormonal changes that regulated this sexual succession or transformation in black sea bass.

In general, sex ratios favor females at smaller sizes and younger ages and males at larger sizes and older ages. Based on a compilation of several studies, the probability that a female black sea bass will undergo sexual transformation was greatest between 7 and 10 inches TL (Shepherd pers. comm.) (Table 1). In the Middle Atlantic Bight, individuals begin to become sexually mature at age 1 yr (8-17 cm TL), but it is not until they grow to about 19 cm SL (age 2-3 yrs) that about 50% of that size group are mature (O'Brien *et al.* 1993). A majority of this size-maturity threshold group are females (Mercer 1978). The average size at which sexual transformation from females to male occurs was reported to be between 10-13 inches (23.9-33.7 cm; Chesapeake Bay Program 1996). In the South Atlantic Bight, Cupka *et al.* (1973) reported that both sexes matured at smaller sizes, between 14 and 18 cm SL, in South Carolina waters. However, Wenner *et al.* (1986) and Alexander (1981) found mature fish at smaller sizes, i.e., about 4.0-4.4 inches (10-11 cm; age 1+) for South Carolina and New York populations, respectively, and a majority were mature at about 19 cm, again corresponding to an age of about 2-3 years, as was found for the Middle Atlantic population. Alexander (1981) reported a decrease in the age and size of sex change since the 1940s with fewer mature males in the population; he associated this decrease with increasing fishing pressure.

Based on collections of ripe fish and egg distributions, the species spawns primarily on the inner continental shelf between Chesapeake Bay and Montauk Pt., Long Island at depths of about 66-165 ft (20-50 m; Breder 1932, Kendall 1972, 1977, Musick and Mercer 1977, Wilk *et al.* 1990, Eklund and Targett 1990, Berrien and Sibunka in press), but eggs frequently occurred or spawning have been reported as far north as Buzzards Bay and Nantucket Sound, Massachusetts (Wilson 1889, Sherwood and Edwards 1902, Kolek 1990). Mercer (1978) reported that 2-5 yr old fish release between 191,000 and 369,500 eggs each. Some larvae have been collected in Cape Cod Bay but these were considered stragglers washed there through the Cape Cod Canal from Buzzards Bay and not the product of local spawning (MAFMC 1996b). Gravid females are not generally found in estuaries (Allen *et al.* 1978). Spawning in the Middle Atlantic population is generally reported in the late spring through mid-summer, May to July (Kendall 1972, 1977, Musick and Mercer 1977, Feigenbaum *et al.* 1989, Wilk *et al.* 1990, Eklund and Targett 1990) during inshore migrations, but can extend to October-November (Fahay 1983, Berrien and Sibunka in press). Larval distributions presented in Able *et al.* (1995a) suggest spawning is earliest off Virginia-North Carolina (in the vicinity of the wintering grounds) and progresses northerly and inshore as inner shelf waters warm.

Shepherd and Idoine (1993) noted that the complex social hierarchy of reef fishes during spawning, such as the temperate black sea bass, implies that the number of males may be an important factor limiting reproductive potential. They also noted, however, that theoretical studies suggested that the current relative abundance of males may not yet be limiting in the black sea bass population to the degree that non-dominant males participate in spawning. There are no known reported observations of the actual spawning activity and whether it is near the bottom or water surface. However, in Massachusetts coastal waters, spawning fish have been reported to aggregate on sand bottoms broken by ledges, and after spawning the fish disperse to ledges and rocks in deeper water (Kolek 1990, MAFMC 1996b). From tagging studies, Kolek (1990) reported evidence of spawning ground homing, as some tagged adult black sea bass returned annually to the same spawning grounds in northwestern Nantucket Sound. Kolek (1990) also reported this local spawning group spawned earlier and in shallower waters than generally reported (Kendall 1977). Although nothing is known of the mating of this species, distinct pairing is characteristic of the family (Breder and Rosen 1966).

Black sea bass produce colorless, buoyant eggs that are spherical and approximately 0.04 inches in diameter. Mercer (1978) derived fecundity relationships for 25 black sea bass collected in the Mid-Atlantic. The relationship between total fecundity (F - thousands of eggs) and total weight (W - grams) was:

$$F=-587.684 + 348.053 (\log W)$$

Fertilized black sea bass eggs hatch in approximately 75 hours at a temperature of 61° F. Wilson (1891) described the embryonic development of black sea bass and Kendall (1972) described black sea bass larvae.

3.3.2 Age and growth

Growth in mature black sea bass is sexually dimorphic, with faster growth but resulting in a lower maximum size in females (Lavenda 1949, Mercer 1978, Wilk *et al.* 1978). However, Shepherd and Idoine (1993) suggest that the species can have three possible sex-related growth rates: female, male, and transitional. Alexander (1981) found the males grew faster than females off New York based on otolith annuli analysis for year-1 or older fish. Dery and Mayo (1988), Kolek (1990) and Caruso (1995) reported that black sea bass from southern New England (Massachusetts) had growth rates almost double those reported for New York and Virginia, but different growth estimators were used; this observation is consistent with Mercer (1978) and Wenner *et al.* (1986) who noted that Middle Atlantic Bight fish at age were larger and grew faster than South Atlantic Bight fish. The long-term validity and habitat relationship of this observation is unknown at present. Growth is linear to about age 6, then slows; the Middle Atlantic population is larger at age than the South Atlantic population (Wenner *et al.* 1986).

Mercer (1978) aged 2905 black sea bass collected from commercial fisheries and trawl surveys in the Mid-Atlantic from 1973 to 1975. She found that back-calculated mean lengths almost doubled between ages 1 and 2 and then the rate of growth declined steadily thereafter (Table 2). She did not age any black sea bass older than 9 and larger, older fish were not well represented in the samples. Mercer (1978) also found significant differences in growth rates between male and female black sea bass.

Length-age data (all sexes combined) was fit to the von Bertalanffy growth equation. This equation, which relates age to length, is:

$$L_t=469\ (1-e^{-0.182(t-0.1056)})$$

where L_t is mean standard length (mm) at age t.

Most scientific publications report lengths of black sea bass in standard lengths. The standard length is the length of the fish from the tip of the snout to the posterior end of the hypural bone. However, most state regulations and the regulations pertaining to size in this FMP are in total length. Total length (TL), the length along the mid-line of the fish from the tip of the snout to the tip of the tail, can be derived from standard length using the following formula (Shepherd pers. comm.):

$$TL=1.42076\ (SL) - 30.5$$

where length is measured in millimeters.

3.3.3 Length-weight relationship

Mercer (1978) developed length-weight relationships for black sea bass collected from the Mid-Atlantic Bight. Based on a sample of 2016 fish, the derived equation was:

$$\log w = -4.9825 + 3.1798 (\log l)$$

where weight (w) is in grams and length (l) is standard length in millimeters. Mercer (1978) also found significant differences between sexes with males heavier than females of the same length.

3.3.4 Mortality

The instantaneous natural mortality rate (M) is defined as annual losses experienced by black sea bass from all natural and anthropogenic factors except commercial and recreational fishing. The NEFSC assumed an M of 0.2 for black sea bass in the most recent stock assessment (NEFSC 1995).

The SAW-25 SARC concluded that there was inadequate information to pursue an age-based assessment at least for several years. Therefore, SAW-27 estimated fishing mortality during 1984-1997 was estimated using length-based methods. The Beverton and Holt (1956 in SAW-27) and Hoenig (1987 in SAW-27) method were both applied to length frequencies of the combined commercial and recreational landings and of the spring NEFSC survey. An L_{∞}=66.3 , K=0.168, and length at recruitment of 9.4 inches (24 cm) were used in the estimations. Average annual fishing mortality, estimated from length-based analyses, ranged from 0.56 to 0.79 during 1984-1997 and was 0.73 (48 percent exploitation) in 1997.

3.3.5 Feeding and predation

According to Section 600.815 (a)(8) of the MFCMA, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species may be considered adverse effects on a managed species and its EFH. The following sections on feeding and predation were taken from the black sea bass EFH source document.

3.3.5.1 Feeding

The diets of black sea bass larvae are poorly known and can be expected to be mostly zooplankton. Tucker (1989) reported that black sea bass larvae are capable of surviving and growing at lower prey densities and resist prey abundance fluctuations better then bay anchovy, *Anchoa mitchilli*, larvae.

Juvenile black sea bass are reported to be diurnal, visual predators and prey often on small benthic crustacea (isopods, amphipods, small crabs, sand shrimp, copepods) and other epi- or semi-benthic, estuarine-coastal taxa, such as mysids or smaller fish (Richards 1963a, Kimmel 1973, Allen *et al.* 1978, Werme 1981). Kimmel (1973) included polychaete worms as significant dietary items and reported a diet shift with juvenile growth, from mysids (55%) and amphipods (15%) at 1.2-3.5 inches (3.0-9.0 cm) SL to xanthid and other crabs (35%), mysids (19%) and polychaetes (14%) for 3.5-5.7 inches (9.1-14.6) cm SL sub-adults. Orth and Heck (1980) reported sub-adults (5.5-6.4 inches [14.0-16.5 cm] TL) using and feeding within eelgrass beds in lower Chesapeake Bay; prey were juvenile blue crabs, eelgrass fragments, isopods, caprellid amphipods, shrimp and pipefish, *Syngnathus* sp. Festa (1979) also reported various crabs (lady, blue and mud) and caridean shrimp as major diet items in a small sampling from a central New Jersey estuary. Allen *et al.* (1978) reported small bait fish (anchovies and silversides, *Anchoa* sp. and *Menidia* sp.) became most evident in the diets of southern New Jersey coastal-estuarine black sea bass between 4.3 inches and about 7.0 inches (11 cm and about 18 cm) lengths; but so did an increase in the occurrence of plant detritus, though crustacea were still the most common prey.

While on their summer habitat, adult black sea bass continue to feed on a variety of infaunal and epibenthic invertebrates (especially crustacea, including juvenile lobster) and small fish, and on pelagic squid and baitfish (Bigelow and Schroeder 1953, Miller 1959, Richards 1963a, Mack and Bowman 1983, Steimle and Figley 1996). Feeding was reported heaviest after spawning (Hoff 1970). The diets and feeding while the population is wintering offshore is poorly known. The potential benthic invertebrate macrofaunal prey in the wintering area is known to be variable and can be dominated by echinoderms (sand dollars and sea stars), molluscs such as razor clams, and polychaetes (Wigley and Theroux 1981, Steimle 1990). Some co-wintering guild species, e.g., scup (Austen *et al.* 1994), can be competitors for habitat or food. Other guild species, such as butterfish and squid, can be prey for adult black sea bass.

3.3.5.2 Predation

There are a multitude of potential larval black sea bass predators, and "jellyfish" can be a significant source of larval mortality when they are abundant in the coastal zone (Arai 1988).

Hartman and Brandt (1995) included black sea bass, presumably juvenile, in the summer diets of one year old weakfish, *Cynoscion regalis*, and other predators in Chesapeake Bay. Summer flounder, smooth dogfish and toadfish are potential demersal predators of juvenile black sea bass, and exposed juveniles can also be prey to piscivorous bluefish, *Pomatomus saltatrix*, striped bass, *Morone saxatilus,* weakfish and other predators that use the entire water column, including fish-eating diving birds. Steimle (unpub. data) found juvenile black sea bass in the stomachs of the following predators examined in Raritan Bay during the summer 1997: clearnose skate (*Raja eglanteria*), northern and striped sea robin (*Prionotus evolans*), summer flounder, spot, and possibly others (e.g., weakfish, bluefish, toadfish, smooth dogfish, and four-spot flounder, *Paralichthys oblongus*) whose stomachs contained small unidentified, partially digested fish, similar in size and shape to juvenile black sea bass.

The NEFSC food habits database lists the following as predators of black sea bass: spiny dogfish, *Squalus acanthias*; Atlantic angel shark, *Squatina dumeril*; clearnose skate; little skate, *Raja erinacea*; spotted hake; summer flounder; windowpane, and goosefish, *Lophius americanus*. This predation undoubtedly includes many sizes of black sea bass, but smaller fish are probably most vulnerable.

3.3.5.3 Parasites, diseases, injuries and abnormalities

Several different kinds of acanthocephalans, cestodes, and nemotodes have been found encysted in black sea bass digestive tracts (Linton 1901). Cupka *et al.* (1973) found that black sea bass collected from South Carolina waters were generally free of external parasites.

3.3.5.4 Overfishing definition

The Amendment 12 overfishing definition for black sea bass is when the fishing mortality rate exceeds the threshold fishing mortality rate of $F_{msy.}$ Since F_{msy} cannot be reliably estimated, F_{max} is used as a proxy for F_{msy}. When an estimate of F_{msy} is available, it will replace the proxy. F_{max} is 0.32 under current stock conditions. The maximum value of the spring survey index based on a three year moving average (0.9 kg/tow), is a proxy for the biomass threshold. B_{msy} cannot be reliably estimated for black sea bass (MAFMC 1998).

3.3.5.5 Probable future condition

The future condition of a stock is dependent upon the recruitment, growth, natural mortality and fishing mortality that the current stock is undergoing. The following paragraphs summarize the important parameters from the above discussion and project where the future stock will be in relation to the current fishery.

In addition, the advisory report on black sea bass from SAW-27 states that "recent catches are well below the historical average, age and size structure is truncated, and survey biomass indices since the late 1980s have been one-tenth of those observed in the late 1970s. Average annual fishing mortality, estimated from length-based analyses, ranged from 0.56 to 0.79 during 1984-1997 and was 0.73 (48 percent exploitation) in 1997. Recruitment in 1997, as indicated by survey indices, was well below the 1972-1996 average." The SARC-27 advisory report concluded that "in the absence of age-based estimate of current stock size (e.g., from virtual population analysis), a forecast of future stock was not possible. However, the existing fishing mortality rate reduction schedule, if effective, should result in increased survival for recruits leading to increases in stock biomass, if recruitment does not decrease." Additional, detailed information is available in the SAW-27 documents.

4 DESCRIPTION OF HABITAT

This section remains unchanged from the 1996 Black Sea Bass FMP. Reference Section 6, page 12.

5 DESCRIPTION OF THE FISHERIES

5.1 DOMESTIC COMMERCIAL FISHERY

Commercial landings of black sea bass have been recorded since the late 1800's. These data indicate that commercial landings north of Cape Hatteras varied around 6 million pounds from 1887 until 1948 when they increased to 15.2 million pounds (NEFSC 1992). Reported landings increased to a peak of 21.8 million pounds in 1952, declined to 1.4 million pounds in 1971 (Table 3), and in recent years have fluctuated between approximately 2 and 4 million pounds (Table 3). Commercial black sea bass landings have varied without trend since 1981, ranging from a low of 2.06 million lb in 1994 to a high of 4.33 million lb in 1984 (Table 3). The 1999 landings of 2.98 million lb were substantially below the peak landings estimated for 1952 (Table 3).

The distribution of commercial landings by state has fluctuated since 1950 (Table 3). However, Virginia has generally had the highest black sea bass landings with 42% of the total landings from Maine through North Carolina from 1950 through 1999, followed by New Jersey. Landings from North Carolina increased in relative importance to the coast in the early 1960's as compared to the early part of the time series. Likewise, New York landings have decreased in relative importance to the coast since the early part of the time series. Commercial landings by state have varied over recent years (Table 3). New Jersey had the highest average landings (33.5% of the average) from 1990 to 1999, with Virginia second (22.6%; Table 3). Virginia had the highest landings in 1998 and 1999. In addition, although Massachusetts has a 12" TL size limit for black sea bass, landings in that state almost doubled from 1998 to 1999 to around 574 thousand pounds making that state second in 1999.

Traditionally, two gears, fish otter trawls and fish pots/traps have accounted for the majority of commercial landings on a coastwide basis. These two gears accounted for about 85% of the landings from 1990 to 1999 (Table 4). Other important gear include hand lines (9%) and inshore and offshore lobster pots (nearly 2% combined).

Otter trawls, which harvested 40% of the black sea bass coastwide, accounted for the majority of the black sea bass landings in most states with the exception of Massachusetts, New Jersey, Delaware, and Maryland, from 1990 to 1999 (Table 5). Fish pots/traps accounted for a significant proportion of the landings from the remaining states. In addition, hand lines harvested a significant proportion of black sea bass in Massachusetts, Connecticut , New York, Virginia, and North Carolina (Table 5).

Due to a change in reporting requirements, the reporting of commercial landings by distance from shore is inconsistent from 1994-1998. Therefore, only 1999 landings are presented by distance from shore in this document. Earlier black sea bass landings by distance from shore are presented in Amendment 9. In 1999, 74.6% of the commercial landings of black sea bass were caught in the EEZ (Table 6). Of the states with reported landings Massachusetts had the lowest landings (0.5%) from the EEZ. Virginia had the highest landings (99.7%) from the EEZ. The remainder of the states with reported landings caught the majority of their landings in the EEZ (Table 6).

Landings by month indicate that most black sea bass were harvested from January through June with peak landings in March and May, for the period 1990 to 1999 (Table 7). By state landings generally peaked in the winter months for all states except Massachusetts, New York, and Maryland. These states generally showed peaks in the summer months from April through August (Table 7).

5.2 DOMESTIC RECREATIONAL FISHERY

From 1981 to 1999 recreational landing have fluctuated between a high of 12.4 million pounds in 1986 to a low of 1.2 million pounds in 1998. During this time period the recreational sector accounted for 79% of the total black sea bass landings in 1982 to only 25% of the total black sea bass landings in 1984. Recreational fishermen landed 1.7 million pounds of black sea bass in 1999, accounting for 36% of the total black sea bass landings (Table 8). However, recreational landings were about 50% below the average value of 3.9 million pounds, from 1990 to 1999.

From 1990 to 1999, recreational trips directing for black sea bass in the Mid-Atlantic, New England, and South Atlantic Regions, ranged from a 219 thousand trips in 1992, to 315 thousand trips in 1995 (Table 9). Data of recreational fishing trips directed for black sea bass is not reported in the MRFSS statistics after 1997.

Over the past ten years (1990 to 1999) New Jersey accounted for the majority of recreational black sea bass landings (53.1% of the ten year total), followed by Virginia (20.3%), and North Carolina (5%; Table 10). The remainder of the states each accounted for less than 5.0% of the total recreational black sea bass landings from 1990 to 1999.

The majority of the black sea bass recreational landings came from the EEZ, from 1990 to 1999, in the Mid-Atlantic Region and North Carolina, with an average of 71.0% and 63.8%, respectively, of the landings from the EEZ (Table 11). During this time period, an average of 77.1% of the landings came from state waters in the North Atlantic Region.

In the North Atlantic Region and North Carolina, recreational landings of black sea bass were predominantly made by fishermen from private/rental boats (62.9% and 69.8% of the 1990 to 1999 average, respectively; Table 12). In the Mid-Atlantic Region recreational landings of black sea bass were predominantly made by fishermen on party/charter boats (66.5% of the 1990 to 1999 average).

VTR data for party/charter boats is only available from 1996 and later, when the requirement for a federal permit holder to submit a vessel logbook was implemented. VTR data indicate that black sea bass contributed almost 20% of the total catch (by number) made by party/charter vessels for the

1996-1999 period (Table 13). The contribution of black sea bass to the total catch of party/charter vessels fluctuated throughout the year, ranging from less than 10% in January, February, March, April, and August to almost 50% in November, with the largest proportion of black sea bass caught from May through December (Table 13). Analysis of the recreational landings by state indicates that the proportion of black sea bass to the total catch ranged from less than 1% to over 47%.

6 ECONOMIC CHARACTERISTICS OF THE FISHERY

Black sea bass is an important component of the commercial and recreational fisheries from North Carolina through Massachusetts. The economic characteristics of the commercial and recreational fishery for black sea bass is described below. Throughout this description, it is important to note the distinction between economic value and economic impact.

Economic value is a measure of willingness to pay for a good or service. Ex-vessel value in the commercial sector is thus a measure of processor and wholesaler willingness to pay for summer flounder, scup, or black sea bass in the dockside market. Likewise, retail value is a measure of final consumer willingness to pay for these species at supermarkets, seafood shops and restaurants. Economic impact, on the other hand, is a measure of expenditures made by people engaged in a particular activity, and the employment, income, tax revenues, etc. which result from these expenditures. Often, it is said that recreational fishermen spend "x" dollars on gear, boats, travel, etc., and generate "y" amount of employment or "z" dollars in tax revenue.

Clearly, this species is valuable to both recreational anglers and seafood consumers who do not or cannot fish for themselves. Also, individuals and firms engaged in the commercial harvesting, processing and marketing of black sea bass make expenditures and generate employment in the course of business activities, as do participants in the recreational fishery. This species has economic value in both recreational and commercial uses and these species related activities have economic impact in each use.

When considering the relative benefits of black sea bass to the two sectors, commercial values must be compared to recreational values and commercial impacts must be compared to recreational impacts. Unfortunately, recreational values are not easily measured and too often, economic impacts of recreational fishing are erroneously contrasted with ex-vessel value in the commercial sector. The reader is cautioned to avoid this confusion when impact and value estimates are presented in the following sections.

6.1 COMMERCIAL FISHERY

As a general rule, commercial fisheries are divided into three different components: harvesting, processing, and marketing. Different degrees of specialization and integration within each of these components exists among different fisheries. That is, many individuals and firms specialize in a single sector, although some vertically integrated companies span all sectors, and diversified companies are often involved in food related industries besides seafood. The intent of the following section is to examine each component in order to better understand these fisheries.

6.1.1 Harvesting sector

6.1.1.1 Ex-vessel value and price

Commercial landings of black sea bass have decreased approximately 31% from 4.3 million pounds in 1984 to less than 3.0 million pounds in 1999. Commercial landings in 1999 were 16% above the 1998 landings and 5% above the 1990-1999 mean. The commercial share averaged 45% of the combined total landings of black sea bass from 1990-1999 (Table 8). Preliminary landings data indicates that less than 2.7 million pounds of black sea bass were landed in 2000.

The ex-vessel value of black sea bass landings increased from approximately $2.3 million in 1994 to over $5.0 million in 1999. In 2000, the commercial value of black sea bass was estimated at $4.7 million or 6% below the 1999 value. Inflation adjusted prices (2000 dollars) have ranged from $1.14 to $1.81 per pound for the 1991 to 2000 period. These prices have increased from $1.14/lb in 1993 to $1.79/lb in 2000 (Table 14).

The value of black sea bass landings relative to the value of total landings in 1999 and 2000 are presented in Table 15 In 2000, the contribution of black sea bass landings to the value of total landings varied for each state from 1% or less for most states to slightly over 1% in Delaware, Virginia, and North Carolina. The overall contribution of summer flounder landings to the total ex-vessel value from Maine to North Carolina was less than 0.5% in 2000. While some states experienced small percentage changes in the contribution of black sea bass value to the value of total landings from 1999 to 2000, Delaware experienced about a 3% reduction. However, the aggregate contribution associated with this species from Maine to North Carolina was virtually unchanged from 1999 to 2000.

At $1.81/lb, the average price (all sizes) of black sea bass reached a record high in inflation adjusted (2000) dollars in 1998 (Table 14). Adjusted prices for black sea bass have ranged from $1.19 to $1.81 per pound for the 1991 to 2000 period. In 2000, highest prices were received in North Carolina ($2.08/lb), Virginia ($2.06/lb), and New York ($1.90/lb). Coastwide, the average price of scup was $1.79 per pound in 2000 (Table 16).

Monthly landing and price data for black sea bass indicates that a supply - price relationship is observable on a monthly basis. Months with highest average ex-vessel prices tend to coincide with months of lowest landings, normally between June and September (Table 17). Prices received for black sea bass originating in EEZ waters were generally higher than for state waters for 1999-2000 (Table 18). The 2000 coastwide average ex-vessel price per pound for jumbo was $2.62, $2.04 for large, $1.47 medium, $1.05 for small, $10.3 for extra small, and $1.56 for unclassified landings (Table 19). Price differential in 2000 indicate that the ex-vessel price per pound for large black sea bass was approximately 95% greater than for small and extra small (pins).

6.1.1.2 Fishing vessel activity

Analysis of permit data indicates that in 2000 there were 1,969 vessels with one or more of the following three commercial or recreational federal northeast permits: summer flounder, black sea bass, and scup. A total of 1,033, 977, and 831 federal commercial permits for summer flounder, scup, and black sea bass, respectively, were issued to northeast region fishing vessels. For party/charter operators a total of 613, 498, and 528 federal permits were issued for summer flounder, scup, and black sea bass, respectively (section 3.5).

These three fisheries (summer flounder, scup, and black sea bass) have vessels permitted as commercial, recreational, or both. Of the 1,969 vessels with at least one federal permit there were 1,303 that held only commercial permits for summer flounder, scup, or black sea bass while there were 546 vessels that held only a recreational permit. The remaining vessels (120) held some combination of recreational and commercial permits. Whether engaged in a commercial or recreational fishing activity vessels may hold any one of seven combinations of summer flounder, scup, and black sea bass permits. The total number of vessels holding any one of these possible combinations of permits by species and commercial or recreational status are reported in Table 20

In addition to summer flounder, scup, and black sea bass there are a number of alternative commercial or recreational fisheries for which any given vessel might possess a federal permit. The total number of vessels holding any one or more of these other permits is reported in Table 21 Additional descriptive information for these permit holders is presented in section 3.5.

Table 22 presents the top commercial landing ports for summer flounder, scup, and black sea bass for 1999. Activity at the port level indicate that 57% of the total black sea bass commercial landings occurred in seven ports: Chatham and "Other Massachusetts", Massachusetts; Point Judith, Rhode Island; Cape May, New Jersey; Ocean City, Maryland; and Virginia Beach and Hampton, Virginia. The contribution of black sea bass to ports with 10% or more black sea bass dependence (value) is presented in Table 23 Of the seven ports accounting for the bulk of the black sea bass landings in 1999, only Virginia Beach (14.60%) and Ocean City (9.76%) had 10% or more revenue dependence on black sea bass (Table 23).

6.1.1.3 Fishing costs

Vessel costs are composed of ownership costs and operating costs. Ownership costs are incurred once the durable goods are purchased. These are added costs whether or not the assets (equipment/materials) are used in the production process, that is they remain constant regardless of the output level. Ownership costs are frequently referred to as "fixed costs." They include depreciation, debt, insurance, routine maintenance, and insurance, etc. Operating costs are incurred when the production process occurs. These costs are commonly known as "variable costs." They include fuel, oil, maintenance, wages, food, sale and unloading fees, etc.

Vessel variable costs are proportionate to the hours traveling and fishing (operating maintenance, fuel, ice) and the quantity of fish landed (wages, sales and unloading fees, ice). Costs vary in different locations and the cost components have changed over the years. Due to the variation in vessels landings, summer flounder, scup, and/or black sea bass (home port, tonnage class, directed fishery, etc.), exact cost information is difficult to obtain and generally applicable only to a hypothetical "average" vessel.

Wages are almost always in the form of a share or "lay" system. The captain, crew, and vessel owner split the net revenue based on a predetermined, set ratio. Ratios are in many instances set according to what is traditional in that port. The particular ratio of the lay system utilized varies between vessels. In some cases none of the trip expenses are paid by the crew but incurred by the boat. When this system is employed, the gross revenue is divided equally between the crew and the boat. This system is termed “Clear 50.” On the other hand, trip expenses such as fuel, ice, and in some cases food are subtracted from the gross revenue with the remainder divided 50-50 between the crew and the boat. This system is termed “Broken 50.” When one or the other of the parties is responsible for additional costs, the share split normally reflects this.

In the Northeast, diesel fuel has increased from approximately $0.96 per gallon in 1997 to $1.27 per gallon in 2000 (USDA 2001). However, fuel costs will vary throughout the year and among ports. Total vessel fuel costs are directly proportional to the amount of time spent steaming and fishing as well as the size and drag of the fishing gear used. Given the uncertainties of world oil markets, it is likely that fuel prices will fluctuate unpredictably from year to year.

Variable maintenance costs are related to the hours the engines, fishing gear, etc. are used and the weather conditions. Much of the minor repair work is conducted by crew members and, on larger vessels, by an engineer. Since these crew members perform their labor as part of their normal responsibilities there is no added labor cost (Crutchfield 1986). However, most major engine, electronics, and gear repairs are contracted to specialists.

In addition to the shares earned from the sale of fish, crews often receive bycatch as "shack" (Gates pers. comm.). This is fish which is not sold on the official vessel record and the gross receipts are divided among the captain and crew and, sometimes, the vessel owner. Shack varies by season, fishery, and port (Logan pers. comm.). Otter trawlers often shack all or part of the finfish catch when scalloping. No records exist to estimate shack so it is not possible to consider it separately from wages.

Over 95% of the landed black sea bass are harvested by three gear types: pots/traps for fish (46%), fish otter trawl gear (40%), and hand lines (9%) (Table 24).

The results of a survey of small Northeast fishing vessels (<65 feet in length) whose primary gear was otter trawl and reported landings in New England in 1996 was presented by Lallemand *et. al.* (1998). Even though the vessels in the survey had wide ranges in effort and in operating expenses, the vessel physical characteristics were very similar. The value most frequently reported for length (40 ft), gross ton (16 GRT), horsepower (300 hp), number of engines (1), crew size (2), and captain's age (38 years of age) are close to the respective reported means or averages. The age of the typical vessels was 17-years-old. The typical vessel value reported was $150,000 (mean of $142,726), however, a wide variation ($30,000 to $425,000) in vessel value was reported. Small otter trawlers indicated than when using secondary harvesting gear (other than otter trawl gear) they most likely catch squids late in the winter and early spring, lobsters early in summer and fall, and tuna in the summer.

Trip expenses were divided into eight categories (fuel, oil, ice, food and water, lumpers fees, supplies, consignment fees, and other expenses). The average total operating cost per trip for small trawlers in 1996 was $267. Fuel was the most significant expense, contributing with an average of $132/trip ($97/day), a median of $100/trip (or $100/day), and a standard deviation of $94/trip (or $26/day) (Tables 25 and 26). Trip expenses per year are presented in Table 27. Number of fishing trips by month, days absent by month, and steaming time by month are presented in Tables 28, 29, and 30, respectively.

The small trawler survey reported a total mean of $7,141/year for repair and maintenance. This represents the cost of routine repair and maintenance. Repair and maintenance cost for fishing and other gears was the largest component with 28% of the total, followed by maintenance (21%), engine (14%), other repair (12%), electronics (11%), tow wires (11%), and generator (3%).

Unusual expenses and unexpected repair costs ranging from $2,000 to $20,000 (mean $9,840) were reported. These costs are not likely to be made annually and probably represent major investments which will be amortized. Loan payments for small trawlers, have a mean of $873 and in most cases, are modest when compared to operating expenses and overhead costs. The mean average duration of the loan is 7 years at an 8.6% interest rate.

The remuneration system of smaller trawlers in the survey indicated that 56% of the resonants implemented a Clear Lay system in 1996, 41% used a Broken System, and 3% used a daily rate system. As such, it is reasonable to conclude that on small trawlers, the gross revenues are shared equally between the crew and the vessel using a 50-50 ratio. In addition, the captains bonus averaged between 6% and 9% and it was deducted from either the gross or vessel revenues.

The small trawler survey indicated that large variations among vessels' overhead costs exist. Overhead costs were divided into the following categories: haul-out charges; fishing permit(s); other permit(s); mooring and dockage fees; insurance; association(s) fees; professional fees; office expenses; vehicle; taxes (property, fuel, etc.); and other charges. The largest mean values were associated with other charges ($9,300), insurance ($3,925), and haul-out charges ($2,904). These items accounted for the bulk of the total mean overhead cost of $14,650 (standard error of $1,456).

Gross revenue for small otter trawl vessels in the survey ranged from $60,000 to $475,000, and the mean revenue was $174,863 (standard error $28,233). Most of the larger gross revenues (>$200,000) were reported by vessels that were greater than 50 feet and fished distances greater than 80 miles from the principal port of landings.

The results of a survey of large Northeast fishing vessels (>65 feet in length) whose primary gear was otter trawl and reported landings in New England in 1997 was presented by Lallemand *et. al.* (1999). Even though the vessels in the survey had wide ranges in effort and in operating expenses, the vessel physical characteristics were very similar. The value most frequently reported for length (65 ft), gross ton (125 GRT), horsepower (675 hp), number of engines (1), crew size (4), and captain's age (55 years of age) are close to the respective reported means or averages. The age of the typical vessels was 20 years old. The typical vessel value reported was $800,000, however, a wide variation ($80,000 to $1,250,000) in vessel value was reported. Large otter trawlers indicated that when using secondary harvesting gear (other than otter trawl gear) they most likely catch invertebrates (squids and shrimp) late in the winter and early spring, pelagics in the fall and early winter, and other fish (i.e., summer flounder, monkfish, whiting) in the summer. In addition, flat fish and other than groundfish are still mainly caught using otter trawl bottom fishing gear.

Trip expenses were divided into eight categories (fuel, oil, ice, food and water, lumpers fees, supplies, consignment fees, and other expenses). The average total operating cost per trip for large trawlers in 1997 was $2,608. Fuel was the most significant expense, contributing with an average of $1,369/trip ($332/day), a median of $1,440/trip (or $341/day), and a standard deviation of $314/trip (or $38/day) (Tables 31 and 32). Trip expenses per year are presented in Table 33 Number of fishing trips by month, days absent by month, and steaming time by month are presented in Tables 34, 35, and 36, respectively.

The large trawler survey reported a total mean of $40,805/year for repair and maintenance. These represents the cost of routine repair and maintenance. Repair and maintenance cost for fishing and other gears was the largest component with 27% of the total, followed by other repair (22%), maintenance (20%), engine (13%), tow wires (8%), electronics (7%), and generator (4%). Unusual expenses and unexpected repair costs ranging from $1,800 to $50,000 (mean $16,404) were reported. These costs are not likely to be made annually and probably represent major investments which will be amortized. Loan payments for small trawlers, have a mean of $4,155. The mean average duration of the loan is 9 years at a 7.3% interest rate.

The remuneration system of large trawlers in the survey indicated that 6% of the resonants implemented a Clear Lay system in 1997, 94% used a Broken System, and 0% used a daily rate system. As such, it is reasonable to conclude that on large trawlers, after trip expenses are subtracted from gross revenues, the remainder is shared equally between the crew and the vessel using a 50-50 ratio. In addition, the captains bonus averaged between 4% and 9% and it was deducted from either the gross or vessel revenues.

The large trawler survey indicated that the variations among vessels overhead costs is smaller than that from smaller trawlers. Overhead costs for large trawlers were divided into the following categories: haul-out charges; fishing permit(s); other permit(s); mooring and dockage fees; insurance; association(s) fees; professional fees; office expenses; vehicle; taxes (property, fuel, etc.); and other charges. The largest mean values were associated with insurance ($30,337), other charges ($8,200), and haul-out charges ($14,283). These items accounted for the bulk of the total mean overhead cost of $55,141 (standard error of $3,412). Gross revenue for large otter trawl vessels in the survey ranged from $65,468 to $1,542,417, and the mean revenue was $564,915 (standard error $74,492).

Fishing costs for pound nets, fish traps, and hand line operations are much less than costs for otter trawlers (Norton *et al.* 1983). There are no studies addressing summer flounder, scup, or black sea bass fishing costs by type of gear. Fishing costs of commercial striped bass harvesters using fish traps and hook and line gear were developed by Norton *et al.* (1983). The design of floating traps allows for the harvesting of species such as black sea bass, scup, butterfish, squid and fluke. Fish trap fishermen typically use 70 ft vessels with major expenditures for wages (41%) followed by nets (15%) and taxes (14%). Hook and line fishermen typically use a small boat (17 ft average), have major expenses of wages (35%), fuel (16%), and tackle (16%), and in past years made much of their income from striped bass (Norton *et al.* 1983).

The cost of using hook and line gear to fish for groundfish in the Northeastern U.S. was presented by Georgianna and Cass (1998). A population of 234 vessels interviewed in 1997 (averaging 26 trips per year), indicated that the fleet spent $2,479,613 in operating costs in 1996. However, this figure underestimates total operating cost outlays by the fleet because hook boats fish for other species (than groundfish) or use other gear for a considerable amount of fishing time. Overhead cost was estimated to be $2,981,137, $1,905,019 for mortgage, $1,154,557 for depreciation, and $3,266,349 for repairs and maintenance in 1996. The report indicates that most of these expenses were incurred in or near the vessel's home port.

Table 37 presents an estimated average annual operating costs for pot/trap vessels in 2000. These estimates are based on operating expenditures for the lobster fishery less bait and labor expenditures. While these costs are not specifically associated with pot/trap fishing for scup or black sea bass, they represent realistic approximations to the cost structure of those fisheries. The overall average annual operating costs for pot/trap vessels was $22,472 in 2000. The largest average operating cost was associated with fuel and lubricants with 29% of the total, followed by general maintenance (normal use) 19%, boat repair and maintenance (by owner) 15%, vehicles 15%, supplies (store) 14%, food 6%, boat repair and maintenance (by yard) 3%.

6.1.2 Processing, marketing, and consumption

NMFS unpublished processing survey data indicates that in 1999, one plant reported handling scup and two plants handled black sea bass. Information regarding production for these plants is confidential. However, the overall contribution of black sea bass to the total poundage processed and total value of the products processed of these plants was minimal, i.e., less than 0.5%. The overall contribution of scup to the total poundage processed and total value of the products processed for the one plant reporting scup processing in 1999 was also minimal, i.e., 0.6% and 0.3%, respectively. Most scup and black sea bass are sold fresh (Bergman and Ross pers. comm.). The catch is generally refrigerated or iced during long trips and might or might not be iced during short trips. When the catch arrives at the dock, it is sorted, washed, weighed, and boxed and iced for shipment. Scup and black sea bass might be frozen for future marketing when demand is low or when the market is glutted. When frozen, processing is minimal, mainly consisting of handling and freezing. Boxes containing scup and black sea bass for shipment typically weigh 100 pounds. However, higher value scup and black sea bass may be boxed in 50 and 60 pound cartons, respectively (McCauley pers. comm.).

Scup and black sea bass are generally transported to market by truck. The Fulton Fish Market in New York City is the primary wholesale outlet for scup (Finlayson and McCay 1994). Marketing channels for scup appear to be well established. Black sea bass is carried as a specialty item in the Fulton Fish Market in New York City, with supplies peaking during the spring and fall months, then decreasing during the summer, and reaching yearly lows during the winter months (Finlayson and McCay 1994).

Scup is generally a low priced fish. The greatest proportion of small scup go to dealers in Philadelphia, Washington, Baltimore and points south (Finlayson and McCay 1994). Some of the large scup marketed from Point Judith, Rhode Island are shipped to the Boston area (McCauley pers. comm.).

Finlayson and McCay (1994) reported that "black sea bass dealers in the Fulton Fish Market would pay and charge the highest prices for hook and line-caught fish, somewhat less for pot-caught fish, and the least for dragger-caught fish." This price differential appears to be associated with the quality and appearance of the product.

The greatest proportion of small black sea bass go to dealers in Philadelphia, Washington, Baltimore and points south (Finlayson and McCay 1994).

6.1.3 Economic impact of the commercial fishery

The economic impact of the commercial black sea bass fishery as it relates to employment and wages is difficult to determine given its nature. Since black sea bass represents 0.4% of the total value for all finfish and shellfish from North Carolina to Maine, it can be assumed that only a small portion of the region's fishing vessel employment, wages and sales is dependent on black sea bass (Table 38).

6.2 RECREATIONAL FISHERY

Recreational fishing contributes to the general well being of participants by affording them opportunities for relaxation, experiencing nature, and socializing with friends. The potential to catch and ultimately consume fish is an integral part of the recreational experience, though studies have shown that non-catch related aspects of the experience are often as highly regarded by anglers as the number and size of fish caught. Since equipment purchase and travel related expenditures by marine recreational anglers have a profound affect on local economies, the maintenance of healthy fish stocks and development of access sites is as important to fishery managers as the status of commercial fisheries.

Since 1979, the NMFS has conducted an annual MRFSS along the Atlantic coast. The survey is designed to provide estimates of the total bimonthly fishing effort (number of days fished), participation, and finfish catch by marine recreational anglers. The MRFSS consists of two independent yet complementary surveys: an intercept survey of marine anglers at fishing access sites and a random digit dial (RDD) telephone survey of coastal county households. Data from the intercept survey are primarily used to estimate mean catch-per-trip by species. Participation and effort are estimated using data acquired through the RDD survey of coastal households. The MRFSS distinguishes between fish available for identification and measurement by the interviewers (Type A), fish used as bait, filleted, or discarded dead (Type B1), and fish released alive (Type B2). The sum of types A, B1, and B2 comprise the total recreational catch, whereas types A and B1 constitute total recreational landings. It is worth noting that the recreational landings estimates are not comparable to commercial landings estimates because they include fish that are discarded dead.

6.2.1 Economic impact of the recreational fishery

Anglers' expenditures generate and sustain employment and personal income in the production and marketing of fishing-related goods and services. In 1998, saltwater anglers from Maine to Virginia spent an estimated $1.136 billion on trip-related goods and services (Steinback and Gentner 2001). Trip-related goods and services included expenditures on private transportation, public transportation, food, lodging, boat fuel, party/charter fees, access/boat launching fees, equipment rental, bait, and ice. Unfortunately, estimates of trip expenditures specifically associated with black sea bass were not provided in the study. However, if average trip expenditures are assumed to be constant across all fishing trips, an estimate of the expenditures associated with black sea bass can be determined by multiplying the proportion of total trips that targeted black sea bass (0.72%) by the total estimated trip expenditures from the Steinback and Gentner study ($1.136 billion). According to this procedure, anglers fishing for black sea bass from Maine to Virginia spent an estimated $883,354 on trip-related goods and services in 2000.[1] Apart from trip-related expenditures, anglers also purchase fishing equipment and other durable items that are used for many trips (i.e., rods, reels, clothing, boats, etc.). Although some of these items may be purchased with the intent of targeting/catching specific species, the fact that these items can be used for multiple trips creates difficulty when attempting to associate durable expenditures with particular species. Therefore, only trip-related expenditures were used in this assessment.

The black sea bass expenditure estimate can be used to reveal how anglers' expenditures affect economic activity such as sales, income, and employment from Maine to Virginia. During the course of a fishing trip, black sea bass anglers purchase a variety of goods and services, spending money on transportation, food, boat fuel, lodging, etc. The sales, employment, and income generated from these transactions are known as the direct effects of anglers' purchases. Indirect and induced effects also occur because businesses providing these goods and services also must purchase goods and services and hire employees, which in turn, generate more sales, income, and employment. These ripple effects (i.e., multiplier effects) continue until the amount remaining in a local economy in negligible. A variety of analytical approaches are available for determining these impacts, such as input-output modeling. Unfortunately, a model of this kind was not available. Nonetheless, the total sales impacts can be approximated by assuming a multiplier of 1.5 to 2.0 for the Northeast Region. Given the large geographical area of the Northeast Region, it is likely that the sales multiplier falls within those values. As such, the total estimated sales generated from anglers that targeted black sea bass in 2000 was likely to be between $1.325 million ($883,354*1.5) and $1.767 million ($883,354*2.0). A similar procedure could be used to calculate the total personal income and employment generated from black sea bass anglers' expenditures, but since these multiplier values have been quite variable in past studies no estimates were provided here.

6.2.2 Value of the fishery to anglers

The value that anglers place on the recreational fishing experience can be divided into actual expenditures and non-monetary benefits associated with satisfaction (consumer surplus). Anglers incur expenses for fishing (purchase of gear, bait, boats, fuel, etc.), but do not pay for the fish they catch or for the enjoyment of many other attributes of the fishing experience (socializing with friends, contact with nature, etc.). Despite the obvious value of these attributes of the experience to anglers, no direct expenditures are made for them, hence the term "non-monetary" benefits.

Behavioral models that examine travel expenditures, catch rates, accessibility of fishing sites, and a variety of other factors affecting angler enjoyment can be used to estimate the "non-monetary" benefits

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[1]The 1998 estimate of expenditures ($817,920) was adjusted to its 2000 equivalent ($883,354) by using the Bureau of Labor Statistics Consumer Price Index.

associated with recreational fishing trips. Unfortunately, a model of this kind does not exist for black sea bass. Data constraints often preclude researchers from designing species-specific behavioral models. However, a recent study by Hicks, *et. al.* (1999) estimated the value of access across states in the Northeast region (that is, what people are willing to pay for the opportunity to go marine recreational fishing in a particular state in the Northeast) and the marginal value of catching fish (that is, what people are willing to pay to catch an additional fish). Table 39 shows, on average, the amount anglers in the Northeast states (except for North Carolina which was not included in the study) are willing to pay for a one-day fishing trip. The magnitude of the values in Table 39 reflect both the relative fishing quality of a state and the ability of anglers to choose substitute sites. The willingness to pay is generally larger for larger states, since anglers residing in those states may need to travel significant distances to visit alternative sites. Several factors need to be considered when examining the values in Table 39 First, note that Virginia has relatively high willingness to pay estimates given its relative size and fishing quality characteristics. In this study, Virginia defines the southern geographic boundary for a person's choice set, a definition that is arbitrary in nature. For example, an angler in southern Virginia is likely to have a choice set that contains sites in North Carolina. The regional focus of the study ignores these potential substitutes and therefore the valuation estimates may be biased upward (Hicks, *et. al.* 1999). Second, the values cannot be added across states since they are contingent upon all of the other states being available to the angler. If it was desirable to know the willingness to pay for a fishing trip within Maryland and Virginia, for example, the welfare measure would need to be recalculated while simultaneously closing the states of Maryland and Virginia.

Assuming the average willingness to pay values shown in Table 39 are representative of trips that targeted black sea bass, these values can be multiplied by the number of trips that targeted black sea bass by state (from the MRFSS data) to derive welfare values for black sea bass. Table 40 shows the aggregate estimated willingness to pay by state for anglers that targeted black sea bass in 2000 (i.e., the value of the opportunity to go recreational fishing for black sea bass). New Jersey, Virginia, and New York were the states with the highest estimated willingness to pay for black sea bass day trips. Once again, note that the values cannot be added across states since values are calculated contingent upon all of the other states being available to the angler.

In the Hicks *et. al.* (1999) study, the researchers also estimated welfare measures for a one fish change in catch rates for 4 different species groups by state. One of the species groups was "bottom fish," of which black sea bass is a component. Table 41 shows their estimate of the welfare change associated with a one fish increase in the catch rate of all bottom fish by state. For example, in New Jersey, it was estimated that all anglers would be willing to pay $2.01 (the 1994 value adjusted to its 2000 equivalent) extra per trip for a one fish increase in the expected catch rate of all bottom fish. The drawback to this type of aggregation scheme is that the estimates relate to the marginal value of the entire set of species within the bottom fish category, rather than for a particular species within the grouping. As such, it is not possible to estimate the marginal willingness to pay for a one fish increase in the expected catch rate of black sea bass from the information provided in Table 41

However, it is possible to calculate the aggregate willingness to pay for a 1 fish increase in the catch rate of bottom fish across all anglers. Assuming that anglers will not adjust their trip taking behavior when bottom fish catch rates at all sites increase by one fish, the estimated total aggregate willingness to pay for a one fish increase in the catch rate of bottom fish in 2000 was $76.092 million (total trips (33.228 million) x average per trip value ($2.29)). This is an estimate of the total estimated welfare gain (or loss) to fishermen of a one fish change in the average per trip catch rate of all bottom fish. Although it is unclear how much of this welfare measure would be attributable to black sea bass, the results show that bottom fish in general, in the Northeast, are a very valuable resource.

Although not addressed here, recreational fishing participants and nonparticipants may also hold additional intrinsic value out of a desire to be altruistic to friends and relatives who fish or to bequeath a fishery resource to future generations. A properly constructed valuation assessment would include both use and intrinsic values in the estimation of total net economic value. Currently, however, there have been no attempts to determine the altruistic value (i.e., non-use value) of black sea bass in the Northeast.

6.2.3 1990 survey of party and charter boats

This Section is unchanged from the 1996 Black Sea Bass FMP. Please reference Section 8.2.4, page 33.

6.3 INTERNATIONAL TRADE

Black sea bass occur primarily on the continental shelf of the north-west Atlantic, and there are no imports of this species into the US. International trade of black sea bass is relatively limited. In 1991 about 6,000 pounds valued at $14,377 were exported to Mexico, and in 1992 about 5,000 pounds valued at $11,766 were exported to Mexico, the Netherlands and Switzerland (Ross pers. comm.). These figures represent minimum export values. Given the export classification codes employed by the NMFS, it is possible that some black sea bass were exported under the "unclassified" species category.

7 FISHERY MANAGEMENT PROGRAM

This section will remain unchanged from the 1996 Black Sea Bass FMP with the exception of the section addressing commercial quota allocation (Section 9.1.2.3.6).

7.1 COMMERCIAL MANAGEMENT MEASURES

7.1.1 Commercial Quota

A state-by-state system to distribute and manage the annual commercial quota will be implemented by the Commission for 2003 and 2004. Under Amendment 13 to the Mid-Atlantic Fisheries Management Council Summer Flounder, Scup and Black Sea Bass Fishery Management Plan, a coastwide quota will be approved by NMFS without quarterly or seasonal breakdowns. Under the authority of this amendment, the states will then allocate this quota according to a negotiated formula (Table 42) based on their percentage share of historical commercial landings and current fishing trends (Table 43). States will be expected to adopt appropriate measures to prevent quota overages and to indicate these measures in their annual report to the Commission Management Board (Section 8). This alternative will not place an additional burden of federal monitoring on NMFS, as states will have the responsibility for implementing closures when their state-specific quota has been reached. Any state landings in excess of their annual quota will be deducted from that state's annual quota the following year.

Under this state-by-state quota system, states will be allowed to transfer or combine quotas during the year. In order for a quota transfer to occur, one state must request a quota transfer in writing from a state that has not landed its entire annual allocation. Should that state agree to such a transfer, that state must notify the requesting state and Commission of the total number of pounds that will be transferred. All quota transfers must take place during the fishing year to which they will apply.

These management measures will be in place for 2003 and 2004. The effectiveness of the program will be evaluated in preparation for the 2005 specification setting process, at which time the Commission and Council will determine if the program should be continued, modified or terminated. If the Commission and Council terminate this management program, or take no action, the commercial management measures described in Section 9.1.2.3.6 of the 1996 Black Sea Bass FMP will prevail beginning in 2005.

The coastwide quota will apply throughout the management unit, that is, in both state and federal waters. All black sea bass landed for sale in a state will be applied against the state's annual commercial quota regardless of where the black sea bass were harvested. Any overages of the commercial quota landed in a state will be deducted from that state's annual quota for the following year.

The Commission has also established compliance criteria as a part of the interstate management process (Section 8). These compliance criteria will require states to submit dealer reports to NMFS for state permitted dealers.

The Regional Administrator will close the EEZ to commercial fishing for black sea bass once the quota is landed. Each state will close its waters to commercial fishing for black sea bass when its share of the quota is landed.

This state-by-state quota system will allow for the most equitable distribution of the commercial quota to fishermen. Specifically, under this set of management measures, states will have the responsibility of managing their quota for the greatest benefit of the commercial black sea bass industry in their state. States will design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns.

7.2 Impacts of the Fishery Management Program

7.2.1 The Amendment relative to the National Standards

Section 301(a) of the MSFCMA states: "Any fishery management plan prepared, and any regulation promulgated to implement such plan pursuant to this title shall be consistent with the following National Standards for fishery conservation and management." The following is a discussion of the standards and how this amendment meets them:

7.2.1.1 National Standard 1 - Overfishing Definition

"Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery for the United States fishing industry."

This amendment does not modify the overfishing definitions for black sea bass. The overfishing definitions for black sea bass were addressed in Amendment 12, as follows:

Overfishing for black sea bass is defined to occur when the fishing mortality rate exceeds the threshold fishing mortality rate of F_{msy}. Because F_{msy} cannot be reasonably estimated, F_{max} is used as a proxy for F_{msy}. F_{max} is 0.32 under current stock conditions. The maximum value of the spring survey index based on a three year moving average (0.9 kg/tow), would serve as a biomass threshold. B_{msy} cannot be reliably estimated for black sea bass.

Amendment 13 does not make any changes to the existing overfishing definitions or rebuilding schedules. Therefore, the amendment is consistent with National Standard 1.

7.2.1.2 National Standard 2 - Scientific Information

"Conservation and management measures shall be based upon the best scientific information available."

The analyses in this amendment are based on the best scientific information available. Therefore, this amendment is consistent with National Standard 2.

7.2.1.3 National Standard 3 - Management Units

"To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination."

Black sea bass managed as a single unit throughout its range, from Maine through North Carolina. Amendment 13 does not alter the management units. Therefore this amendment is consistent with National Standard 3.

7.2.1.4 National Standard 4 - Allocations

"Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."

This amendment was adopted to remedy problems with the current commercial black sea bass quarterly quota system. In addition to early closures, possible inequities have also been created by the current management system as landings have shifted to the north. As such, the amendment does not discriminate between residents of different states. In this amendment the Council adopted a system that would allocate the annual quota on a coastwide basis each year. Additionally, the states adopted a state-by-state allocation system that would allocate the coastwide quota to each state. After considerable debate, the Commission adopted allocation percentages that represented a compromise between the allocation percentages associated with the various base periods presented in the public hearing draft of Amendment 13. Specifically, they adopted the following allocations: Maine 0.5%, New Hampshire 0.5%, Massachusetts 13%, Rhode Island 11%, Connecticut 1.0%, New York 7%, New Jersey 20%, Delaware 5%, Maryland 11%, Virginia 20%, and North Carolina 11%.

Under this program, states will have the responsibility of managing their quota for the greatest benefit of the commercial black sea bass industry in their state. States can design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns.

This alternative was chosen because a federal coastwide quota with a state-by-state allocation system managed by the Commission, will allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. As such, this amendment is consistent with National Standard 4.

7.2.1.5 National Standard 5 - Efficiency

"Conservation and management measures shall, where practicable, consider efficiency in the utilization of the fishery resources; except that no such measure shall have economic allocation as its sole purpose."

The management program adopted in this amendment is intended to allow the fishery to operate at the lowest possible cost (e.g., fishing effort, administration, and enforcement) given the FMP's objectives. The objectives focus on the issues of administrative and enforcement costs by encouraging compatibility between federal and state regulations since a substantial portion of the fishery occurs in state waters. The management measures proposed in this amendment place no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting. Therefore the action is consistent with National Standard 5.

7.2.1.6 National Standard 6 - Variations and Contingencies

"Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches."

A federal coastwide quota with a state-by-state allocation system managed by the Commission, was chosen because it could allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. Under this program, states can design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns. Thus, this program takes into account and allows for variations among, and contingencies in, fisheries, fishery resources, and catches. As such, this amendment is consistent with National Standard 6.

7.2.1.7 National Standard 7 - Cost and Benefits

"Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication."

The management program was adopted in conjunction with the Commission, and developed to be compatible with, and reinforce the management efforts of the states and the Commission. The status quo EFH alternative was adopted because the other EFH alternatives were deemed not to be practicable (section 4.2 in Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan: practicability analyses), i.e., the costs outweigh the expected benefits. As such, this amendment is consistent with National Standard 7.

7.2.1.8 National Standard 8 - Communities

"Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of over fished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities."

One of the purposes of this amendment is to revise the currently quarterly quota system which fails to allow black sea bass to be landed during the entire three months in each quarter. As such, the black sea bass fishery experienced early closures during the last three quarters in 1999 and 2000, and all four quarters in 2001. In fact, in quarters 3 and 4 of 2000 the quarterly allocation was harvested within one month, leaving the fishery closed for the remaining two months of those quarters. In 2001, the quarters 1 through 4, also experienced early closures. Quarter 3 of 2001 was closed in less than three weeks.

Long closures have obvious economic consequences to fishermen and processors, and the ports and communities that are dependent upon them. A market glut at the beginning of the quarter allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the additional economic concerns of no or reduced income.

In addition to early closures, possible inequities have been created by the current management system as landings have shifted to the north. In fact, preliminary data for quarter 4 in 2000 indicate that 41% of the landings for that quarter occurred in one state, Massachusetts. A shift in abundance of black sea bass to the north may account for these higher landings. However, some fishermen have also indicated that more restrictive possession limits have favored fishing operations in the north where black sea bass are caught closer to shore.

The management program in this amendment, a federal coastwide quota with a state-by-state allocation system managed by the Commission, was chosen because it could allow for the most equitable distribution of the commercial quota to fishermen. Specifically, this preferred alternative should minimize economic burdens on communities created by the current quarterly quota system. Additionally, states can design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States are more familiar with the needs of their local constituents and communities. States will also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns. As such, this amendment is consistent with National Standard 8.

7.2.1.9 National Standard 9 - Bycatch

"Conservation and management measures shall, to the extend practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."

This National Standard requires Councils to consider the bycatch effects of existing and planned conservation and management measures. Bycatch can, in two ways, impede efforts to protect marine ecosystems and achieve sustainable fisheries and the full benefits they can provide to the Nation. Bycatch can increase substantially the uncertainty concerning total fishing-related mortality, which makes it more difficult to assess the status of stocks, to set the appropriate optimal yield, define overfishing levels, and ensure that OYs are attained and overfishing levels are not exceeded. Bycatch may also preclude other more productive uses of fishery resources.

The term "bycatch" means fish that are harvested in a fishery, but that are not sold or kept for personal use. Bycatch includes the discard of whole fish at sea or elsewhere, including economic discards and regulatory discards, and fishing mortality due to an encounter with fishing gear that does not result in capture of fish (i.e., unobserved fishing mortality). Bycatch does not include fish released alive under a recreational catch-and-release fishery management program. A catch-and-release fishery management program is one in which the retention of a particular species is prohibited. In such a program, those fish released alive would not be considered bycatch.

Recent stock assessments for black sea bass indicate that the stock is overexploited. As a result, the black sea bass FMP is focused on reducing fishing mortality and rebuilding these stocks. The regulations are necessary to meet the conservation objectives of the FMP. Many of these management measures have associated discards. However, these regulations are necessary to achieve the principal goal of the MSFCMA - to halt overfishing and to rebuild over fished stocks.

The commercial fishery for black sea bass is primarily prosecuted with otter trawls, otter trawls and floating traps, and otter trawls and pots/traps, respectively. This fishery is managed principally through the specification of annual quotas. In addition, there are other management measures in place which would affect discard rates in the black sea bass fishery (e.g., minimum size regulation, mesh size/mesh thresholds, and possession limits).

An analysis of NMFS 1999 VTR data indicates that vessels which land summer flounder, scup, and black sea bass also harvest other species throughout the year. These fisheries are mixed fisheries, where squid, Atlantic mackerel, silver hake, skates, and other species are harvested with summer flounder, scup, and/or black sea bass. The contribution to total landings made by black sea bass (in addition to all other species landed) on trips targeting summer flounder, scup, or black sea bass is shown in Table 44. For trips that landed 100 or more pounds of black sea bass, black sea bass contributed 18.5% of the total landings (weight; Table 44). In the commercial fishery this data is collected from commercial vessels that have permits to operate in federal waters as required by the FMPs or amendments for Summer Flounder, Scup, Black Sea Bass, Northeast Multispecies, Atlantic Mackerel, Butterfish, Squids, Dogfish, Bluefish, and Tilefish. Commercial vessels with a federal permit are required to report their activities when they engage in a fishery for one or more of the species mentioned above. Further characterization of catch, composition, and disposition in the directed summer flounder, scup, and black sea bass fisheries follow.

Based on further analysis of VTR data of trips keeping 100 pounds or more of black sea bass, 98% of the black sea bass were landed (Table 44). In these trips a total of 90 species were harvested in addition to black sea bass. The top ten species landed (by weight) had discard rates of approximately 3% or less with the exception of black sea bass (7.7%). Discard rates of over 10% were evident for several species, e.g., tautog (14.4%), sea robins (12.2%), blueback herring (33.3%), cunner (40.1%), and crab-unknown (96.2%). However, total catch for some of these species ranged from a few pounds to a few thousand pounds. As such, the total quantity discarded by weight for some of these species was small. Overall, 2% of the total weight harvested on these trips was reported as discarded.

Given the mixed fishery nature of the black sea bass fisher, discards of targeted species and/or incidental species will occur. Catch disposition from NMFS sea sampling data for these species for 1999 are shown on Table 45. This sea sampling data is the most complete at-sea observation data available to characterize commercial catch and discards in the summer flounder, scup, and black sea bass fisheries.

Analysis of sea sampling data for black sea bass based on a definition of a directed trip at 100 pounds indicated that about 45.3% of the black sea bass were landed (Table 45). The predominant species caught for these trips was Atlantic mackerel, accounting for 23.7 of the catch. A total of 23 species were harvested in addition to black sea bass in these trips. Approximately 55.9% of the total weight caught in these trips was discarded. Discard rates of over 50% were evident for most species. However, total catch for these species ranged from a few pounds to a few thousand pounds and, as such, the total quantity discarded by weight for some of these species was small.

The VTR and sea sampling discard data for and black sea bass are limited and/or contradictory. VTR data indicate discard estimates are minimal for all three species, i.e., less than 3%. Estimates from sea sample data indicate that nearly 55% of black sea bass were discarded. However, these estimates are based on samples that are limited in their temporal or geographical scope.

The nature of the data make it difficult to develop any definitive or reliable conclusions about discards for this fishery especially during the periods or in areas where sea sampling has not occurred. As such, it is difficult for the Council and Commission to modify or add management measures to further minimize discards if the data are not available to define the nature and scope of the discard problem or the data indicate that a discard problem does not exist.

The Council recognizes the need for improved estimates of discards for all of the fisheries managed under this FMP. The Council has requested increased at-sea sampling intensity over a broader temporal and geographical scope than is currently available.

The lack of discard data, for black sea bass has hampered the ability of the Council and Commission to respond to potential discard problems in the commercial fisheries. In fact, the lack of this data has been the primary reason cited by the SARC as to why an age based assessment cannot be developed for black sea bass. The collection of additional data by NMFS will allow the Council and Commission to more effectively respond to discard problems by changes in mesh, threshold and minimum size regulations or by implementing season and area closures in response to changes in fishermen behavior or an increased level of discards.

There are also a significant recreational fisheries for black sea bass. A high portion of the black sea bass that are caught are released after capture. It is estimated that 25% of the black sea bass that are caught and released by anglers die after release, i.e, the majority of the fish are released alive and are expected to survive after release. The fish that survive are not defined as bycatch under the SFA. The Council and Commission believe that information and education programs relative to proper catch and release techniques for black sea bass and other species caught by recreational fishermen should help to maximize the number of these species released alive.

Current recreational management measures could effect the discards of black sea bass. These measures include a possession limit, size limit, and season. The effects of the possession limit would be greatest at small limits and be progressively less at higher limits. The size limit would have similar effects but the level of discarding will be dependent upon the levels of incoming recruitment and subsequent abundance of small fish. Seasonal effects would differ depending on the length of the season and the amount of black sea bass caught while targeting other species.

Minimum size limits, bag limits and seasons have proven to be effective management tools in controlling fishing mortality in the recreational fishery. A notable example is the recent success in the management of the Atlantic coast striped bass fishery. The recreational striped bass fishery is managed principally through the use of minimum size limits, bag limits and seasons. When these measures were first implemented, release rates in the recreational striped bass fishery exceeded 90%. However, the quick and sustained recovery of the striped bass stock after implementation of these measures provides evidence of their effectiveness in controlling fishing mortality in recreational fisheries.

The Council and Commission can currently implement annual changes in commercial and recreational management measures in response to changes in fishermen behavior or an increased level of discards, through the annual specifications process. Currently, the Council and Commission have implemented gear restricted areas through their annual specification process to minimize scup discards in the small mesh fisheries. The Council also funded research to identify gear modifications that reduce the bycatch of scup in small mesh fisheries. In addition, the framework adjustment procedure implemented in Amendment 12 can be used to allow the Council and Commission to respond quickly to changes in the fishery through the implementation of new management measures or the modification of existing measures. As such, the Council also feels that

The management system proposed in this FMP represents the most effective tool for managing the black sea bass fishery. It is intended to distribute black sea bass landings throughout the year. In distributing black sea bass landings throughout the year, it is less likely that seasonal closures will occur in the commercial black sea bass fishery. Therefore, when black sea bass are caught in the directed and mixed trawl fisheries, they will not have to be discarded. Therefore the amendment is consistent with National Standard 9.

7.2.1.10 National Standard 10 - Safety at Sea

"Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea."

The black sea bass fishery management system in this amendment was designed to eliminate derby style fishing for black sea bass. Landings will be controlled by the states and allocated over the year. The measures in this amendment should not affect the vessel operating environment or gear loading requirements. The Council and Commission developed this amendment with the consultation of industry advisors to help ensure that this was the case. In summary, the Council and Commission has concluded that the proposed amendment will not impact or affect the safety of human life at sea. Therefore the amendment is consistent with National Standard 10.

7.2.2 Biological Impacts

The management program implemented by this amendment is a coastwide quota allocated to each state by the Commission. This alternative was chosen because a federal coastwide quota with a state-by-state allocation system managed by the Commission could allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. Because of the states' ability to tailor management measures to the needs of their fishery, this system should reduce the likelihood of derby-style fishing and the associated biological and ecological impacts as described in section 2.2. Additionally, this alternative may be more effective at constraining landings to the commercial quota thereby increasing the likelihood that the target exploitation rate would be met. Achieving the target exploitation rates would allow for stock rebuilding to continue on schedule. In addition, distributing landings evenly throughout the year should reduce the negative impacts to the stocks of non-target species that may occur under the current system. As such, this management program is likely to result in positive biological impacts relative to the current quarterly coastwide quota system.

7.2.3 Economic Impacts

A coastwide quota system without quarterly or seasonal breakdowns, will likely exacerbate the current problems that the fishery is experiencing because controls to regulate landings throughout the year would be lacking. A coastwide quota system will likely increase derby-style fishing and amplify the "use it or lose it" mentality which could lead to harvesting the quota quickly, thus creating early fishery closures, market gluts, and inequities among owners of different sized vessels and in different geographic locations. Long closures have obvious economic consequences to fishermen and processors. A market glut at the beginning of the year allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the economic concerns of decreased annual revenues.

A federal coastwide quota with a state-by-state allocation system managed by the Commission could allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. As such, it is expected that this program will benefit each state's fishery. A state-by-state quota system will allow for the most equitable distribution of the commercial quota to fishermen. Under this alternative, states will have the responsibility of managing their quota. States can design allocation systems based on possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. Thus, this system may reduce the likelihood of derby-style fishing effort and the associated economic impacts as described in section 2.2 Additionally, there will be long-term economic gains associated with stock rebuilding.

Overall, this program is likely to result in positive economic impacts relative to the management program described in Section 9.1.2.3.6 of the 1996 Black Sea Bass FMP..

7.2.4 Social and Community Impacts

A federal coastwide quota with a state-by-state allocation system managed by the Commission, is expected to allow for the most equitable distribution of the commercial quota to fishermen without the additional burden of federal monitoring by NMFS. This system allows states to design management measures that allow their fisheries to operate in critical periods that occur because of market conditions or the availability of black sea bass to their industry. States will design allocation systems based on possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair and equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. Thus, this program is likely eliminate derby-style fishing, and promote safety at sea. Seasonal closures should be less likely, thus eliminating the social burdens associated with little or no income. This program should make it possible to meet specific cultural and social needs of each states' black sea bass commercial fishery.

This program may create confusion among fishermen that are in adjacent ports and have different regulations. The state-by-state allocations may also create difficulties in the monitoring of quota in states with small allocations.

Overall, this program is likely to result in positive social impacts relative to the management program it replaces.

7.2.5 Effects on Protected Species

Black sea bass are primarily landed by fish pots/traps, bottom and midwater trawls, and lines (Table 46). The Mid-Atlantic pot/trap and mixed trawl fisheries are Category III fisheries as defined in the NMFS 2001 List of Fisheries. This means that these fisheries have a remote likelihood or no known serious injuries or mortalities of marine mammals. All fishing gear are required to meet gear restrictions under the LWTRP, HPTRP, MMPA, and ESA.

7.2.6 Effects on Landings Patterns

This management program may result in changes in landings patterns along the coast. For example, if landings are decreased in some states and increased in other states, it is possible that fishing effort could follow the same pattern. However, this program is not expected to change overall commercial quota or fishing effort. This program is expected to be more effective at constraining landings to the annual commercial quota, than the current system. By constraining landings to the annual commercial quota, this program may result in an overall decrease in effort. As such, this management program is not expected to change existing impacts on protected species (section 7.1.1.4) relative to the management measures it replaces.

8 COMPLIANCE

The Commission has established compliance criteria as a part of the interstate management process for summer flounder, scup, and black sea bass. This Amendment only modifies the compliance criteria that pertain to the black sea bass commercial fishery. The following compliance criteria that are listed in the previous amendments will remain unchanged:

-Commercial size limits and mesh requirements
-Commercial quota provisions
-Commercial fishery closure ability
-Recreational harvest limit

-Permit and reporting requirements
-Area closures
-Gear restrictions

8.1 COMPLIANCE REPORTING CONTENTS AND SCHEDULES

The Compliance reporting requirements will remain unchanged relative to Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass FMP.

8.2 PROCEDURES FOR DETERMINING COMPLIANCE

Procedures for determining a state's compliance with the provisions of an FMP are contained in section 7 of the Interstate Fisheries Management Program Charter (ASMFC 2001). The following compliance determination will be done in addition to the Summer Flounder, Scup, and Black Sea Bass FMP Monitoring Committee activities. The following represents compliance determination procedures as applied to this plan:

The Plan Review Team (PRT) will continually review the status of state implementation, and advise the Management Board any time that a question arises concerning state compliance. The Plan Review Team will review annual state compliance reports and prepare a compliance review for the Management Board summarizing the status of the fishery and any compliance recommendations on a state-by-state basis.

Upon review of a report from the PRT, or at any time by request from a member of the Management Board, the Management Board will review the status of an individual state's compliance. If the Management Board finds that a state's regulatory and management program fails to meet the requirements of this section, it may recommend that the state be found out of compliance. The recommendation must include a specific list of the state's deficiencies in implementing and enforcing the FMP and the actions that the state must take in order to come back in compliance.

If the Management Board recommends that a state be found out of compliance, it shall report that recommendation to the ISFMP Policy Board for further review.

The Policy Board shall, within 30 days of receiving a recommendation of non-compliance from a Management Board/Section, review that recommendation of non-compliance. If it concurs in the decision, it shall recommend at that time to the Commission that a State be found out of compliance.

The Commission shall consider any recommendation as quickly as possible and within 30 days of receipt. Any State which is the subject of a recommendation for a finding of non-compliance shall be given an opportunity to present written and/or oral testimony concerning whether it should be found out of compliance. If the Commission agrees with the recommendation of the Policy Board, it may determine that a State is not in compliance with the relevant fishery management plan, and specify the actions the State must take to come into compliance. Upon a non-compliance determination, the Executive Director shall within ten working days notify the State, the Secretary of Commerce, and the Secretary of the Interior of the Commission's determination.

8.3 ADAPTIVE MANAGEMENT PROCESS

The Commission will participate in the Amendment to allocate the commercial quota to the states and implement other commercial management measures.

In accordance with the Commission's Interstate Fisheries Management Program Charter, each FMP may provide for changes within the management program to adapt to changing circumstances. Changes made under adaptive management shall be documented in writing through addenda to the FMP. The Management Board shall in coordination with each relevant state, utilizing that states established public review process, ensure that the public has an opportunity to review and comment upon proposed adaptive management changes. The states shall adopt adaptive management changes through established legislative and regulatory procedures. However, the states may have a range of procedures and time frames available for the adjustment and implementation of fishery regulations.

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Table 1 The probability that a female black sea bass will transform to a male by size.

SL (cm)	TL (in)	Probability of Transition
7	2.7	0.000
8	3.3	0.010
9	3.8	0.015
10	4.4	0.025
11	4.9	0.050
12	5.5	0.072
13	6.1	0.100
14	6.6	0.125
15	7.2	0.145
16	7.7	0.150
17	8.3	0.151
18	8.9	0.152
19	9.4	0.152
20	10.0	0.150
21	10.5	0.140
22	11.1	0.130
23	11.7	0.120
24	12.2	0.110
25	12.8	0.095
26	13.3	0.080
27	13.9	0.060
28	14.5	0.045
29	15.0	0.035
30	15.6	0.030
31	16.1	0.025
32	16.7	0.020
33	17.3	0.015
34	17.8	0.010
35	18.4	0.005
36	18.9	0.002
37	19.5	0.001
38	20.0	0.000

Source: Gary Shepherd pers. comm.

Table 2 The mean back-calculated lengths (TL inches) at age for black sea bass collected from the Mid-Atlantic, 1973-75.

		Age (Years)								
	N	1	2	3	4	5	6	7	8	9
Male	972	3.7	8.0	10.6	12.4	14.2	16.4	18.2	19.2	20.3
Female	1797	3.8	7.9	10.2	12.0	13.4	14.4	17.6		
Combined	2905	3.7	8.0	10.4	12.2	13.9	15.7	18.2	19.2	20.3

Table 3. Commercial landings ('000 lbs) of black sea bass, 1950-1999.

YEAR	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC*	Total
1950	0	0	49	327	100	1,898	4,564	2	395	5,311	n/a	12,646
1951	0	0	104	725	61	2,792	5,658	0	321	8,772	n/a	18,433
1952	0	0	134	656	52	1,680	9,207	1	279	9,778	n/a	21,787
1953	0	0	81	459	40	1,096	5,829	0	214	6,657	n/a	14,376
1954	0	0	132	304	60	1,261	5,029	0	166	4,383	n/a	11,335
1955	0	0	141	437	143	936	4,134	0	229	5,291	n/a	11,311
1956	0	0	74	413	24	510	4,207	0	230	6,111	n/a	11,569
1957	0	0	119	334	216	809	3,636	0	205	4,202	n/a	9,521
1958	0	0	81	376	48	842	4,227	0	252	5,730	n/a	11,556
1959	0	0	62	183	37	612	3,739	0	157	3,268	n/a	8,058
1960	0	0	64	210	36	524	2,206	0	128	3,669	n/a	6,837
1961	0	0	51	170	42	313	1,497	0	139	3,211	n/a	5,423
1962	0	0	48	146	30	524	2,621	0	339	4,127	287	8,122
1963	0	0	17	114	29	576	2,812	0	304	4,316	204	8,372
1964	0	0	10	151	28	501	2,195	0	293	3,752	120	7,050
1965	0	0	11	98	24	382	2,146	0	243	4,771	274	7,949
1966	0	0	2	90	19	221	961	0	212	1,886	217	3,608
1967	0	0	6	48	1	110	816	0	154	1,410	n/a	2,545
1968	0	0	9	42	1	67	539	0	124	1,598	259	2,639
1969	0	0	7	34	0	69	392	0	147	1,770	n/a	2,419
1970	0	0	20	55	1	70	308	0	202	1,482	n/a	2,138
1971	0	0	19	39	1	55	308	30	140	658	102	1,352
1972	0	0	40	46	0	44	423	40	228	782	70	1,673
1973	0	0	54	34	1	105	694	80	207	1,282	75	2,532
1974	0	0	132	69	1	98	778	80	237	860	96	2,351
1975	0	0	144	174	4	131	1,176	180	349	1,546	347	4,051
1976	0	0	174	250	4	272	1,464	150	296	822	288	3,720
1977	0	0	104	176	2	232	1,487	220	459	1,696	1,065	5,441
1978	0	0	135	177	6	168	829	160	427	1,762	909	4,573
1979	0	0	137	234	1	123	600	60	356	1,226	682	3,419
1980	0	0	91	162	1	204	471	48	203	975	633	2,788
1981	0	0	132	168	3	123	423	57	203	806	598	2,513
1982	0	0	176	312	3	61	679	80	152	749	413	2,625
1983	7	0	254	674	10	77	856	70	181	1,038	170	3,337
1984	0	0	420	563	12	161	826	84	245	1,392	630	4,333
1985	0	0	312	671	13	132	643	92	221	606	731	3,421
1986	0	0	418	608	4	209	798	178	435	1,044	498	4,192
1987	0	0	323	358	77	246	1,110	196	493	1,205	160	4,168
1988	2	0	477	221	59	121	1,180	132	395	793	725	4,105
1989	4	0	351	208	11	77	841	149	296	648	350	2,935
1990	2	0	436	198	14	72	990	150	343	886	415	3,506
1991	0	0	244	74	9	92	1,034	189	481	499	184	2,806
1992	0	0	43	141	5	112	1,245	194	468	580	221	3,009
1993	0	0	39	222	5	125	1,381	86	362	763	178	3,161
1994	0	0	21	87	4	122	957	70	220	390	169	2,040
1995	0	0	42	89	9	193	797	166	303	363	102	2,064
1996	0	0	40	157	17	260	1,222	166	546	790	162	3,360
1997	0	0	91	178	12	262	705	152	513	506	185	2,604
1998	0	0	281	135	9	136	579	127	315	827	156	2,565
1999	0	0	574	176	15	209	501	168	486	740	106	2,975
50-99 Mean	0	0	139	239	26	400	1,834	71	286	2,355	337	5,586
50-99 %	0.0%	0.0%	2.5%	4.3%	0.5%	7.2%	32.8%	1.3%	5.1%	42.1%	6.0%	100.0%
90-99 Mean	0	0	181	146	10	158	941	147	404	634	188	2,809
90-99 %	0.0%	0.0%	6.4%	5.2%	0.4%	5.6%	33.5%	5.2%	14.4%	22.6%	6.7%	100.0%

*Landings north of Cape Hatteras, NC.

n/a=not available

Table 4. Black sea bass commercial landings by gear, Maine to Cape Hatteras, North Carolina, 1990 - 1999 combined.

Gear	1,000 Pounds	Percent
Unknown Combined Gear	207	0.73
Haul Seines, Beach	1	*
Haul Seines, Long	*	*
Gill Net, Drift, Large Pelagic	*	*
Pots and Traps, Eel	*	*
Pots and Traps, Offshore Wire	*	*
Otter Trawl Bottom, Crab	*	*
Otter Trawl Bottom, Fish	11,353	40.32
Otter Trawl Bottom, Scallop	46	0.16
Otter Trawl Bottom, Shrimp	*	*
Otter Trawl Bottom, Other	18	0.06
Otter Trawl Midwater	*	*
Trawl Midwater, Paired	9	0.03
Trawl Bottom, Paired	*	*
Scottish Seine	*	*
Pound Nets, Fish	23	0.08
Pound Nets, Other	4	0.02
Floating Traps (Shallow)	144	0.51
Pots And Traps, Combined	*	*
Pots And Traps, Conch	24	0.09
Pots And Traps, Crab, Blue	21	0.08
Pots And Traps, Fish	12,878	45.74
Pots And Traps, Lobster Inshore	259	0.92
Pots And Traps, Lobster Offshore	256	0.91
Pots And Traps, Other	204	0.73
Dredges, Crab	*	*
Gill Nets, Sea Bass	8	0.03
Gill Nets, Other	6	0.02
Gill Nets, Sink, Other	105	0.37
Gill Net, Shad	*	*
Gill Nets, Drift, Other	26	0.09
Gill Nets, Drift, Runaround	3	0.01
Gill Nets, Stake	*	*
Trammel Nets	*	*
Troll And Handline	*	*
Lines Hand, Other	2,475	8.79
Lines Troll, Other	20	0.07
Lines Long Set With Hooks	27	0.1
Dip Nets, Common	*	*
Dredge, Surfclam	*	*
Dredges Scallop, Sea	37	0.13

Source: NMFS Weighout Data.

Table 5. Black sea bass commercial landings, by state and gear type, 1990-1999 combined.

Gear	ME % of Total	MA % of Total	RI % of Total	CT % of Total	NY % of Total	NJ % of Total	DE % of Total	MD % of Total	VA % of Total	NC % of Total
Unknown Combined Gears		1.55	*	16.14	0.07	1.36		0.8	*	*
Haul Seines, Beach					0				0	0.05
Haul Seines, Long										0
Gill Net, Drift, Large Pelagic		*	*							
Pots and Traps, Eel			0							
Pots and Traps, Offshore Wire								*		
Otter Trawl Bottom, Crab						0				
Otter Trawl Bottom, Fish	95.02	3.58	79.04	70.32	64.82	41.11		4.01	62.73	55.33
Otter Trawl Bottom, Scallop		0				0.09		0.05	0.55	*
Otter Trawl Bottom, Shrimp										0
Otter Trawl Bottom, Other								0.39	*	
Otter Trawl, Midwater			0							
Trawl Midwater, Paired		0.49								
Trawl Bottom, Paired					*					
Scottish Seine		*								
Pound Nets, Fish			*	0.05	1.35	0		*	0	0
Pound Nets, Other		0.22			*					
Floating Traps (Shallow)			9.91							
Pots And Traps, Combined.			*		0					
Pots And Traps, Conch		0.11			0			0.29	0.16	0
Pots And Traps, Crab, Blue						*			0.33	0
Pots And Traps, Fish		71.3	4.83	3.16	5.76	53.49	96.5	91.53	16.6	7.79
Pots And Traps, Lobster Inshore		*	1.95	1.37	12.02	0.4				
Pots And Traps, Lobster Offshore		0.11	0.56	0.69	2.38	1.92	0.88	0.31	0	
Pots And Traps, Other		9.87	0.06		0			0.41	0.13	
Dredges, Crab						0				
Gill Nets, Sea Bass								0.2		
Gill Nets, Other							*	0		0.28
Gill Nets, Sink, Other	0.65	1.04	0.55	*	0.52	0.09		1.27	0.16	
Gill Net, Shad								0		
Gill Nets, Drift, Other			0	0.21		0.11	*	0.19	0.11	0
Gill Nets, Drift, Runaround						*				
Gill Nets, Stake							0		0	
Trammel Nets						0				
Troll and Handline			0							
Lines Hand, Other		11.15	2.74	7.62	12.62	1.28	2.58	0.53	18.65	35.39
Lines Troll, Other			0.23							0.9
Lines Long Set With Hooks	4.33	0.48	*		0.43	0.05		0	0.05	0.18
Dip Nets, Common										0
Dredges Scallop, Sea		0.05	*	0.42		0.05		0	0.49	0

Source: NMFS Weighout Data.

Table 6. Black sea bass commercial landings by distance from shore, 1999.

	Black Sea Bass			
	0-3 miles ('000 lbs)	3-200 miles ('000 lbs)	Total ('000 lbs)	% EEZ
ME	NA	NA		
NH	NA	NA		
MA	571	3	574	0.5
RI	65	111	176	63.1
CT	2	12	14	85.7
NY	82	127	209	60.8
NJ	8	493	501	98.4
DE	NA	NA		
MD	78	407	485	83.9
VA	2	738	740	99.7
NC	26	564	590	95.6
Total	834	2455	3289	74.6

Source: NMFS General Canvass Data.

Table 7. Distribution (%) of black sea bass commercial landings by month and state, all gear, 1990-1999 combined.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ME	97.78	1.16	0.4					0.65					99.99
NH													
MA	0.08	0.23	0.15	0.15	32.51	31.60	5.72	3.31	8.28	16.33	1.58	0.08	100.02
RI	14.48	12.15	11.09	12.57	12.22	3.53	2.40	3.04	2.97	4.87	11.86	8.83	100.01
CT	14.52	9.68	11.29	8.06	6.45	3.23	3.23	3.23	6.45	9.68	8.06	16.13	100.01
NY	6.83	7.96	8.31	12.46	11.76	9.51	6.06	6.83	5.85	6.69	9.01	8.73	100.00
NJ	10.63	12.22	10.01	7.02	10.02	6.83	4.79	4.49	5.81	9.99	11.04	7.15	100.00
DE	0.37			0.87	15.67	6.97	4.60	2.24	4.73	7.96	13.81	42.79	100.01
MD	0.82	1.21	1.14	3.87	24.18	18.36	12.81	9.94	8.30	8.25	6.47	4.66	100.01
VA	14.39	16.82	22.83	12.93	7.57	3.62	3.07	2.04	2.61	5.67	4.85	3.60	100.00
NC	17.11	18.02	19.46	15.72	4.00	1.55	3.89	6.93	3.09	1.17	3.41	5.65	100.00
Total*	9.67	10.85	11.55	8.62	12.65	8.64	5.51	4.82	5.18	7.89	7.89	6.74	100.01

* = Total by state does not include landings with month unknown.

Source: NMFS Weighout Data.

Table 8. Black sea bass commercial and recreational landings ('000 lbs), 1981-1999.

Year	Comm	Rec	Total	% Comm	% Rec
1981	2,489	1,232	3,721	67%	33%
1982	2,595	9,894	12,489	21%	79%
1983	3,336	4,079	7,415	45%	55%
1984	4,332	1,447	5,779	75%	25%
1985	3,419	2,097	5,516	62%	38%
1986	4,191	12,392	16,583	25%	75%
1987	4,167	1,924	6,091	68%	32%
1988	4,142	2,869	7,011	59%	41%
1989	2,919	3,289	6,208	47%	53%
1990	3,501	2,761	6,262	56%	44%
1991	2,804	4,186	6,990	40%	60%
1992	3,007	2,706	5,713	53%	47%
1993	3,225	4,842	8,067	40%	60%
1994	2,039	2,948	4,987	41%	59%
1995	2,062	6,207	8,269	25%	75%
1996	3,360	3,993	7,353	46%	54%
1997	2,614	4,268	6,882	38%	62%
1998	2,563	1,152	3,715	69%	31%
1999	2,974	1,697	4,671	64%	36%
Total Mean	3,144	3,894	7,038	45%	55%
90-99 Mean	2,815	3,476	6,291	45%	55%

Source: NMFS Weighout Data and MRFSS Data.

Table 9. Number of black sea bass recreational fishing trips, recreational harvest limit, and recreational landings from 1990 to 1999.

Year	Number of Fishing Trips[a]	Recreational Harvest Limit (million lb)	Recreational Landings of BSB (million lb)[b]
1990	863,707	None	4.14
1991	N/A	None	4.19
1992	218,700	None	2.71
1993	296,370	None	4.84
1994	265,402	None	2.95
1995	315,165	None	6.21
1996	282,972	None	4.00
1997	313,052	None	4.27
1998	N/A	3.15	1.15
1999	N/A	3.15	1.70

[a] Number of fishing trips as reported by anglers in the intercept survey indicating that the primary species group sought was summer flounder, North Atlantic, Mid-Atlantic, and South Atlantic regions combined. Estimates are not expanded. Source: MRFSS, Data.
[b] From Maine to North Carolina.

N/A = Data not available.

Table 10. Recreational black sea bass landings (number) by state, 1990-1999.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Total
1990	-		31,236	7,865	825	356,918	1,505,745	112,567	494,356	1,343,904	415,334	4,268,750
1991		274	24,976	9,521	1,528	197,611	2,486,662	392,325	640,916	1,446,653	257,634	5,458,100
1992			5,918	12,211	7,990	163,554	1,579,431	195,915	758,596	783,130	362,038	3,868,783
1993			11,379	25,663	10,020	218,764	4,212,362	237,081	593,581	672,354	215,366	6,196,570
1994			6,676	16,769	-	218,184	1,913,993	66,712	273,541	912,975	162,011	3,570,861
1995		-	8,493	41,723	5,196	90,026	3,953,412	209,549	1,498,449	919,636	160,298	6,886,782
1996			16,757	43,232	5,404	78,897	2,320,501	58,878	286,687	799,323	154,603	3,764,282
1997		-	15,960	35,125	1,724	216,891	3,352,953	91,082	372,178	635,559	146,041	4,867,513
1998			7,332	25,637	3,491	12,391	272,808	52,089	354,203	398,010	133,059	1,259,020
1999		-	20,985	25,290	1,583	88,880	449,134	41,462	159,527	536,489	88,493	1,411,843
Total	-	274	149,712	243,036	37,761	1,642,116	22,047,001	1,457,660	5,432,034	8,448,033	2,094,877	41,552,504
% of Total	-	0.0	0.4	0.6	0.1	4.0	53.1	3.5	13.1	20.3	5.0	100.0

Source: MRFSS Data.

Table 11. Black sea bass recreational landings (a+b1), in number, by distance from shore, Maine through North Carolina.

YEAR	NORTH ATLANTIC			MID-ATLANTIC			NORTH CAROLINA		
	(<= 3 MI)	OCEAN (> 3 MI)	INLAND	(<= 3 MI)	OCEAN (> 3 MI)	INLAND	(<= 3 MI)	OCEAN (> 3 MI)	INLAND
1990	11,089	13,575	15,262	517,695	2,551,156	744,638	99,595	282,328	33,410
1991	10,514	1,840	23,945	901,566	3,145,033	1,117,568	97,309	139,602	20,723
1992	9,823	5,411	10,885	747,721	2,232,389	500,515	100,545	237,615	23,878
1993	15,354	7,623	24,084	2,229,831	3,040,787	663,525	70,551	123,438	21,377
1994	16,020	2,692	4,733	213,935	2,581,279	590,192	29,916	109,749	22,345
1995	35,376	11,425	8,611	274,115	5,408,822	988,136	36,370	109,318	14,610
1996	28,480	19,308	17,606	327,398	2,725,230	491,659	14,991	118,302	21,310
1997	10,919	25,578	16,311	320,046	4,065,634	282,981	25,296	91,287	29,457
1998	19,983	4,298	12,178	66,687	970,893	51,920	33,990	80,801	18,268
1999	24,055	6,409	17,395	188,658	975,512	111,322	35,433	43,609	9,451
90-99 MEAN	18,161	9,816	15,101	578,765	2,769,674	554,246	54,400	133,605	21,483
% MEAN	42.16	22.79	35.05	14.83	70.97	14.20	25.97	63.78	10.25

Source: MRFSS Data.

Table 12. Black sea bass recreational landings (a+b1, in number), by fishing mode, Maine through North Carolina.

	NORTH ATLANTIC			MID-ATLANTIC			NORTH CAROLINA		
YEAR	SHORE	PARTY/ CHARTER	PRIVATE/ RENTAL	SHORE	PARTY/ CHARTER	PRIVATE/ RENTAL	SHORE	PARTY/ CHARTER	PRIVATE/ RENTAL
1990	3,957	18,709	17,259	247,229	2,161,489	1,404,772	38,194	88,715	288,425
1991	2,536	1,722	32,041	242,387	2,532,676	2,389,105	5,755	51,750	200,129
1992	0	4,917	21,201	43,108	1,955,178	1,482,339	2,260	83,093	276,685
1993	0	7,584	39,478	48,197	4,529,975	1,355,970	6,479	42,105	166,781
1994	11,513	988	10,943	227,464	1,950,911	1,207,030	4,369	53,989	103,653
1995	2,945	27,467	25,000	262,710	5,103,314	1,305,049	10,325	66,448	83,525
1996	1,176	31,738	32,480	66,113	2,524,677	953,496	3,233	75,319	76,050
1997		28,745	24,064	7,847	3,893,581	767,234	490	28,009	117,542
1998	0	3,459	33,001	5,894	739,958	343,648	1,179	34,457	97,423
1999	363	10,215	37,280	17,390	576,558	681,543	1,477	34,580	52,435
90-99 Mean	2,499	13,554	27,275	116,834	2,596,832	1,189,019	7,376	55,847	146,264
% Mean	5.8	31.3	62.9	3.0	66.5	30.5	3.5	26.7	69.8

Source: MRFSS Data.

Table 13. The percentage (%) contribution of black sea bass to the total catch by party charter vessels, 1996-1999 combined.

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
CT	0.00	0.00	0.00	0.00	0.05	0.01	0.02	0.03	0.16	0.13	0.39		0.08
DE				0.00	64.87	32.61	4.40	4.89	24.59	42.57	0.00	0.00	10.73
ME	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.38	0.00	0.00	0.03
MD	0.00	0.00	0.00	7.44	91.16	87.38	15.26	2.30	19.68	80.09	96.59	88.53	38.08
MA	0.00	0.00	0.00	0.00	1.76	1.28	2.44	1.36	2.02	1.25	0.00	0.00	1.39
NH				0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01
NJ	11.13	10.71	5.03	1.45	30.59	28.03	15.39	16.73	38.83	57.97	51.94	14.64	28.74
NY	0.00	0.03	0.01	0.25	4.54	14.41	11.14	18.63	25.57	26.53	35.78	5.91	17.42
NC	0.00	1.84	0.00	22.93	43.97	27.36	39.30	35.17	34.97	24.93	14.55	0.00	32.65
RI	2.62	0.00	0.00	0.01	0.06	0.48	1.08	0.10	1.51	3.22	11.63	12.27	0.77
VA		0.00	0.54	43.14	67.56	17.89	16.31	10.52	85.13	91.19	92.87	89.38	47.37
Total	7.29	6.94	2.69	1.43	18.93	19.45	11.04	9.56	28.39	45.01	49.09	13.08	20.00

Source: Vessel Trip Report Data.

Table 14. Ex-vessel value, nominal price and 2000 adjusted price of black sea bass by year, 1991-2000, ME to Cape Hatteras (NC), all gear combined.

Year	Nominal Value 1,000 $	Nominal Price Mean	Mean Price in constant 2000 $
1991	3,516	1.25	1.43
1992	3,158	1.05	1.19
1993	3,240	1.03	1.14
1994	2,386	1.17	1.29
1995	3,042	1.48	1.57
1996	3,896	1.16	1.20
1997	3,909	1.50	1.56
1998	4,341	1.69	1.81
1999	5,037	1.69	1.79
2000	4,758	1.79	1.79

Table 15. Total ex-vessel value of all finfish and shellfish landings, ex-vessel value of black sea bass, and black sea bass as a percentage of the total ex-vessel value by state, 1999 and 2000.

	1999			2000		
State	Total Ex-vessel Value ($1,000)	Black Sea Bass Ex-vessel Value ($1,000)	Black Sea Bass Percent	Total Ex-vessel Value ($1,000)	Black Sea Bass Ex-vessel Value ($1,000)	Black Sea Bass Percent
ME	323,809	0	0.00	354,055	<1	0.00
NH	12,542	0	0.00	13,951	0	0.00
MA	260,239	961	0.37	288,262	969	0.34
RI	79,270	331	0.42	72,544	190	0.26
CT	38,090	28	0.07	31,227	26	0.08
NY	76,046	453	0.60	59,425	256	0.43
NJ	97,555	781	0.80	107,163	1033	0.96
DE	6,893	275	4.00	6,707	89	1.33
MD	63,759	760	1.19	53,874	475	0.88
VA	108,253	1,195	1.10	118,336	1335	1.13
NC	30,689	456	1.49	36,739	385	1.05
Total	1,097,146	5,240	0.48	1,142,283	4,758	0.42

Table 16. Landings, value, and price of black sea bass by state for 2000, all gear combined.

State	Landings (1,000 lbs)	Value ($1,000)	Price ($/lb)
ME	<1	<1	1.44
MA	626	969	1.55
RI	101	190	1.87
CT	15	26	1.80
NY	135	256	1.90
NJ	587	1,033	1.76
DE	55	89	1.61
MD	305	475	1.56
VA	648	1,335	2.06
NC	185	385	2.08
Total	2,658	4,758	1.79

Table 17. Landings, value, and price of black sea bass by month, 1991-2000 averaged, ME to Cape Hatteras (NC), all gear combined.

Month	Landings (1,000 lbs)	Value ($1,000)	Adjusted Price ($/lb)
Jan	1,963	2,987	1.52
Feb	2,868	3,614	1.26
Mar	3,101	4,107	1.32
Apr	2,301	3,252	1.41
May	3,609	5,013	1.39
Jun	2,311	3,238	1.40
Jul	1,658	2,722	1.64
Aug	1,189	2,012	1.69
Sep	1,263	2,112	1.67
Oct	2,464	3,702	1.50
Nov	1,881	2,857	1.52
Dec	1,692	2,731	1.61
All	26,300	38,346	1.46

Table 18. Average ex-vessel commercial landings of black sea bass, value and price by month and water area, ME to NC, 1999-2000 combined.

	State (<3 miles)			EEZ (>3 miles)		
Month	Landings (1,000 lbs)	Value ($1,000)	Average Price	Landings (1,000 lbs)	Value ($1,000)	Average Price
Jan	<1	2	3.58	<1	2	1.75
Feb	<1	1	2.67	5	7	1.51
Mar	1	2	1.76	3	5	1.43
Apr	1	2	1.32	5	10	2.20
May	185	290	1.57	<1	1	1.76
Jun	117	158	1.35	3	4	1.45
Jul	67	141	2.10	5	10	1.96
Aug	4	8	2.14	12	32	2.60
Sep	2	3	1.28	7	21	3.07
Oct	181	260	1.44	<1	1	1.81
Nov	7	15	2.20	0	0	0.00
Dec	6	9	1.59	0	0	0.00
All	571	890	1.56	41	92	2.22

Table 19. Landings, ex-vessel value , and price of black sea bass by size category for 2000, ME to Cape Hatteras (NC), all gear combined.

Size Category	Landings (1,000 lbs)	Value ($1,000)	Price ($/lb)
Extra Small	<1	<1	1.03
Small	513	536	1.05
Medium	643	948	1.47
Large	833	1,700	2.04
Jumbo	502	1,315	2.62
Unclassified	166	259	1.56

Table 20. Summary of number of vessels holding federal commercial and/or recreational permit combinations for summer flounder, scup, and black sea bass.

Comm. Permit Combinations	Recreational Permit Combinations								
	No. Rec. Permit	FLK Only	SCP Only	FLK/ Scup	BSB Only	FLK/ BSB	SCP/ BSB	FLK/ SCP/ BSB	Row Total
No. Comm. Permit	0	54	12	34	9	66	15	356	546
FLK Only	286	5	4	1	2	0	1	5	304
SCP Only	69	3	0	1	0	3	0	7	83
BSB	96	1	0	0	0	0	1	1	99
FLK/ SCP	178	3	0	6	3	5	2	8	205
FLK/ BSB	40	0	0	0	0	2	1	0	43
SCP/ BSB	172	8	0	1	0	1	2	24	208
FLK/ SCP/ BSB	462	3	1	1	0	0	0	14	481
Column Total	1303	77	17	44	14	77	22	415	1969

Table 21. Other permit year 2000 federal northeast region permits held by summer flounder, scup, and black sea bass commercial and recreational vessels.

	Commercial Only (n= 1,303)		Party/Charter Only (n= 546)		Commercial and Party/Charter (n= 120)	
Northeast Permits	Vessels (No.)	Percent of Total	Vessels (No.)	Percent of Total	Vessels (No.)	Percent of Total
Surfclam	620	47.6	84	15.4	24	20
Ocean Quahog	574	44.1	80	14.7	19	15.8
Scallop	253	19.4	0	0	4	3.3
Non-trap Lobster	594	45.6	8	1.5	10	8.3
Lobster Trap	355	27.2	43	7.9	24	20
Party/ Charter Lobster	2	0.2	14	2.6	2	1.7
Party/ Charter Multi-Species	433	33.2	440	80.6	52	43.3
Comm. Multi-species	711	54.6	63	11.5	52	43.3
Party/ Charter Squid/ Mackerel/ Butterfish	4	0.3	423	77.5	76	63.3
Comm. Squid/ Mackerel/ Butterfish	1071	82.2	220	39.6	86	71.7
Comm. Bluefish	1062	81.5	425	77.8	100	83.3
Party/ Charter Bluefish	14	1.1	84	15.4	88	73.3

Table 22. Top ports of landing (in pounds), based on NMFS 1999 weighout data. Since this table includes only the "top ports," it may not include all of the landings for the year.

PORT	POUNDS FLK	# FLK Vessels	Pounds SCP	# SCP Vessels	Pounds BSB	# BSB Vessels
STONINGTON, CT	188,498		52,799		8,207	
OCEAN CITY, MD	166,866	21	C	C	407,245	27
CHATHAM, MA	24,883	17	78,894	28	166,154	33
NEW BEDFORD, MA	318,553	139	264,495	31	85,143	42
BARNSTABLE, MA	126,224	31	47,083	25	10,758	27
OTHER DUKES, MA	157,619	30	34,376	23	118,436	29
NANTUCKET, MA	117,688	30	0	0	C	C
OTHER MASS	4,349	4	162,007	5	133,270	7
BAYBORO, NC	106,628	4	0	0	C	C
BEAUFORT, NC	576,122	25	0	0	21,317	13
ENGELHARD, NC	361,185	17	0	0	16,722	13
ORIENTAL, NC	312,304	19	0	0	783	6
WANCHESE, NC	1,020,351	53	0	0	85,612	56
VANDEMERE, NC	137,494	7	0	0	C	C
BELFORD, NJ	358,957	19	1,602	15	2,972	28
WILDWOOD, NJ	68,481	6	C	C	60,352	7
CAPE MAY, NJ	740,914	72	644,603	27	277,209	55
PT. PLEASANT, NJ	649,293	39	118,352	24	30,643	43
SEA ISLE CITY, NJ	6,891	5	C	C	107,018	7
FREEPORT, NY	30,012	24	63,675	9	18,825	17
GREENPORT, NY	70,182	22	54,358	14	13,247	14
HAMPTON BAY, NY	328,952	57	159,843	45	64,538	48
MONTAUK, NY	316,141	74	133,484	68	102,809	103
LITTLE COMPTON, RI	70,815	14	214,078	11	11,210	14
NEWPORT, RI	198,165	46	317,833	29	16,353	36
POINT JUDITH, RI	1,147,339	130	671,995	105	137,857	143
TIVERTON, RI	143,506	31	36,966	18	5,026	23
CHINCOTEAGUE, VA	391,248	29	323	5	84,125	24
HAMPTON, VA	719,640	39	C	C	219,437	33
NEWPORT NEWS, VA	887,148	59	C	C	72,343	42
VIRGINIA BEACH, VA	C	C	C	C	362,665	23

C = Confidential

Table 23. Ports with 10% or more revenue dependence on summer flounder, scup, and/or black sea bass, 1999.

Port	State	County	All Species Value ($)	Percent (%) Summer Flounder	Percent (%) Scup	Percent (%) Black Sea Bass	Percent (%) Summer Flounder, Scup, Black Sea Bass Mix
Falmouth	MA	Barnstable	118,464	47.69%	0.59%	0.23%	48.51%
Other Dukes	MA	Dukes	2,196,255	13.36%	2.02%	9.99%	25.37%
Nantucket	MA	Nantucket	510,147	46.22%	-	Confidential	Confidential
Other MA	MA	Not-Specified	2,578,272	0.35%	7.60%	7.37%	15.32%
Little Compton	RI	Newport	1,853,977	6.35%	18.16%	1.36%	25.88%
Newport	RI	Newport	8,740,253	4.97%	4.77%	0.37%	10.12%
Tiverton	RI	Newport	3,807,282	7.94%	1.74%	0.23%	9.90%
New Shoreham	RI	Washington	113,282	39.8%	-	-	39.82%
S. Kingstown	RI	Washington	207,760	Confidential	Confidential	Confidential	Confidential
Westerley	RI	Washington	161,815	Confidential	Confidential	Confidential	Confidential
Clinton	CT	Middlesex	164,988	Confidential	15.78%	0.22%	33.00%
East Lyme	CT	New London	199,495	7.83%	16.32%	0.17%	24.32%
Freeport	NY	Nassau	1,492,839	4.24%	7.12%	2.48%	13.84%
Ammagansett	NY	Suffolk	181,625	Confidential	Confidential	Confidential	Confidential
Hampton Bay	NY	Suffolk	8,471,407	8.33%	2.85%	1.37%	12.54%
Mattituck	NY	Suffolk	233,472	32.78%	11.98%	1.21%	45.97%
Montauk	NY	Suffolk	11,499,567	6.64%	1.76%	2.14%	10.54%
Cape May	NJ	Cape May	22,398,888	4.30%	3.17%	1.90%	9.34%
Sea Isle City	NJ	Cape May	1,646,613	0.73%	Confidential	10.38%	Confidential

Table 23 (continued). Ports with 10% or more revenue dependence on summer flounder, scup, and/or black sea bass, 1999.

Port	State	County	All Species Value ($)	Percent (%) Summer Flounder	Percent (%) Scup	Percent (%) Black Sea Bass	Percent (%) Summer Flounder, Scup, Black Sea Bass Mix
Other Essex	NJ	Essex	906,139	10.47%	-	0.20%	10.66%
Belford	NJ	Monmouth	2,993,513	23.74%	0.08%	0.16%	23.98%
Indian River	DE	Sussex	574,019	Confidential	Confidential	Confidential	Confidential
Lewes	DE	Sussex	119,757	-	-	Confidential	Confidential
Ocean City	MD	Worcester	6,192,175	5.41%	0.01%	9.76%	15.18%
Chincoteague	VA	Accomac	2,138,891	30.00%	0.01%	6.21%	36.21%
Hampton	VA	City of Hampton	8,670,343	10.87%	0.01%	3.69%	14.57%
VA Beach/Lynn Haven	VA	City of VA Beach	4,347,932	0.36%	Confidential	14.60%	Confidential
Atlantic	NC	Carteret	1,003,298	12.14%	-	0.06%	12.20%
Beaufort	NC	Carteret	3,653,821	18.95%	-	1.00%	19.96%
Other Carteret	NC	Carteret	224,897	Confidential	-	Confidential	Confidential
Wanchese	NC	Dare	9,748,684	13.26%	-	2.00%	15.27%
Engelhard	NC	Hyde	4,244,478	10.87%	-	0.71%	11.58%
Bayboro	NC	Pamlico	507,960	24.85%	-	Confidential	Confidential
Lowland	NC	Pamlico	522,277	19.16%	-	-	19.16%
Oriental	NC	Pamlico	3,518,360	11.82%	-	0.04%	11.85%
Vandemere	NC	Pamlico	1,516,704	10.02%	-	0.01%	10.03%

Table 24. Black sea bass commercial landings by gear, Maine to Cape Hatteras, North Carolina, 1990 - 1999 combined.

Gear	1,000 Pounds	Percent
Unknown Combined Gear	207	0.73
Haul Seines, Beach	1	*
Haul Seines, Long	*	*
Gill Net, Drift, Large Pelagic	*	*
Pots and Traps, Eel	*	*
Pots and Traps, Offshore Wire	*	*
Otter Trawl Bottom, Crab	*	*
Otter Trawl Bottom, Fish	11,353	40.32
Otter Trawl Bottom, Scallop	46	0.16
Otter Trawl Bottom, Shrimp	*	*
Otter Trawl Bottom, Other	18	0.06
Otter Trawl Midwater	*	*
Trawl Midwater, Paired	9	0.03
Trawl Bottom, Paired	*	*
Scottish Seine	*	*
Pound Nets, Fish	23	0.08
Pound Nets, Other	4	0.02
Floating Traps (Shallow)	144	0.51
Pots And Traps, Combined	*	*
Pots And Traps, Conch	24	0.09
Pots And Traps, Crab, Blue	21	0.08
Pots And Traps, Fish	12,878	45.74
Pots And Traps, Lobster Inshore	259	0.92
Pots And Traps, Lobster Offshore	256	0.91
Pots And Traps, Other	204	0.73
Dredges, Crab	*	*
Gill Nets, Sea Bass	8	0.03
Gill Nets, Other	6	0.02
Gill Nets, Sink, Other	105	0.37
Gill Net, Shad	*	*
Gill Nets, Drift, Other	26	0.09
Gill Nets, Drift, Runaround	3	0.01
Gill Nets, Stake	*	*
Trammel Nets	*	*
Troll And Handline	*	*
Lines Hand, Other	2,475	8.79
Lines Troll, Other	20	0.07
Lines Long Set With Hooks	27	0.1
Dip Nets, Common	*	*
Dredge, Surfclam	*	*
Dredges Scallop, Sea	37	0.13

Source: NMFS Weighout Data.

Table 25. Trip expenses (per trip) for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

	Breakdown of Trip Expenses per Trip								
	Fuel per Trip [a] ($/ trip)	Oil per Trip [a] ($/ trip)	Ice per Trip [a] ($/ trip)	Food, Water per Trip [a] ($/ trip)	Lumpers Fees per Trip [a] ($/ trip)	Supplies per Trip [a] ($/ trip)	Consignment Fees per Trip [a] ($/ trip)	Other Trip Expenses [a] ($/ trip)	Total Operating Costs per Trip in 1996 [a] ($/ trip)
Maximum	454	40	136	75	60	200	250	150	722
Minimum	30	2	2	3	10	2	3	5	30
Range	424	38	134	72	50	198	247	145	692
Mode	100	10	10	10	20	10	- [b]	10	250
Median	100	10	20	20	30	29	40	15	210
Mean	132	14	39	27	33	52	76	38	267
Standard Error of the Mean	16.35	1.82	7.68	3.97	6.09	10.33	26.40	18.12	30.03
Standard Dev.	93.90	10.12	39.17	21.36	18.27	55.64	79.21	51.24	177.64
Skewness	1.99	1.16	1.15	1.00	0.25	1.55	1.57	1.93	1.19
Count	*33*	*31*	*26*	*29*	*9*	*29*	*9*	*8*	*35*
# of Trimmed Responses [a]	*2*	*4*	*2*	*4*	*1*	*2*	*1*	*1*	-

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1998.

Table 26. Trip expenses (per day) for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

	Breakdown of Trip Expenses per Day								
	Fuel per day [a] ($/ day)	Oil per day [a] ($/ day)	Ice per day [a] ($/ day)	Food, Water per day [a] ($/ day)	Lumpers Fees per day [a] ($/ day)	Supplies Per day [a] ($/ day)	Consignment Fees per day [a] ($/ day)	Other Trip Expenses per day [a] ($/ day)	Total Operating Costs per day in 1996 [a] ($/ day)
Maximum	160	25	60	56	40	100	82	80	304
Minimum	50	3	3	3	10	2	16	5	101
Range	110	22	57	53	30	98	65	75	203
Mode	100	10	10	10	20	10	- [b]	- [b]	255
Median	100	10	20	20	20	23	45	15	190
Mean	97	11	26	23	23	33	48	26	191
Standard Error of the Mean	4.77	1.10	3.79	2.79	3.82	5.68	7.71	9.35	10.56
Standard Dev.	25.69	5.93	18.56	15.27	10.11	28.95	21.81	26.44	58.78
Skewness	0.39	1.10	0.50	0.65	0.75	1.07	0.25	1.63	0.19
Count	29	29	24	30	7	26	8	8	31
# of Trimmed Responses [a]	6	6	4	3	3	5	2	1	4

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1998.

Table 27. Trip expenses (per year) for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

	Breakdown of Trip Expenses per Year								
	Fuel Per year [a] ($/ year)	Oil per year [a] ($/ year)	Ice Per year [a] ($/ year)	Food, Water per year [a] ($/ year)	Lumpers Fees per year [a] ($/ year)	Supplies Per year [a] ($/ year)	Consignment Fees per year [a] ($/ year)	Other Trip Expenses per year [a] ($/ year)	Total Operating Costs per year in 1996 [a] ($/ year)
Maximum	*36,000*	*4,980*	*8,410*	*11,832*	*8,960*	*17,500*	*14,790*	*18,560*	*65,000*
Minimum	*6,930*	*288*	*231*	*385*	*2,145*	*154*	*4,290*	*770*	*11,328*
Range	*29,070*	*4,692*	*8,179*	*11,447*	*6,815*	*17,346*	*10,500*	*17,790*	*53,672*
Mode	*13,930*	*1,990*	*1,990*	*2,490*	- [b]	*1,990*	- [b]	- [b]	*40,670*
Median	*15,600*	*1,550*	*2,940*	*3,000*	*3,980*	*3,638*	*9,730*	*2,818*	*33,824*
Mean	*17,368*	*1,862*	*3,392*	*4,300*	*4,635*	*6,281*	*9,628*	*5,200*	*34,317*
Standard Error of the Mean	*1,310.44*	*242.09*	*514.60*	*602.01*	*935.62*	*1,068.85*	*1,528.99*	*2,245.47*	*2,292.18*
Standard Dev.	*7,056.95*	*1,347.92*	*2,467.91*	*3,351.85*	*2,475.41*	*5,655.82*	*3,745.24*	*6,351.14*	*12,762.35*
Skewness	*1.07*	*0.96*	*0.65*	*0.83*	*0.93*	*0.89*	*-0.08*	*1.75*	*0.19*
Count	*29*	*31*	*23*	*31*	*7*	*28*	*6*	*8*	*31*
# of Trimmed Responses [a]	*6*	*4*	*5*	*2*	*3*	*3*	*4*	*1*	*4*

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1998

Table 28. Number of trips by month for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

	Number of Trips by month												
	January	February	March	April	May	June	July	August	September	October	November	December	Total number of Trips in 1996
Maximum	25.0	25.0	20.0	20.0	30.0	25.0	28.0	25.0	25.0	25.0	21.0	25.0	250.0
Minimum	1.0	1.5	2.0	2.0	2.0	1.0	1.0	2.0	2.0	1.0	1.0	1.0	22.0
Range	24.0	23.5	18.0	18.0	28.0	24.0	27.0	23.0	23.0	24.0	20.0	24.0	228.0
Mode	15.0	12.0	10.0	20.0	20.0	25.0	20.0	20.0	20.0	20.0	15.0	15.0	200.0
Median	11.0	11.0	12.0	13.5	19.0	16.0	20.0	20.0	19.0	15.0	13.0	12.0	166.0
Mean	11.3	11.4	11.9	12.7	15.1	15.7	15.9	16.4	15.2	13.9	12.3	11.6	150.0
Standard Error of the Mean	1.18	1.18	0.97	1.07	1.40	1.36	1.42	1.35	1.44	1.30	1.13	1.02	11.16
Standard Dev.	6.58	6.49	5.31	6.26	8.04	8.07	8.27	7.65	8.03	7.22	6.27	5.97	66.01
Skewness	0.33	0.42	(0.26)	(0.40)	(0.37)	(0.38)	(0.52)	(0.63)	(0.44)	(0.47)	(0.40)	(0.16)	(0.45)
Count	31	30	30	34	33	35	34	32	31	31	31	34	35

Source: Lallemand et al. 1998.

Table 29. Days absent by month for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

	Days Absent by month												
	January	February	March	April	May	June	July	August	September	October	November	December	Total Day Absent in 1996
Maximum	25.0	25.0	20.0	30.0	30.0	25.0	28.0	25.0	25.0	25.0	21.0	25.0	257.5
Minimum	1.0	2.0	4.0	3.0	2.0	3.0	(1.0)	2.0	3.0	3.0	2.0	1.0	22.0
Range	24.0	23.0	16.0	27.0	28.0	22.0	29.0	23.0	22.0	22.0	19.0	24.0	235.5
Mode	15.0	12.0	10.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	200.0
Median	12.0	12.0	13.5	15.0	20.0	20.0	20.0	20.0	20.0	18.0	15.0	14.5	193.0
Mean	12.2	12.3	13.0	14.7	17.6	17.9	17.6	18.7	17.5	16.2	14.3	12.7	170.3
Standard Error of the Mean	1.05	1.05	0.80	1.04	1.22	1.03	1.27	1.00	1.08	1.05	0.96	0.90	9.75
Standard Dev.	5.83	5.78	4.37	6.09	7.02	6.11	7.42	5.64	6.00	5.84	5.34	5.23	57.68
Skewness	0.39	0.52	(0.11)	(0.10)	(0.63)	(0.58)	(1.10)	(0.98)	(0.74)	(0.86)	(0.76)	(0.33)	(0.81)
Count	31	30	30	34	33	35	34	32	31	31	31	34	35

Source: Lallemand et al. 1998.

Table 30. Steaming time by month for small trawlers in the Northeast, whose primary gear was otter trawl, 1996.

	Estimated Total Steaming Time by month (in hours)												
	January	February	March	April	May	June	July	August	September	October	November	December	Total Steaming Time (hrs) in 1996
Maximum	104.0	104.0	100.0	140.0	200.0	252.0	168.0	150.0	168.0	120.0	252.0	208.0	1,452.0
Minimum	2.0	2.0	4.0	3.0	1.5	3.0	(2.0)	3.0	2.5	3.5	2.0	1.0	27.0
Range	102.0	102.0	96.0	137.0	198.5	249.0	170.0	147.0	165.5	116.5	250.0	207.0	1,425.0
Mode	24.0	40.0	30.0	20.0	30.0	25.0	20.0	24.0	40.0	30.0	30.0	30.0	204.0
Median	24.0	25.0	30.0	27.0	30.0	30.0	30.0	31.0	32.0	30.0	26.0	24.0	307.5
Mean	30.7	31.5	33.4	39.2	45.6	47.0	45.6	46.6	45.9	38.1	42.1	37.6	446.0
Standard Error of the Mean	4.07	4.33	4.20	5.64	8.34	8.79	7.65	7.32	7.37	5.72	9.89	7.51	64.99
Standard Dev.	22.65	23.71	23.01	32.91	47.91	52.02	44.62	41.42	41.05	31.85	55.06	43.77	384.48
Skewness	2.10	1.90	1.40	1.66	2.06	2.39	1.47	1.26	1.64	1.30	2.89	2.75	1.46
Count	31	30	30	34	33	35	34	32	31	31	31	34	35

Source: Lallemand et al. 1998.

Table 31. Trip expenses (per trip) for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

	Breakdown of Trip Expenses per Trip								
	Fuel per Trip [a] ($/ trip)	Oil per Trip [a] ($/ trip)	Ice per Trip [a] ($/ trip)	Food, Water per Trip [a] ($/ trip)	Lumpers Fees per Trip [a] ($/ trip)	Supplies per Trip [a] ($/ trip)	Consignment Fees per Trip [a] ($/ trip)	Other Trip Expenses [a] ($/ trip)	Total Operating Costs per Trip in 1997 [a] ($/ trip)
Maximum	2,164	182	513	550	600	1,000	351	500	4,468
Minimum	507	25	184	205	13	141	115	15	1,090
Range	1,657	156	329	345	587	859	236	485	3,378
Mode	- [b]	- [b]	227	- [b]	- [b]	- [b]	- [b]	- [b]	- [b]
Median	1,440	78	300	360	265	526	189	100	2,490
Mean	1,369	84	333	372	257	528	224	137	2,608
Standard Error of the Mean	194.31	15.17	39.69	42.67	45.62	100.01	50.97	64.53	311.23
Standard Dev.	614.46	47.98	131.62	134.95	158.02	331.70	113.97	170.73	1,078.12
Skewness	(0.27)	0.86	0.34	0.03	0.57	0.17	0.36	2.04	0.24
Count	10	10	11	10	12	11	5	7	12
# of Trimmed Responses [a]	5	3	5	6	1	4	2	2	4

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

Table 32. Trip expenses (per day) for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

	Breakdown of Trip Expenses per Day								
	Fuel per day [a] ($/ day)	Oil per day [a] ($/ day)	Ice per day [a] ($/ day)	Food, Water per day [a] ($/ day)	Lumpers Fees per day [a] ($/ day)	Supplies Per day [a] ($/ day)	Consignment Fees per day [a] ($/ day)	Other Trip Expenses per day [a] ($/ day)	Total Operating Costs per day in 1997 [a] ($/ day)
Maximum	384	25	94	92	69	175	67	65	760
Minimum	260	13	40	42	12	35	6	4	144
Range	124	12	54	50	57	140	60	62	617
Mode	- [b]	- [b]	- [b]	- [b]	- [b]	- [b]	- [b]	- [b]	- [b]
Median	341	20	58	56	40	85	31	25	481
Mean	332	21	62	60	42	95	32	24	472
Standard Error of the Mean	11.42	1.59	5.65	5.03	5.19	14.09	8.58	8.25	51.94
Standard Dev.	37.86	4.22	17.87	16.68	17.99	48.80	21.02	21.83	201.17
Skewness	(0.64)	(0.74)	0.90	1.32	0.01	0.42	0.68	1.19	(0.39)
Count	11	7	10	11	12	12	6	7	15
# of Trimmed Responses [a]	4	6	6	5	1	3	1	2	1

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

Table 33. Trip expenses (per year) for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

	Breakdown of Trip Expenses per Year								
	Fuel Per year [a] ($/ year)	Oil per year [a] ($/ year)	Ice Per year [a] ($/ year)	Food, Water per year [a] ($/ year)	Lumpers Fees per year [a] ($/ year)	Supplies Per year [a] ($/ year)	Consignment Fees per year [a] ($/ year)	Other Trip Expenses per year [a] ($/ year)	Total Operating Costs per year in 1997 [a] ($/ year)
Maximum	81,600	5,500	19,000	19,000	17,200	34,000	12,286	12,000	202,640
Minimum	53,215	2,600	6,000	7,000	1,500	3,800	1,500	800	61,248
Range	28,385	2,900	13,000	12,000	15,700	30,200	10,786	11,200	141,392
Mode	- [b]	3,000	9,000	12,000	- [b]	20,000	- [b]	- [b]	- [b]
Median	76,000	4,000	10,000	12,000	7,250	15,030	4,457	3,500	127,550
Mean	71,728	4,082	11,251	12,983	7,806	16,372	5,783	4,286	132,136
Standard Error of the Mean	3,829.29	375.70	1,146.56	1,168.66	1,151.51	2,376.98	1,664.42	1,484.86	13,630.49
Standard Dev.	10,830.87	1,127.10	4,133.97	3,876.00	3,988.96	8,570.33	4,076.97	3,928.57	47,217.41
Skewness	-0.85	0.09	0.60	0.31	1.03	0.77	0.89	1.42	0.08
Count	8	9	13	11	12	13	6	7	12
# of Trimmed Responses [a]	7	4	3	5	1	2	1	2	4

[a] Cost Data were trimmed to exclude unusual values (i.e. values greater or lower than the Mean o 1 standard deviation respectively).

[b] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

Table 34. Number of trips by month for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

	Number of Trips by month												
	January	February	March	April	May	June	July	August	September	October	November	December	Total number of Trips in 1997
Maximum	20.0	20.0	16.0	16.0	25.0	28.0	28.0	30.0	22.5	20.0	20.0	20.0	217.5
Minimum	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	19.0
Range	18.0	18.0	15.0	15.0	24.0	27.0	27.0	29.0	21.5	19.0	19.0	19.0	198.5
Mode	2.0	2.0	6.0	4.0	2.0	1.0	2.0	2.0	2.0	5.0	2.0	3.0	19.0
Median	4.0	4.0	5.0	4.0	4.5	4.0	4.0	4.0	3.3	4.0	3.8	3.0	47.5
Mean	5.3	5.3	5.0	4.7	7.9	8.0	8.6	7.7	6.5	5.8	5.1	5.7	71.8
Standard Error of the Mean	0.93	0.91	0.67	0.74	1.51	1.91	1.86	1.81	1.37	1.15	0.99	1.15	11.68
Standard Dev.	4.58	4.48	3.29	3.61	7.40	9.36	9.11	8.85	6.70	5.63	4.86	5.65	57.21
Skewness	2.33	2.33	1.84	1.89	1.02	1.32	1.11	1.62	1.51	1.87	2.03	1.68	1.12
Count	24	24	24	24	24	24	24	24	24	24	24	24	24

Source: Lallemand et al. 1999.

Table 35. Days absent by month for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

	Days Absent by month												
	January	February	March	April	May	June	July	August	September	October	November	December	Total Day Absent in 1997
Maximum	28.0	28.0	28.0	26.0	28.0	28.0	28.0	30.0	28.0	30.0	28.0	28.0	278.0
Minimum	3.8	0.4	5.1	2.0	4.0	1.1	7.0	7.0	3.8	8.8	2.0	2.0	107.0
Range	24.2	27.6	22.9	24.0	24.0	26.9	21.0	23.0	24.2	21.2	26.0	26.0	171.0
Mode	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	240.0
Median	15.5	18.6	17.0	16.0	18.0	20.0	19.9	17.8	17.2	18.0	14.8	14.9	184.3
Mean	15.8	17.6	16.7	15.5	17.0	16.9	18.6	17.4	16.1	17.3	14.6	14.7	188.4
Standard Error of the Mean	1.31	1.13	1.16	1.24	1.28	1.54	1.06	1.26	1.34	1.20	1.36	1.22	10.41
Standard Dev.	6.44	5.54	5.69	6.10	6.26	7.55	5.20	6.16	6.56	5.86	6.66	5.98	50.98
Skewness	(0.14)	(1.19)	(0.31)	(0.41)	(0.31)	(0.41)	(0.17)	0.06	(0.31)	0.41	(0.16)	(0.11)	0.14
Count	24	24	24	24	24	24	24	24	24	24	24	24	24

Source: Lallemand et al. 1999.

Table 36. Steaming time by month for large trawlers in the Northeast, whose primary gear was otter trawl, 1997.

	Estimated Total Steaming Time by month (in hours)												
	January	February	March	April	May	June	July	August	September	October	November	December	Total Steaming Time (hrs) in 1997
Maximum	210.0	364.5	268.6	302.5	320.0	374.9	520.0	255.5	418.3	185.5	177.8	264.0	2,292.1
Minimum	36.0	4.9	8.0	8.0	20.0	17.2	16.0	26.0	7.5	12.1	8.0	8.0	412.0
Range	174.0	359.6	260.6	294.5	300.0	357.8	504.0	229.5	410.8	173.4	169.8	256.0	1,880.1
Mode	120.0	-[a]	60.0	60.0	80.0	-[a]	-[a]	60.0	60.0	80.0	90.0	100.0	-[a]
Median	99.9	103.5	102.0	85.0	85.6	70.0	77.6	60.0	70.0	80.0	80.0	87.5	1,183.2
Mean	108.5	126.7	107.9	106.7	105.7	96.2	148.0	94.2	100.5	78.6	81.1	84.3	1,170.0
Standard Error of the Mean	11.07	18.41	12.86	15.96	14.02	18.80	30.85	14.31	20.18	8.60	8.98	11.47	111.79
Standard Dev.	51.93	88.27	62.99	76.54	68.69	86.14	141.39	68.63	94.67	41.27	43.99	55.01	547.64
Skewness	0.41	1.33	0.84	1.02	1.62	2.01	1.39	1.27	2.28	0.78	0.56	1.64	0.37
Count	22	23	24	23	24	21	21	23	22	23	24	23	24

[a] In cases where all values reported were distinct, there is no modal value; we then report this as blank ("-"). The proper interpretation of such a ("-") cell is that all values within the range are equally likely.

Source: Lallemand et al. 1999.

Table 37. Estimated average annual operating costs for pot and trap vessels in 2000.

Expenditure Category	Average Annual Expense ($'s)
Boat Repair and Maintenance - By Yard	576.14
Boat Repair and Maintenance - By Owner	3,445.63
Supplies (Store)	3,105.36
Food	1,240.83
Gear Maintenance (Normal Use)	4,162.50
Fuel and Lubricants	6,506.27
Vehicles	3,435.71

Source: University of Rhode Island lobster simulator data less bait expenditures.

Table 38. Total ex-vessel value of all finfish and shellfish landings, ex-vessel value of scup, and scup as a percentage of the total ex-vessel value by state, 1999 and 2000.

	1999			2000		
State	Total Ex-vessel Value ($1,000)	Scup Ex-vessel Value ($1,000)	Scup Percent	Total Ex-vessel Value ($1,000)	Scup Ex-vessel Value ($1,000)	Scup Percent
ME	323,809	0	0.00	354,055	0	0.00
NH	12,542	0	0.00	13,951	0	0.00
MA	260,239	774	0.30	288,262	448	0.16
RI	79,270	1,672	2.11	72,544	1,252	1.73
CT	38,090	177	0.47	31,227	175	0.56
NY	76,046	718	0.94	59,425	906	1.52
NJ	97,555	885	0.91	107,163	552	0.52
DE	6,893	0	0.00	6,707	<1	0.00
MD	63,759	<1	0.00	53,874	<1	0.00
VA	108,253	1	0.00	118,336	1	0.00
NC	30,689	<1	0.00	36,739	<1	0.00
Total	1,097,146	4,228	0.39	1,142,283	3,333	0.29

Table 39. Average willingness to pay for a one-day fishing trip, by state in 1994.

State	Mean ($'s)	Adjusted to 2000 ($'s)[a]
Maine	6.40	7.44
New Hampshire	0.85	0.99
Massachusetts	8.38	9.74
Rhode Island	4.23	4.92
Connecticut	3.07	3.57
New York	21.58	25.07
New Jersey	14.12	16.41
Delaware	1.43	1.66
Maryland	12.09	14.05
Virginia	42.33	49.19

[a] - Prices were adjusted using the Bureau of Labor Statistics Consumer Price Index.

Table 40. Aggregate willingness to pay for anglers that indicated they were targeting black sea bass in 2000.

State	Willingness to pay ($'s)
Maine	0
New Hampshire	0
Massachusetts	47,444
Rhode Island	55,389
Connecticut	0
New York	1,349,393
New Jersey	1,746,762
Delaware	19,286
Maryland	197,585
Virginia	1,574,769

Table 41. Willingness to pay for a one fish increase in the catch rate of bottom fish per trip, Maine to Virginia, 1994.

State	Mean ($'s)	Adjusted to 2000 ($'s)[a]
Maine	2.62	3.04
New Hampshire	2.14	2.49
Massachusetts	2.04	2.37
Rhode Island	2.11	2.45
Connecticut	2.25	2.61
New York	1.63	1.89
New Jersey	1.73	2.01
Delaware	2.06	2.39
Maryland	2.44	2.84
Virginia	1.79	2.08
All States	1.97	2.29

[a] - Prices were adjusted using the Bureau of Labor Statistics Consumer Price Index.

Table 42. State-by-state allocations of the coastwide black sea bass commercial quota implemented by Amendment 1.

State	Percent of Coastwide Quota
Maine	.5
New Hampshire	.5
Massachusetts	13
Rhode Island	11
Connecticut	1
New York	7
New Jersey	20
Delaware	5
Maryland	11
Virginia	20
North Carolina	11

Table 43. State-by-state black sea bass landings for various time periods.

State	1980-1997	%	1988-1997	%	1993-1997	%	Best 5-years[1] 1980-1997	%	Best 5-years[2] 1988-1997	%	1997-2001	%	2001	%	State Allocation %
ME	13,561	0.02	7,561	0.03	103	0.00	13,543	0.05	7,553	0.04	474	0.00	465	0.02	0.50
NH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.50
MA	3,906,939	6.86	1,783,939	6.02	232,435	1.76	2,100,212	8.44	1,599,386	8.49	2,141,448	15.95	570,300	20.61	13.00
RI	5,085,716	8.93	1,571,716	5.31	732,467	5.53	2,872,000	11.54	1,024,144	5.44	965,872	7.19	375,944	13.58	11.00
CT	266,297	0.47	144,297	0.49	45,962	0.35	179,061	0.72	112,933	0.60	65,574	0.49	15,349	0.55	1.00
NY	2,651,773	4.65	1,443,773	4.88	970,078	7.33	1,187,462	4.77	970,078	5.15	1,001,986	7.46	251,233	9.08	7.00
NJ	16,154,960	28.36	10,351,960	34.96	5,061,750	38.25	6,136,717	24.66	6,061,850	32.17	3,018,782	22.49	646,824	23.37	20.00
DE	2,280,763	4.00	1,475,763	4.98	640,077	4.84	927,900	3.73	885,948	4.70	473,815	3.53	25,449	0.92	5.00
MD	6,055,698	10.63	3,926,698	13.26	1,944,254	14.69	2,500,922	10.05	2,403,622	12.76	1,719,410	12.81	147,254	5.32	11.00
VA	14,031,720	24.63	6,218,720	21.00	2,811,785	21.25	5,653,000	22.72	3,880,538	20.60	3,328,308	24.79	607,025	21.93	20.00
NC	6,521,467	11.45	2,690,467	9.08	796,013	6.01	3,315,729	13.32	1,895,175	10.06	708,770	5.28	127,856	4.62	11.00
Total	56,968,894	100.00	29,614,894	100.00	13,234,924	100.00	24,886,546	100.00	18,841,227	100.00	13,424,439	100.00	2,767,699	100.00	100.00

[1]Best 5-years commercial landings for each state during the 1980 to 1997 period.
[2]Best 5-years commercial landings for each state during the 1988 to 1997 period.

Table 44. Catch disposition for trips that kept 100 or more pounds of black sea bass, 1999, all gear combined.

Species	Landed (lbs)	% of Total Landed	Discarded (lbs)	% of Total Discarded	Total Catch (lbs)
BLUEFISH	130471	99.889	145	0.111	130616
BONITO	1378	100	0	0	1378
BUTTERFISH	380750	97.853	8355	2.1472	389105
COBIA	62	100	0	0	62
COD	17366	99.919	14	0.0806	17380
CREVALLE	23	100	0	0	23
CROAKER, ATLANTIC	910288	99.78	2009	0.2202	912297
CUNNER	705	59.949	471	40.051	1176
CUSK	4	100	0	0	4
DOLPHIN FISH	456	98.701	6	1.2987	462
DRUM, BLACK	8	100	0	0	8
HERRING, BLUE BACK	2425	66.749	1208	33.2508	3633
EEL, CONGER	11462	100	0	0	11462
EEL, NK	24579	99.862	34	0.1381	24613
FLOUNDER, WINTER	71929	99.886	82	0.1139	72011
FLOUNDER, SUMMER	1160804	97.101	34658	2.8991	1195462
FLOUNDER, WITCH	21242	99.953	10	0.0471	21252
FLOUNDER, YELLOWTAIL	9418	99.524	45	0.4755	9463
FLOUNDER, AM. PLAICE	681	100	0	0	681
FLOUNDER, SAND-DAB	1572	100	0	0	1572
FLOUNDERS (NK)	827	100	0	0	827
FLOUNDER, FOURSPOT	2337	100	0	0	2337
GROUPER	1529	100	0	0	1529
GRUNTS	300	97.72	7	2.2801	307
HADDOCK	6773	100	0	0	6773
HAKE, RED	419949	98.638	5798	1.3618	425747
HAKE, WHITE	76451	98.353	1280	1.6467	77731
HAKE MIX RED & WHITE	11860	100	0	0	11860
HALIBUT, ATLANTIC	25	100	0	0	25
HERRING, ATLANTIC	13075	100	0	0	13075
JOHN DORY	15307	100	0	0	15307
MACKEREL, KING	7	100	0	0	7
WHITING, KING	37163	100	0	0	37163
MACKEREL, ATLANTIC	996886	99.361	6410	0.6389	1003296
MULLETS	200	100	0	0	200
REDFISH	20	100	0	0	20
ROSEFISH,BLK BELLIED	121	100	0	0	121
POUT, OCEAN	4135	96.118	167	3.8819	4302
PIGFISH	509	100	0	0	509
POLLOCK	1207	99.097	11	0.9031	1218
POMPANO, COMMON	3	100	0	0	3
SCULPINS	20	100	0	0	20
SEA RAVEN	390	90.698	40	9.3023	430
SCUP	996804	97.911	21267	2.089	1018071
SEA BASS, BLACK	2267913	92.322	188616	7.6782	2456529
SNAPPER	69	100	0	0	69
SEA ROBINS	3581	87.834	496	12.1658	4077
WEAKFISH, SQUETEAGUE	25237	97.301	700	2.6988	25937
WEAKFISH, SPOTTED	7053	91.681	640	8.3193	7693
DOGFISH CHAIN	10923	99.854	16	0.1463	10939

Table 44 (continued). Catch disposition for trips that kept 100 or more pounds of black sea bass, 1999, all gear combined.

Species	Landed (lbs)	% of Total Landed	Discarded (lbs)	% of Total Discarded	Total Catch (lbs)
SHAD, AMERICAN	1238	99.839	2	0.1613	1240
DOGFISH (NK)	71549	99.958	30	0.0419	71579
DOGFISH SMOOTH	1538	99.805	3	0.1947	1541
DOGFISH SPINY	211969	99.653	739	0.3474	212708
SHEEPSHEAD	539	100	0	0	539
SKATES	241838	99.668	806	0.3322	242644
SPADEFISH	215	100	0	0	215
MACKEREL, SPAN	502	100	0	0	502
TUNA, YELLOWFIN	1589	100	0	0	1589
SHARK, BLACK TIP	38	100	0	0	38
SHARK, ATL SHARPNOSE	2	100	0	0	2
WHITING, BLACK	222736	99.821	400	0.1793	223136
HAKE, SILVER	1822887	99.475	9612	0.5245	1832499
WOLFFISHES	1034	100	0	0	1034
OTHER FISH	3367	100	0	0	3367
CRAB, JONAH	27897	95.744	1240	4.2558	29137
CRAB, ROCK	581	99.828	1	0.1718	582
CRAB, NK	159	3.805	4020	96.1953	4179
CRAB, HORSESHOE	5699	100	0	0	5699
LOBSTER	79067	90.641	8164	9.3591	87231
CONCHS	827	100	0	0	827
WHELK, CHANNELED	59637	99.931	41	0.0687	59678
WHELK, KNOBBED	324	100	0	0	324
OCTOPUS	5	100	0	0	5
SCALLOP, CALICO	140	100	0	0	140
SCALLOP, SEA	55120	99.101	500	0.899	55620
SQUID (LOLIGO)	1855099	99.829	3174	0.1708	1858273
SQUID (ILLEX)	18978	100	0	0	18978
SQUIDS (NS)	333004	99.988	40	0.012	333044
OTHER SHELLFISH	30	100	0	0	30

Table 45. Mean recreational anglers' ratings of reasons for marine fishing, by subregion.

	New England			Mid-Atlantic		
Statement	Not Important	Somewhat Important	Very Important	Not Important	Somewhat Important	Very Important
To Spend Quality Time with Friends and Family	4.4%	14.3%	81.3%	3.0%	12.0%	85.0%
To Enjoy Nature and the Outdoors	1.4%	10.1%	88.5%	1.1%	11.6%	87.3%
To Catch Fish to Eat	42.2%	37.4%	20.4%	29.3%	40.1%	30.6%
To Experience the Excitement or Challenge of Sport Fishing	6.2%	24.9%	68.8%	8.4%	26.0%	65.6%
To be Alone	55.0%	27.9%	17.1%	57.7%	25.8%	16.4%
To Relax and Escape from my Daily Routine	3.4%	13.3%	83.3%	2.6%	11.9%	85.5%
To Fish in a Tournament of when Citations are Available	78.6%	14.0%	7.4%	73.4%	17.1%	9.5%

Source: Steinback and O'Neil. MS.

Table 46. Black sea bass landings (percentage) by gear type, Maine to Cape Hatteras, North Carolina, for various time periods.

Gear Type	88-97	93-97	00
Bottom/Mid water trawls	45.82%	45.51%	29.88%
Pot/Traps	44.72%	43.14%	48.82%
Gill Nets	0.40%	0.65%	1.56%
Lines	7.75%	8.37%	13.67%
Other	1.31%	2.33%	6.07%

APPENDIX C. "THE EFFECTS OF FISHING ON MARINE HABITATS OF THE NORTHEASTERN UNITED STATES." (NMFS 2001)

August 19, 2002

APPENDIX A.

DRAFT

The Effects of Fishing on Marine Habitats of the Northeastern United States

A review of fishing gear utilized within the Northeast Region and its potential impacts on marine habitats

National Marine Fisheries Service

Northeast Regional Office
1 Blackburn Drive
Gloucester, MA 01930

Northeast Fisheries Science Center
James J. Howard Laboratory
74 Magruder Road
Highlands, NJ 07732

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In the order of the report's outline, major contributors were: Introduction - Johnson; Habitat Types - Stephan; Fishing Gears Included, with descriptions - Chiarella, Stevenson, Lock; Distribution of Fishing Trips - Stevenson; Types of Fishing Gear Effects - Johnson (general overview and review of national and international literature), Reid, McCarthy and Lock (review of northeast region literature). McCarthy and Stevenson were responsible for most of the assembly of the report.

DRAFT

THE EFFECTS OF FISHING ON MARINE HABITATS OF THE NORTHEASTERN UNITED STATES

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INTRODUCTION

STATUTORY REQUIREMENTS

The 1996 Amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) require that fishery management plans (FMPs) minimize to the extent practicable adverse effects on essential fish habitat (EFH) caused by fishing (MSA section 303(a)(7)). Pursuant to the EFH regulations (50 CFR 610.815(a)(3)), FMPs must include an assessment of adverse effects from fishing, including physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other components of the ecosystem. The assessment must consider the potential adverse effects of all fishing gear types used in waters designated as EFH, not just those gears used in the fishery in question. It must also consider potential impacts of fishing on EFH for all federally-managed species. In completing this assessment, Councils should use the best scientific information available, as well as other appropriate information sources. Included in this assessment should be consideration of the establishment of research closure areas and other measures to evaluate the impacts of any fishing activity that may adversely affect EFH.

In order to meet the above mandates, this report summarizes available information concerning impacts of fishing on on marine habitats in the Northeast region of the United States (North Carolina – Maine). Some of the studies that are cited were conducted in the Northeast region, while others were conducted in other locations in the United States or in other countries. Information sources include peer reviewed scientific journals, as well as non peer-reviewed reports. Major bibliographic sources include Rester (2000), NMFS Alaska Fisheries Science Center bibliography (Wion and McConnaughey 2000), and numerous ICES reports. In addition, a thorough literature search was completed to ensure inclusion of recent articles.

Research results are presented by gear type for three major gear categories: bottom-tending mobile gear, bottom-tending static gear, and mobile and static pelagic gear. Sixty different gear types were considered in this report. In addition to summarizing research results, the report also includes a description of each gear type, information on the spatial distribution of fishing activity for 17 individual gears used in the Northeast region during 1995 – 2000, and, where appropriate, summaries of the management implications of research. An attempt was made to identify the sediment type (e.g., mud, sand, hard bottom) and location of each study. No attempt was made in the report to draw any conclusions concerning the habitat impacts of any type of fishing gear. Any conclusions that appear are those reached by the authors of particular research projects that are summarized in the report.

INFORMATION NEEDED TO ASSESS HABITAT IMPACTS

The effects of fishing gears on habitat depend on a number of factors, including the magnitude and frequency of the impact, and the recovery time of the habitat and biological community affected by the gear. These factors in turn depend on characteristics of the gear (i.e., type, weight, towing speed, depth of penetration), the areal extent of the disturbance, and the biological, physical, chemical and oceanographic characteristics of the area impacted (Hall et al. 1993, Brylinsky et al. 1994, Hall 1994, Auster and Langton 1998, DeAlteris et al. 1999, Kaiser 2000). The influence of so many factors complicates our ability to understand the effects of fishing gear on habitat and ultimately to the populations of fishes and invertebrates that utilize that habitat.

To date, considerable research has focused on the impact of fishing to habitat. Unfortunately, despite these efforts, most of the completed research has been limited in scope. For example, the majority of research focuses on trawls and dredges, with much less effort on pots/traps, gill nets, and other gear types. In addition, most studies concentrate on a single gear type and, thus, do not address cumulative effects of all gears used within a given fishing ground. Often research projects are simplified by examining effects to a specific habitat type. These small scale studies may not be applicable over larger areas (i.e., scale of fishing ground) that consist of a mosaic of different habitat types. Because of logistical and financial constraints, most directed experiments are restricted to a short period of time and do not consider cumulative effects over long periods of time. Furthermore, estimates of recovery are often limited to measurements of recovery from a single (or limited) disturbance event rather than from ongoing impacts that normally occur due to fishing. And, typically, the habitats against which recovery is measured have already been significantly altered by long-term effects of fishing, leaving us with an inaccurate picture of recovery times. Finally, where information is available on physical or biological effects, the role these habitat impacts have on harvested populations, in most cases, is unknown.

In order to assess the effects of fishing gear we also need a better understanding of the distribution of fishing effort by gear type. Analyses of fishing effort have been completed in other countries (Rijnsdorp et al. 1998, Jennings et al. 1999, Greenstreet et al. 1999), but for most United States fisheries, we currently have no systematic way of tracking effort at the scale of habitat type within a given geographic area. Churchill (1989) attempted to summarize trawling effort in the Middle Atlantic Bight off the northeast U.S. using fishing effort data in 30' latitude x 30' longitude blocks. While areas impacted could be estimated over blocks, a lack of data on the extent of the area actually disturbed within each block, especially for static gears, made analysis of the impacts to habitat difficult. In an attempt to address this problem, other methods of estimating fishing effort have been explored. For example, authors have used incidence of damage to starfish (Kaiser 1996), scars in molluscan growth lines (Witbaard and Klein 1993) and side scan sonar of mobile gear tracks (Friedlander et al. 1999, Krost et al. 1990). These methods, however, also have limitations. Seastars and molluscs are affected differently by different gear types, and are not available over all geographic areas. And, detection of fishing effects by side scan sonar surveys depends on the timing of the survey relative to the timing of the fishing impact and the recovery time of the sediments.

Natural impacts that occur over large geographic scales may render local effects of fishing insignificant. Furthermore, the strength and occurrence of natural or non-fishing anthropogenic influences are strong determinants of recovery time (Flint and Younk 1983, Hall 1994, DeAlteris et al. 1999). In theory, communities in variable (or high energy) environments are capable of recovering more quickly than communities in more stable (or low energy) environments, and thus, are more resistant to disturbance (Flint and Younk 1983, Collie et al. 2000a). So again, effects of fishing may be insignificant when compared to effects of natural disturbances. For example, Stevenson and Confer 1978) concluded that while dredging resulted in piece-meal destruction of SAV, natural forces were responsible for bay-wide impacts, and thus, were ultimately responsible for SAV distribution and abundance. Daan (1991) concluded that fisheries in the southern North Sea have a relatively small impact on benthic biomass compared to natural mortality. An argument to the contrary is provided by Hall (1999) who states that "while it is important to appreciate a range of natural variation in disturbance from wind, currents and waves to put fishing in context, the fact that the natural range is large *in itself*, gives no basis for arguing that the additional perturbation imposed by fishing is inconsequential."

To fully evaluate the impacts of fishing gear on habitat, and how those habitat impacts affect sustainability of fish populations, information is needed on:

1) the spatial extent of fishing-induced disturbance (fishing effort) by gear type;
2) distribution of habitat types;
3) effects of specific gear types (and configurations within gear types), along a gradient of effort, on specific habitat types;
4) the relative importance of fishing gear effects and natural disturbance;
5) the role that seafloor habitats and impacts on those habitats have in the population dynamics of fishes; and
6) natural changes/trends in communities and ecosystems.

RESEARCH APPROACHES

A number of research approaches have been used to assess gear impacts to habitat. One method compares closed (or lightly fished) areas to open (or heavily fished) areas to identify changes to habitat that may be attributable to fishing activities. Often, however, these comparisons are inconclusive because the unfished areas are unfished precisely because they are ecologically different from the fished areas, making it difficult to determine the actual cause of observed differences. Furthermore, those areas currently closed to fishing may have been significantly altered from previous fishing, such that differences are masked (Margetts and Bridger 1971, Caddy 1973, Dayton et al. 1995, Auster et al. 1996, Kaiser et al. 1996a, Bradshaw et al. 2000, Frid and Clark 2000). For example, sessile organisms accounted for 50% of the catch in virgin trawl tows in Arctic Canada (McAllister and Spiller 1994), causing researchers to speculate on the amount of sessile organisms that might have been caught in initial trawls over the Atlantic shelf.

To avoid the difficulties with control areas (and historical data) many researchers have undertaken small scale experiments looking at varying levels of fishing intensity on habitats. As mentioned above, these types of studies are often restricted to a specific gear type on a very specific habitat type at a scale that may make it impossible to detect effects (Thrush et al. 1995, Hewitt et al. 1998, Cappo et al. 1998, Bradshaw et al. 2000) and that does not allow us to extrapolate to the scale of the fishing grounds (Daan 1991) or to the range of habitats utilized by a given fish species (Langton et al. 1995).

Another approach taken to elucidate effects of fishing on habitat is the comparison of historical (or pre-fishing) biological community data with present day data. With this approach, the same area is sampled over time and the historical data is used as the control. Long-term data sets that allow this comparison, however, are not always available. When such data are available, it is difficult/impossible to separate out effects resulting from fishing activities from effects of natural and other human induced effects (Hall et al. 1993, Kroencke 1995, Glemarec et al. 1996, Botsford et al. 1997, Kaiser 2000). Riesen and Reise (1982) compared benthic samples from the 1920s and 1980s and found large scale changes in the communities attributed to a combination of fishing and natural events: oyster reefs were overexploited by the commercial fishery and then replaced by mussel banks and associated species; seagrasses were lost to a natural epidemic; and *Sabellaria* reefs were destroyed by trawlers. Other studies suggest similar shifts in species composition, but often fail to demonstrate that fishing activity is actually the cause (Thompson

1993). As discussed extensively in Hall (1994), studies on long-term effects of fishing, taken as a whole, provide evidence for long-term trends in benthic communities, however, "the case for invoking fisheries as a primary cause for the recorded changes is not very strong." However, Lindeboom and deGroot (1998) state that "combined with the results ...on the immediate effects of bottom fisheries on the benthos and the comparison between fished and unfished areas, it has to be concluded that the observed trends in benthic invertebrates were to a great extent caused by the direct and indirect effects of fisheries and not solely by eutrophication and/or pollution as interpreted in previous studies."

In addition to problems with research approach, there are questions concerning details of experimental design. Moran and Stephenson (2000) conclude that net sampling is not an accurate method of measuring effects to habitat because it does not indicate the number or types of organisms that are damaged or detached, but not caught, by the net. Rogers et al. (1999) question the level of sampling that we should be focusing on (i.e., community indices, species abundances) to best examine quantifiable effects of exploitation. For example, Sanchez-Jerez and Espla (1996) found that community changes due to trawling in *Posidonia* meadows were not evident at the phyla and class levels of benthic fauna, but that family and species levels of amphipods and isopods did show significant differences, and thus were the best indicators of trawling impacts for this geographic area. According to McConnaughey et al. (2000) lumping taxa for analytical purposes can mask species effects that are a result of functional processes rather than taxonomy. Jennings and Cotter (1999) state that vulnerable species are better indicators of fishing effects than community based measures that can be explained by factors other than fishing. These types of issues need to be evaluated when designing and interpreting studies on effects of fishing gear to habitat.

Ideally, in order to understand the ecosystem effects of fishing on habitat, research needs to be done using comparable fished and non-fished areas at the scale of fishing grounds for specific fisheries, and at a time-scale greater than the life span of the longest-lived species (Hall 1994). Unfortunately, the time and resources needed to complete this research can be prohibitive.

MANAGEMENT PHILOSOPHIES

Given the paucity of existing information, and the limitations on our ability to gather needed information, different philosophies have developed as to how we should manage fishing impacts to habitat. Many believe that we should look beyond scientific literature to anecdotal information and other "non-scientific" evidence. For example, Pederson and Hall-Arber (1999) discuss the extensive information on habitat condition and long-term changes that can be gained from fishermen and incorporated into management decisions.

Under the precautionary approach to management, measures to minimize effects of fishing to habitat should be implemented now, based on the concept that the risk of allowing possibly irreversible damage to continue is too great and far outweighs the short-term economic hardships that might be incurred. It has been argued that, although definitive evidence may not be available, studies have shown "beyond doubt" that some negative impacts from mobile fishing gear are occurring, and thus, that management decisions need to be made without waiting for more scientific evidence (Kenchington 1995, Watling and Norse 1998, Lindeboom and deGroot 1998, Gray 2000). Kenchington (1995) argues that the burden of proof required in scientific research is not appropriate in fisheries management and that we need to take into account the risk that mobile fishing gear is significantly reducing fish production by modifying benthic habitats.

Dayton et al. (1995) state that, while policy makers clearly understand the financial implications of reducing fishing effort when no adverse effects are occurring, there is no clear understanding of the financial implications of ecosystem effects and loss of resources by continuing to fish when impacts have not been detected. These authors and others support a precautionary or risk averse approach to habitat conservation and protection (McAllister and Spiller 1994, Auster and Malatesta 1995, Dayton et al. 1995, Koslow and Garrett-Holmes 1995, Auster et al. 1997, Fogarty and Murawski 1998, Goñi 1998, Mirarchi 1998, Collie 1998, Carr and Milliken 1998, Thrush et al. 1998, Hall-Spencer et al. 1999, Langton and Auster 1999, Norse and Watling 1999, Auster and Shackell 2000, Frid and Clark 2000, ICES 2000, McConnaughey et al. 2000, Turner et al. 1999 Auster 2001).

A number of authors have recommend the use of closed areas for research and conservation (Bergman et al. 1990, Bergman and Hup 1992, Engel and Kvitek 1998, Rumohr 1998, Ball et al. 2000, Hall-Spencer et al. 1999, Auster and Shackell 2000). Hutchings (1990) recommends periodic closures of areas, strip trawling to leave regularly spaced islands of untrawled areas to supply recruits for replenishment, and modification to gear to minimize impacts. Carr and Milliken (1998) recommend that nations modify gear to target specific species, encourage the use of lighter sweeps over heavier gears, reduce the amount of sea bottom available to mobile gear, and opt for stationary gear over mobile gear. McAllister and Spiller (1994) recommend the establishment of nearshore continental shelf and slope protected areas, regular monitoring of impacts of different gear types, and a switch to gear types with low habitat impacts and low bycatch. Ball et al. (2000) recommend large areas closed to fishing to allow large scale experiments, with particular attention to deeper waters at the self edge and slope where natural disturbance is less common, sediments are highly bioturbated, and faunal assemblages are less capable of sustaining disturbance. Auster et al. (1997) recommend a more extensive use of closed areas, starting with a specific fishing gear within a geographical region and if existing knowledge suggests that negative effects to seafloor habitats are occurring from that gear (even if the available information is uncertain or inadequate), then we define the habitats likely to be affected by that gear and designate marine protected areas for those habitats. Based on a fishermen survey by Fuller and Cameron (1998), fishermen generally approved of closing spawning areas during spawning and concurred that fisheries management should occur on an ecosystem level including habitat protection. The precautionary approach would also allow the use of adaptive management, in which fisheries research provides feedback to management decisions (Sainsbury et al. 1993, Thrush et al. 1998, Turner et al. 1999). For example, managers could implement closed areas and then adjust the size or location of those closed areas as scientific research bears new information, and we have a better understanding of effects of fishing to ecosystems.

Kaiser et al. (1999) argue that the magnitude of fishing effects varies greatly relative to background of natural disturbances and that we need to consider subtle differences in habitat structure and assemblage composition before we can understand the consequences of fishing. Kaiser (1998) reviewed scientific studies on the effects of fishing in the North Sea and concluded that oceanic influences have greater ecological effects than localized effects of either eutrophication or fishing disturbance. Langton et al. (1996) suggest protection of "essential" habitats using a decision tree based on scientific information. Messieh et al. (1991) argue that we need to study effects to habitat that have the potential of causing widespread and long-term changes (i.e., gradual modification to surficial sediments and increased suspended sediment loads).

In light of this diversity of information and philosophies, fishery management councils (FMCs) must make a determination about the habitat effects of fishing and evaluate the need for management measures to minimize those effects, as required by the Magnuson-Stevens Act. Under National Standard 2 of the Act, FMCs and the Secretary of Commerce must base conservation and management measures on the "best scientific information available." Under the Administrative Procedures Act, the decision to approve a measure must be supported by scientific information that suggests the measure will contribute to the conservation and management of the fishery resource so as to be neither arbitrary nor capricious. This document attempts to compile the best scientific information available and provide a basis for the determination and evaluation of management measures and their effects..

HABITAT CHARACTERIZATION OF THE NORTHEAST SHELF ECOSYSTEM

INTRODUCTION

PURPOSE

The purpose of this chapter is to describe the habitats of the Northeast Shelf Ecosystem. This discussion is an integral part of this document for two reasons. First, the ecosystem's structure must be reviewed in order to provide a basis for understanding types of disturbance and their implications. Second, the application of research results from other regions can only be determined with some general understanding of how the two systems compare.

The Northeast Shelf Ecosystem is influenced broadly by winds, climate changes, river runoff, estuarine exchange, tides, and Gulf Stream meanders and rings. Each regional subsystem has its own distinct characteristics. This discussion will focus on oceanographic processes and habitat characteristics of each regional system. The information provided will contribute to a more complete understanding of the effects of fishing gear on habitat of the Northeast Shelf ecosystem.

HABITAT FUNCTIONS AND CHARACTERISTICS

In order to adequately evaluate fishing gear impacts on habitat, we must first comprehend the functional value of habitats to the ecosystem. From a biological perspective, habitats provide living things with the basic life requirements of nourishment and shelter. Habitats may also provide a broader range of benefits to the ecosystem. For example, seagrasses physically stabilize the substrate, and help recirculate oxygen and nutrients. In this general discussion, we will focus on the first-level, direct value of habitats, such as food and shelter from predation, to federally managed species.

The spatial and temporal variation of prey abundance influences the survivorship, recruitment, development, and spatial distribution of organisms at every trophic level. For example, phytoplankton abundance and distribution are a great influence on ichthyoplankton community structure and distribution. In addition, the migratory behavior of juvenile and adult fish is directly related to seasonal patterns of prey abundance and changes in environmental conditions, especially water temperature. Prey supply is particularly critical for the starvation-prone early life history stages of fish.

The availability of food for planktivores is highly influenced by oceanographic properties. The seasonal warming of surface waters in temperate latitudes produces vertical stratification of the water column, which isolates sunlit surface waters from deeper, nutrient-rich water, leading to reduced primary productivity. In certain areas, upwelling, induced by wind storms, and tidal mixing, injects nutrients back into the photic zone, stimulating primary production. Changes in primary production from upwelling and other oceanographic processes affect the amount of organic matter available for other organisms, and thus influence their distribution.

Oceanographic properties can also influence the food availability for sessile benthic organisms. For example, certain areas in the Gulf of Maine have a much more limited epifaunal community than similar sediments on Georges Bank. This difference is due at least in part to a difference in the availability of food.

Benthic organisms provide an important food source for many managed species. For example, populations of sand lance are important sources of nutrition for many piscivorous species, and benthic invertebrates are the main source of nutrition for many adult demersal fishes. Additionally, recent research on benthic primary productivity indicates that benthic micro-algae may contribute more to primary production than has been originally estimated (Cahoon 1999).

Another important functional value of benthic habitat is considered to be the shelter provided by structure and the availability of hard surface for attachment of epibenthic organisms. The importance of benthic habitat complexity was discussed by Auster and Langton (1999) and Auster (1998) in the context of providing a conceptual model to visualize patterns in gear impacts across a gradient of habitat types. Based on this model, habitat value increased with structural complexity.

This report cites evidence from many studies that bottom otter trawls and other fishing gear can reduce habitat complexity, with greater potential for change in more complex habitats. Less is known about the subsequent effects of reduced complexity on federally managed species. A prime example of this issue in the Northeast Region is the question of whether removal of emergent epifauna from gravel and rocky habitat affects survival of juvenile cod and other species. There are field studies (in northeast US and eastern Canadian waters), laboratory experiments and modeling studies addressing this question. Because of the controversy associated with this issue in the Northeast Region, the research is addressed in depth below.

The first field study linking survival of juvenile cod (and haddock) to habitat type on Georges Bank was by Lough et al. (1989). Using submersibles, they observed that recently-settled 0-group juvenile cod (and haddock), < 10 cm long, were primarily found in pebble-gravel habitat at 70-100 m depths on eastern Georges. They hypothesized that the gravel enhanced survival through predator avoidance; coloration of the fish mimicked that of the substrate, and from the submersible the fish were very difficult to detect against the gravel background. The authors considered increased prey abundance to be another, but less likely, explanation for the concentration of these fish on gravel. Presence of emergent epifauna, and any effects of epifauna on survival of the juveniles, were not noted.

Gregory and Anderson (1997), using submersibles in 18 to 150 m depths in Placentia Bay, Newfoundland, similarly found that the youngest cod observed (age 1, 10-12 cm long) were primarily associated with gravel substrate with low relief; their mottled color appeared to provide camouflage in the gravel. Older juveniles (ages 2-4) were most abundant in areas with coarser substrate and more relief, e. g., submarine cliffs. No selection by juvenile cod for substrates with macroalgae cover was seen, and emergent epifauna was not mentioned.

In the first study suggesting an added value of emergent epifauna on Georges Bank gravel, Valentine and Lough (1991) observed from submersibles that attached epifauna was much more abundant in areas of eastern Georges which had not been fished (due to the presence of large boulders). They felt the increased bottom complexity provided by the epifauna might be an important component of fisheries habitat, but both trawled and untrawled gravel were considered important for survival of juvenile cod.

Other field studies on the relationship of juvenile cod abundance to habitat complexity have been in shallower inshore waters, and results may not be directly applicable to conditions on Georges Bank. In 2-12 m depths off the Newfoundland coast, Keats et al. (1987) found (in contrast to Gregory and Anderson 1997 [above]) juvenile cod to be much more abundant in macroalgae beds than in adjacent areas which had been grazed bare by sea urchins. This was true of 1-year-old fish (7.8-12.5 cm) as well as older larger (12.6-23.5 cm) juveniles. The larger fish fed on fauna associated with the macroalgae, so enhanced food supply was a probable benefit of the increased complexity. The smallest 1-year-olds fed on plankton, and it was unlikely their growth was affected by presence of macroalgae.

Tupper and Boutilier (1995b), examining four habitat types (sand, seagrass, cobble, rock reef) in St. Margaret's Bay, Nova Scotia, reported that cod settlement was equal in all habitats, but survival and juvenile densities were higher in the more complex habitats. Growth rate was highest in seagrass beds, but predator (larger cod) efficiency was lowest, and juvenile survival highest, on rock reef and cobble. The authors considered the different habitats to provide a tradeoff between enhanced foraging and increased predation risk. In another study in St. Margaret's Bay, Tupper and Boutilier (1995a) found that cod settling on a rocky reef inhabitated crevices in the reef, and defended territories around the crevices. Fish that settled earlier and at larger sizes grew more quickly and had larger territories. Size at settlement and timing of settlement were thus considered important in determining competitive success of individuals.

Habitat associations of juvenile cod were also examined by Gotceitas et al. (1997) using SCUBA in Trinity Bay, and beach seines in Trinity, Notre Dame and Bonavista bays, Newfoundland. In both types of surveys, almost all age-0 cod were found in eelgrass beds as opposed to less structurally complex areas, and eelgrass was suggested to be an important habitat for these fish. Older juveniles were more abundant on mud, sand and rocky bottoms than in eelgrass.

A seining study by Linehan et al. (2001) in Bonavista Bay, Newfoundland, found age 0 cod (< 10 cm long) to be more abundant in vegetated (eelgrass) than in unvegetated habitats, both day and night. However, potential predators of juvenile cod were also most abundant in eelgrass. Tethering experiments with age 0 cod at 6 sites in 0.7 - 20 m depths indicated that predation increased with depth, being about three times higher at deeper sites. At shallow sites, predation was generally higher in unvegetated sites than in eelgrass.

Information on effects of habitat complexity on juvenile cod survival is also available from several laboratory studies. Gotceitas and Brown (1993) observed juvenile cod (6-12 cm) in a tank with two substrate types from among sand, gravel-pebble and cobble, before and after introduction of a larger cod. Before the predator was introduced, small cod preferred sand or gravel-pebble over cobble. In the presence of the predator, they chose cobble if available, and the cobble reduced predation. The experiment did not test effects of emergent epifauna on substrate choices or survival. Gotceitas et al. (1995) conducted a similar study, but with 3.5-8 cm cod in a tank with three substrates, either 1) sand, gravel, and 30 cm long strips of plastic to simulate kelp (*Laminaria* sp.), or 2) sand, cobble, and "kelp". Based on the authors' earlier study, cobble was considered to provide a "safe" habitat that reduced predation. Responses to introduction of two kinds of larger cod were tested: fish which actively attempted to eat the smaller cod, vs. "passive" predators showing no interest in the smaller fish. In the presence of passive predators, small cod preferred sand substrates and avoided kelp. When exposed to an active predator, they hid in cobble if available, or kelp if there was no cobble. Both cobble and kelp significantly reduced predation, and small cod appeared able to modify their behavior based on the varying risk presented by different predators.

Fraser et al. (1996) tested responses of age 0 (5.2-8.2 cm) and age 1 (10.2-13.5 cm) cod to predators (3-year-old cod), using the same tanks as Gotceitas et al. (1995) but with only two substrate choices: sand vs. gravel, and sand vs. cobble. With no predator present, age 0 and 1 cod preferred sand to gravel or cobble, but if both age 0 and 1 fish were in the tank, the smaller fish tended to avoid the larger ones and to increase use of gravel/cobble. When a predator was introduced, both age 0 and 1 cod hid in cobble if available; in the sand/gravel trials, they attempted to flee from the predator. In the predator's presence, the avoidance of age 1 cod by age 0 cod disappeared; overall, however, there was some indication of habitat segregation between age 0 and age 1 cod.

Gotceitas et al. (1997) again used the same experimental system to compare use of sand, gravel and cobble substrates, and three densities of eelgrass, by age 0 cod (3.5-10 cm) in the presence and absence of a predator (age 3 cod). With no predator, the small cod preferred sand and gravel to cobble. When a predator was introduced and cobble was present, age 0 fish hid in the cobble or in dense eelgrass ($\geq$ 720 stems/m^2) if present. With no cobble, they hid in all three densities of eelgrass. Age 0 cod survival (time to capture and number of fish avoiding capture) was highest in cobble or $\geq$ 1000 eelgrass stems/m^2. In other combinations, time to capture increased with both presence and density of vegetation.

Lindholm et al. (1999) tested effects of five habitat types, representing a gradient of complexity, on survival of age 0 cod (7-10 cm) in the presence of age 3 conspecifics. Substrates were sand, cobble, sparse short sponge, dense short sponge, and tall sponge. Sponge presence significantly reduced predation compared to that on sand, with density of sponges being more important than sponge height. Increasing habitat complexity reduced the distance from which a predator could react to the prey. The authors concluded that alteration of seafloor habitat by fishing could lower survival of juvenile cod. [There was no significant increase in survival in epifauna compared to bare cobble, however.]

Finally, effects of habitat complexity on post-settlement survival of juvenile cod have been examined via modeling (Lindholm et al. 1998, 2001). Data from the Lindholm et al. (1999) laboratory study described above were used to assign maximum values of 0.98 for juvenile mortality in the least complex habitats, and 0.32 in habitats of greatest complexity. Twelve monthly runs of a dynamic model were made, with the first month representing settlement of the cod. Results indicated that reduction of habitat complexity by fishing had significant negative effects on survival of juvenile cod, and that preservation of complexity through use of marine protected areas could reduce these negative effects.

In some situations, complexity may not be an important habitat characteristic. As discussed above, Lough et al. (1989) hypothesized that gravel substrate enhanced survival of juvenile cod because the coloration of these juveniles mimicked the substrate. In a similar example, American plaice adults are thought to associate with gravel-sand sediments for appropriate coloration for predation refuge (Scott 1982). It is apparent that in the consideration habitat value, a broad range of characteristics associated with habitat structure and function must be included, which may vary by species and life stage. Considerations cannot be limited to individual aspects such as substrate type. Unfortunately, the amount of information available for individual aspects is limited, much less that which is available for multivariate analyses. ***(Add***

discussion of WWF Seascapes in Canada and CLF GOM Seascapes). Further development of multivariate relationships between biological, chemical, and physical habitat features will increase our understanding of the marine environment and advance the evidence of direct links between habitat conditions and fishery productivity.

DESCRIPTION OF REGIONAL SYSTEMS

The Northeast Shelf Ecosystem (Figure 1) has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream (Sherman *et al.* 1996). A number of distinct subsystems comprise the region, including the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight.

The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and fast-moving currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC.

Pertinent aspects of the physical characteristics of each of these subsystems are described below. This review is based on several summary reviews (Abernathy 1989, Beardsley *et al.* 1996, Brooks 1996, Cook 1988, Mountain 1994, NEFMC 1998, Pacheco 1988, Sherman *et al.* 1996, Stumpf and Biggs 1988, Steimle *et al.* 1999, Townsend 1992). Literature citations are not included for generally accepted principles; however, new research and specific results of research findings are cited.

GULF OF MAINE

Although not obvious in appearance, the Gulf of Maine is actually an enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotian (Scotian) Shelf, on the west by the New England states and on the south by Cape Cod and Georges Bank (Figure 2). The Gulf of Maine (GOM) was glacially derived, and is characterized by a system of deep basins, moraines and rocky protrusions with limited access to the open ocean. This geomorphology influences complex oceanographic processes which result in a rich biological community.

Topographic highlights of the area include three basins that exceed 250m in depth – Jordan to the north, Wilkinson to the west, and Georges just north of Georges Bank. The average depth in the Gulf of Maine is 150 meters. The Northeast Channel between Georges Bank and Browns Bank, leads into Georges Basin, and is one of the primary avenues for exchange of water between the GOM and the North Atlantic Ocean. Other prominent ledges or banks include Cashes Ledge, Stellwagen Bank, Jeffreys Ledge and Platts Bank.

An intense seasonal cycle of winter cooling and turnover, springtime freshwater runoff, and summer warming influences oceanographic and biologic processes in the Gulf of Maine. The Gulf has a general counterclockwise nontidal surface current which flows around the coastal margin of the Gulf (Figure 2). It is primarily driven by fresh, cold Scotian Shelf water that enters over the Scotian Shelf and through the Northeast Channel, and freshwater river runoff, which is particularly important in the spring. Dense relatively warm and saline slope water entering through the bottom of the Northeast Channel from the continental slope also influences gyre formation. Counterclockwise gyres generally form in Jordan, Wilkinson, and Georges Basins and the Northeast Channel as well. These surface gyres are more pronounced in spring and summer; with winter, they weaken and become more influenced by the wind.

Stratification of surface waters during spring and summer seals off a mid-depth layer of water that preserves winter salinity and temperatures. This cold layer of water is called "Maine intermediate water" (MIW) and is located between more saline Maine bottom water and the warmer, stratified Maine surface water. The stratified surface layer is most pronounced in the deep portions of the western GOM. Tidal mixing of shallow areas prevents thermal stratification and results in thermal fronts between the stratified areas and cooler mixed areas. Typically, mixed areas include Georges Bank, the southwest Scotian Shelf, eastern Maine coastal waters, and the narrow coastal band surrounding the remainder of the Gulf.

The Northeast Channel provides an exit for cold MIW and outgoing surface water while it allows warmer more saline slope water to move in along the bottom and spill into the deeper basins. The influx of water occurs in pulses, and appears to be seasonal, with lower flow in late winter and a maximum in early summer.

Gulf of Maine circulation and water properties can vary significantly from year to year. Notable episodic events include shelf-slope interactions such as the entrainment of shelf water by Gulf stream rings, and strong winds which can create currents as high as 1.1 meters/second over Georges Bank. Warm core Gulf Stream rings can also influence upwelling and nutrient exchange on the Scotian shelf, and affect the water masses entering the GOM. Annual and seasonal inflow variations also affect water circulation.

Internal waves are episodic and can greatly affect the biological properties of certain habitats. Internal waves can shift water layers vertically, so that habitats normally surrounded by cold MIW are temporarily bathed in warm, organic-rich surface water. On Cashes Ledge, it is thought that deeper nutrient rich water is driven into the photic zone, providing for increased productivity. Localized areas of upwelling interaction occur in numerous places throughout the Gulf.

The glacial origin of the GOM's bottom structure resulted in a complex variety of sediments and topography. Sand and gravel (gravel is typically defined to include gravel, pebbles, cobbles, and boulders) banks developed from large moraines deposited by the glaciers. Rocky outcrops form significant features such as Cashe's Ledge (Figure 3). Patches of sand, silt and clay are found dispersed throughout the Gulf of Maine, with finer sediments accumulating in the deeper basins. Gravel pavement is found primarily in the northeast channel, with other smaller, more variable gravel areas interspersed in the Gulf. Topographic highs are subject to relatively more currents, and characterized by coarser sediments. In areas along the northeast coast of Maine, sediments are generally silt and clay, while the bottom type south of Casco Bay is largely sand.

CHARACTERISTIC GULF OF MAINE HABITATS

The Gulf of Maine's geologic features, when coupled with the vertical variation in water properties, result in a great diversity of habitat types. Watling et al. (1988) used numerical classification techniques to separate benthic invertebrate samples into six types of bottom communities. These communities are identified in Table 1 and their distribution is indicated in Figure 4. This classification system illustrates the combined effects of substrate type and water properties.

An in-depth review of GOM habitat types has been prepared by Brown (1993). Although still preliminary, this classification system is a promising approach. It builds on a number of other schemes, including Cowardin *et al.* (1979), and tailors them to Maine's marine and estuarine environments. A significant factor that is included in this system but has been neglected in others is the amount of "energy" in a habitat. Energy could be a reflection of wind, waves, or currents present. This is a particularly important consideration in a review of fishing gear impacts since it indicates the natural disturbance regime of a habitat. The amount and type of natural disturbance is in turn an indication of the habitat's recoverability. Although this work appears to be complete in its description of habitat types, unfortunately, the distribution of many of the habitats are unknown.

GEORGES BANK

Georges Bank is a shallow (3-150m depth), elongate (100 miles wide by 200 miles long) extension of the continental shelf formed by the Wisconsinian glacial episode (see Figure 2). It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank. It is separated from the rest of the continental shelf to the west by the Great South Channel. The central region of the bank is shallow, and the bottom is characterized by shoals and troughs, with sand dunes superimposed upon them. The two most prominent elevations on the ridge and trough area are Cultivator and Georges Shoals. This shoal and trough area is a region of strong currents, with average flood and ebb tidal currents greater than 4 km per hour, and as high as 7 km per hour. Glacial retreat during the late Pleistocene deposited the bottom sediments currently observed on eastern Georges Bank, and the sediments have been continuously reworked and redistributed by the action of rising sea level, and by tidal, storm and other currents.

Bottom topography on eastern Georges Bank is characterized by linear ridges in the western shoal areas; a relatively smooth, gently dipping sea floor on the deeper, easternmost part; and steeper and smoother topography incised by submarine canyons on the southeastern margin. The nature of the sea bed sediments varies widely, ranging from clay to gravel (Figure 3). Surficial sediments composed of a gravel-sand mix have been noted as important postlarval habitat for Atlantic cod, haddock, winter flounder, yellowtail flounder and other species. American plaice adults have been demonstrated to associate with gravel-sand sediments for a variety of potential reasons. Gravel-sand sediments have been noted as habitat for sea scallops, where movement of sand is relatively minor (Langton and Uzmann 1990; Valentine and Lough 1991). The gravel-sand mixture is usually a transition zone between coarse gravel and finer sediments. Natural processes continue to erode and rework the sediments on Georges Bank. It is anticipated that erosion and reworking of sediments will reduce the amount of sand available to the sand sheets, and cause an overall coarsening of the bottom sediments (Valentine *et al.* 1993). The strong, erosive currents affect the character of the biological community.

Oceanographic frontal systems separate water masses from the Gulf of Maine and the remainder of the Atlantic on Georges Bank and differ in temperature, salinity, nutrient concentration, and planktonic communities, which influence productivity and may influence fish abundance and distribution. Currents on Georges Bank include a weak, persistent clockwise gyre around the bank, a strong semidiurnal tidal flow predominantly northwest and southeast, and very strong, intermittent storm-induced currents, which can all occur simultaneously (Figure 2). Tidal currents over the shallow top of Georges Bank can be very strong, and keep the waters over the bank well mixed vertically. This results in a tidal front that separates the cool waters of the well-mixed shallows from the warmer, seasonally stratified shelf waters on the seaward and shoreward sides of the bank. The clockwise gyre is instrumental in distribution of the planktonic community, including larval fish. For example, Lough and Potter (1993) describe passive drift of Atlantic cod and haddock eggs and larvae in a southwest residual pattern around Georges Bank. Larval concentrations are found at varying depths along the southern edge between 60 – 100 m.

GULF STREAM AND ASSOCIATED FEATURES

Shelf waters from the Gulf of Maine south are intermittently but intensely affected by the Gulf Stream. The Gulf Stream begins in the Gulf of Mexico and flows northeastward at an approximate rate of 1 m/second (2 knots), transporting warm waters north along the eastern coast of the United States, and then east towards the British Isles. Conditions and flow of the Gulf Stream are highly variable on time scales ranging from days to seasons. The principal source of variability in slope waters are intrusions from the Gulf Stream.

The location of the Gulf Stream's western boundary is variable because of meanders and eddies. Gulf Stream eddies are formed when extended meanders enclose a parcel of sea water and pinch off. These eddies can be cyclonic, meaning they rotate counterclockwise and have a cold-core formed by enclosing slope water (cold core ring), or anticyclonic, meaning they rotate clockwise and have a warm core of Sargasso Sea water (warm core ring). The rings are shaped like a funnel, wider at the top and narrower at the bottom, and can have depths of over 2000 m. They range in size from 150-230 m in diameter. There are 35% more rings and meanders in the vicinity of Georges Bank than in the Mid-Atlantic region. A net transfer of water on and off the shelf may result from the interaction of rings and shelf waters. These warm or cold core rings maintain their identity for several months until they are reabsorbed by the Gulf Stream. The rings and the Gulf Stream itself have a great influence over oceanographic conditions all along the continental shelf.

CHARACTERISTIC GEORGES BANK HABITATS

The interaction of environmental factors (e.g. availability and type of sediment, current speed and direction, and bottom topography) have been investigated; and found to combine to form seven sedimentary provinces on eastern Georges Bank, which are outlined in Table 2.

Georges Bank is characterized by high levels of primary productivity, and historically, high levels of fish production. It has a diverse biological community that is influenced by many environmental conditions. Several studies have attempted to identify demersal fish assemblages over large spatial scales on Georges Bank. Overholtz and Tyler (1985) found five depth-related groundfish assemblages for Georges Bank and Gulf of Maine that were persistent temporally and spatially (Table 3). Depth and salinity were identified as major physical influences explaining assemblage structure.

MID-ATLANTIC BIGHT

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream. Like the rest of the continental shelf, the Mid-Atlantic Bight was shaped largely by sea level fluctuations caused by past ice ages. The shelf's basic morphology and sediments derive from the retreat of the last ice sheet, and the subsequent rise in sea level. Since that time, currents and waves have modified this basic structure.

The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 – 200 m water depth) at the shelf break. In both the Mid-Atlantic and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (see below). The primary morphological features of the shelf include shelf valleys and channels, shoal massifs, scarps, and sand ridges and swales (Figure 5).

Most of these structures are relic except for some sand ridges and smaller sand related features. Shelf valleys and slope canyons were formed by rivers of melted glacier which deposited sediments on the outer shelf edge as they entered the ocean. Most valleys cut about 10 m into the shelf, with the exception of Hudson valley which is about 35m deep. The valleys were partially filled as the glacier melted and egressed across the shelf. The glacier also left behind a lengthy scarp near the shelf break from Chesapeake Bay north to the eastern end of Long Island (Figures 5 and 6). Shoal retreat massifs are produced by extensive deposition at a cape or estuary mouth. Massifs were also formed as estuaries retreated across the shelf.

Some sand ridges (Figure 5) are more modern in origin than the shelf's glaciated morphology. Their formation is not well understood; however, they appear to develop from the sediments that erode from the shore face. They maintain their shape, so it is assumed that they are in equilibrium with modern current and storm regimes. They are usually grouped, with heights of about 10 m, lengths of 10-50 km and spacing of 2 km. Ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. The seaward face usually has the steepest slope. Sand ridges are often covered with smaller similar forms such as sand waves, megaripples, and ripples. Swales occur between sand ridges. Since ridges are higher than the adjacent swales, they are exposed to more energy from water currents, and experience more sediment mobility than swales. Ridges tend to contain less fine sand, silt and clay while relatively sheltered swales contain more of the finer particles. Swales have greater benthic macrofaunal density, species richness and biomass, due in part to the increased abundance of detrital food and the physically less rigorous conditions.

Sand waves are usually found in patches of 5-10 with a heights of about 2m, lengths of 50-100 m and 1-2 km between patches. Sand waves are primarily found on the inner shelf, and often observed on sides of sand ridges. They may remain intact over several seasons. Megaripples occur on sand waves or separately on the inner or central shelf. During the winter storm season, they may cover as much as 15% of the inner shelf. They tend to form in large patches and usually have lengths of 3-5 m with heights of 0.5-1 m. Megaripples tend to survive for less than a season. They can form during a storm and reshape the upper 50-100 cm of the sediments within a few hours. Ripples are also found everywhere on the shelf, and appear or disappear within hours or days, depending upon storms and currents. Ripples usually have lengths of about 1-150 cm and heights of a few centimeters.

Sediments are fairly uniformly distributed over the shelf in this region (see Figure 3). A sheet of sand and gravel varying in thickness from 0 to 10 m covers most of the shelf. The mean bottom flow from the constant southwesterly current is not fast enough to move sand, so sediment transport must be episodic. Net sediment movement is in the same southwesterly direction as the current. The sands are mostly medium to coarse grains, with finer sand in the Hudson shelf valley and on the outer shelf. Mud is rare over most of the shelf, but is common in the Hudson valley. Occasionally relic estuarine mud deposits are re-exposed in the swales between sand ridges. Fine sediment content increases rapidly at the shelf break, which is sometimes called the "mud line," and sediments are 70-100% fines on the slope.

Sand provides suitable habitat properties for a variety of fishes, invertebrates, and microorganisms. Invertebrates, such as surfclams, razor clams, and quahogs, burrow between the grains to support their characteristic sessile behavior. Dunes and ridges provide refuge from currents and predators and habitat for ambush predators. Several species inhabit sand habitats (e.g. amphipods, polychaetes) that are important prey for flounder. Yellowtail and winter flounder distribution has been correlated to sand (Langton and Uzmann 1990). In general, flatfish are more closely associated with sand and finer sediments than are other demersal fishes.

[Add discussion of Mid-Atlantic artificial reef habitats (Steimle and Zetlin 2000].

Canyons occur near the shelf break along Georges Bank and the Mid-Atlantic, cutting into the slope and occasionally up into the shelf as well. Canyons were shaped by alternating erosional and depositional geologic episodes. The canyons look similar to land canyons of fluvial origin, including features such as steep walls, exposed rocks, and tributaries. Some are extensions of shelf valleys. They exhibit a more diverse fauna, topography, and hydrography than the surrounding shelf and slope environments.

The relative biological richness of canyons is in part due to the diversity of substrate types found in the canyons, and the greater abundance of organic matter. Canyons on Georges Bank appear to serve as nursery grounds for species such as lobster, Jonah crab, red crab, tilefish, and several species of hake, which hide in excavated shelters in the fine clay sediments or boulder fields.

Shelf and slope waters of the Mid-Atlantic Bight have a slow southwestward flow which is occasionally interrupted by warm core rings or meanders from the Gulf Stream. On average, shelf water moves parallel to bathymetry isobars at speeds of 5-10 cm/second at the surface and 2 cm/second or less at the bottom. Storm events can cause much more energetic variations in flow. Tidal currents on the inner shelf have a higher flow rate of 20 cm/second that increases to 100 cm/second near inlets.

Slope water tends to be warmer than shelf water because of its proximity to the Gulf Stream, and also tends to be more saline. The abrupt gradient where these two water masses meet is called the shelf-slope front. This front is usually located at the edge of the shelf and touches bottom at about 75-100 m depth of water, and then slopes up to the east toward the surface. It reaches surface waters approximately 25-55 km further offshore. The position of the front is highly variable, and can be influenced by many physical factors. Vertical structure of temperature and salinity within the front can develop complex patterns because of the interleaving of shelf and slope waters – for example cold shelf waters can protrude offshore, or warmer slope water can intrude up onto the shelf.

The seasonal effects of warming and cooling increase in shallower, nearshore waters. Stratification of the water column occurs over the shelf and the top layer of slope water during the spring-summer and is usually established by early June. Fall mixing results in homogenous shelf and upper slope waters by October in most years. A permanent thermocline exists in slope waters from 200-600 m deep. Temperatures decrease at the rate of about 0.02° C per meter and remain relatively constant except for occasional incursions of Gulf stream eddies or meanders. Below 600 m, temperature declines, and usually averages about 2.2° C at 4000 m. A warm, mixed layer approximately 40 m thick resides above the permanent thermocline.

The "cold pool" is an annual phenomenon particularly important to the Mid-Atlantic Bight. It stretches from the Gulf of Maine along the outer edge of Georges Bank and then southwest to

Cape Hatteras. It becomes identifiable with the onset of thermal stratification in the spring and lasts into early fall until normal seasonal mixing occurs. It usually exists along the bottom between the 40 m and 100 m isobaths and extends up into the water column for about 35 m, to the bottom of the seasonal thermocline. The cold pool usually represents about 30% of the volume of shelf water. Minimum temperatures for the cold pool occur in early spring and summer, and range from 1.1° C to 4.7° C.

CHARACTERISTIC MID-ATLANTIC BIGHT HABITATS

Three broad faunal zones related to water depth and sediment type were identified for the Mid-Atlantic by Pratt (1973). The "sand fauna" zone was defined for sandy sediments (1% or less silt) which are at least occasionally disturbed by waves, from shore out to 50 m (Figure 7). The "silty sand fauna" zone occurred immediately offshore from the sand fauna zone, in stable sands containing at least a few percent silt and slightly more (2%) organic material. Silts and clays become predominant at the shelf break and line the Hudson valley, and support the "silt-clay fauna."

Building on Pratt's work, the Mid-Atlantic shelf was further divided by Boesch (1979) into seven bathymetric/morphologic subdivisions based on faunal assemblages. Sediments in the region studied (Hudson Shelf Valley south to Chesapeake Bay) were dominated by sand with little finer materials. Ridges and swales are important morphological features in this area. Sediments are coarser on the ridges, and the swales have greater benthic macrofaunal density, species richness and biomass. Faunal species composition differed between these features, and Boesch incorporated this variation in his subdivisions (Table 4). Much overlap of species distributions was found between depth zones, so the faunal assemblages represented more of a continuum than distinct zones.

Faunal assemblages were described at a broad geographic scale for Mid-Atlantic Bight continental shelf demersal fishes, based on NMFS bottom trawl survey data between 1967-1976 (Colvocoresses and Musick 1983). There were clear variations in species abundances, yet they demonstrated consistent patterns of community composition and distribution among demersal fishes of the Mid-Atlantic shelf. This is especially true for five strongly recurring species associations that varied slightly by season (Table 5). The boundaries between fish assemblages generally followed isotherms and isobaths. The assemblages were largely similar between the spring and fall collections, with the most notable change being a northward and shoreward shift in the temperate group in the spring.

COASTAL FEATURES

Coastal and estuarine features such as salt marshes, mud flats, rocky intertidal zones, sand beaches, and submerged aquatic vegetation are critical to inshore and offshore habitats and fishery resources of the Northeast. For example, coastal areas and estuaries are important for nutrient recycling and primary production, and certain features serve as nursery areas for juvenile stages of economically important species. **(Add more discussion).**

Salt marshes are found extensively throughout the region. Tidal and subtidal mud and sand flats are general salt marsh features and are also occur in other estuarine areas . Salt marshes provide nursery and spawning habitat for many finfish and shellfish species. Salt marsh vegetation can also be a large source of organic material that is important to the biological and chemical processes of the estuarine and marine environment.

Rocky intertidal zones are periodically submerged, high energy environments found in the northern portion of the Northeast system. Sessile invertebrates and some fish inhabit rocky intertidal zones. A variety of algae, kelp, and rockweed are also important habitat features of rocky shores. Fishery resources may depend upon particular habitat features of the rocky intertidal which provide important levels of refuge and food.

Sandy beaches are most extensive along the Northeast coast. Different zones of the beach present suitable habitat conditions for a variety of marine and terrestrial organisms. For example, the intertidal zone presents suitable habitat conditions for many invertebrates, and transient fish find suitable conditions for foraging during high tide. Several invertebrate and fish species are adapted for living in the high energy subtidal zone adjacent to sandy beaches.

REGIONAL GEAR TYPES AND IMPACTS ON HABITATS

FISHING GEARS INCLUDED IN THIS REPORT

The Northeast Region falls within the jurisdiction of the New England and Mid Atlantic Fishery Management Councils as well as the individual states from Maine to North Carolina which are represented by the Atlantic States Marine Fisheries Commission (ASMFC). These jurisdictions are responsible for the management of many different fisheries extending from the upper reaches of the estuaries out to 200 miles offshore at the EEZ.

The EFH regulations promulgated pursuant to the Magnuson-Stevens Fishery Conservation and Management Act require that Fishery Management Plans contain an assessment of all potential adverse effects of all fishing equipment types used in EFH. This review includes gear managed by the Councils as well as those gear used exclusively in state waters. Fifty-nine categories of fishing gear were identified as having been associated with landings of federal or state managed species based on a review of the National Marine Fisheries Service commercial fisheries landings data for 1999 and an ASMFC report on gear impacts to submerged aquatic vegetation (Stephan et al. 2000).

For this review of the impacts of fishing activities on EFH, gears of concern are those that have been identified as having landed any amount of species managed by either the NEFMC or MAFMC (Table 6) as well as gears that contributed 1% or more of any states total landings for all species (Table 7). Although certain gear types are not managed under the auspices of the MSA, this methodology recognizes that certain gear utilized in state waters may have adverse impacts to EFH that is designated in nearshore or estuarine areas. Table 8 provides the list of all 59 gears considered for this review and indicates whether the gear is utilized in estuaries, coastal waters (0-3 miles), or offshore waters (3-200 miles). Since the seabed is the location of the habitat types most susceptible to gear disturbances, Table 8 also indicates whether the gear contacts the bottom.

Figure 8 provides a general indication of the areas that are being fished based upon landings, in the New England States compared to the Mid-Atlantic States. On a relative scale, using landings as a very rough proxy for fishing effort, most of the fishing effort in New England is in the offshore waters (> 3 miles) compared to inshore waters (< 3 miles) for Mid-Atlantic States. Figure 9 shows how this compares for each state from Maine through North Carolina.

For the purposes of this review, the various gear types have been placed into 3 categories: 1) bottom-tending mobile gear; 2) bottom-tending static gear, and; 3) mobile and static pelagic gear. The gear types have been further placed into functional categories to allow for a more generalized discussion of potential impacts due to a lack of specific information for all gear types.

DISTRIBUTION OF FISHING TRIPS BY GEAR TYPE

Numbers of fishing trips made by federal vessel permit holders in the northeast United States (North Carolina – Maine) during the period 1995 – 2000 were aggregated for 17 individual gear types and 3 major gear categories (Table 9), assigned to 10 minute "squares" of latitude and longitude, and plotted to show spatial distribution patterns. Logbook data included in the analysis are currently provided by vessels operating in federal waters and participating in the following fisheries: northeast multispecies (see list of species in Table 10); sea scallops; monkfish; summer flounder; scup; black sea bass; squid, mackerel, and butterfish; spiny dogfish;

bluefish; Atlantic herring; and tilefish. Logbook data provided by ocean quahog and surf clam dredge vessels are archived in a separate database and were analyzed separately. **[Ocean quahog/surf clam trip data not available for this draft].** Data for lobster pots were provided by vessels with multispecies permits. Vessels that operate strictly within state waters (0-3 miles from shore) are not required to have a federal permit and therefore do not submit logbooks. For this reason, fishing trips in nearshore 10 minute squares that include a significant proportion of state water were under-represented.

Permit holders are required to submit a vessel trip report each time they make a fishing trip. A trip is defined as a single departure and return to port. Actual fishing time could not be computed because the only temporal datum that was common to all gear types was total trip duration. Although some additional information is available (the number of hauls and average duration of each haul) which could possibly be used to obtain more precise estimates of fishing time for mobile gear types such as bottom trawls and dredges, it is not reported for all trips and is meaningless when applied to stationary gear types such as pots and gill nets. No attempt was made to estimate fishing time for this analysis. Therefore, the results presented here are not intended to represent the spatial distribution of fishing effort.

Permit holders are given the option of reporting the location of a trip as a point (latitude and longitude or Loran bearings) or inside a statistical area. Only trips which were reported as a point location and therefore could be assigned to a 10 minute square were included in this analysis. Trips made south of 35° N latitude (Cape Hatteras) or north of 45° N latitude (U.S.-Canada border in the Bay of Fundy) were excluded from this analysis. Each ten minute square covers an area of 100 square miles or 259 square kilometers.

Plots of the cumulative number of fishing trips by ten minute square were made for each gear type using ArcView. Data were classified using a statistical formula (Jenk's optimization) that identifies natural breakpoints between classes. This is the default classification method used in ArcView. It provided more demonstrable groupings of the data than the other classification methods that were available. For gear types or groups with >150,000 trips, all 10 minute squares with <10 trips were eliminated in order to "clean up" the distribution plots. For gear types with 20,000-70,000 trips, all 10 minute squares with <5 trips were eliminated from the plots; for gears with 4,000-15,000 trips, squares with only a single trip were eliminated; and for gears with <4,000 trips, all trips were used. The number of trips noted at the top of each plot (N) is the number of trips represented in the plot, not (in most cases) the total number of trips in the input data shown in Table 1.

Overall, 664,800 trips were included in the analysis, representing 78.4 % of all trip reports submitted during the six-year period for these 17 gear types (Table 9). Most (98.2%) of these trip reports were included in the GIS plots. For individual gears, the "coverage" varied from 30.8 to 93.9%, with Danish seines ranking the lowest and scallop trawls ranking the highest. For the major gear types (>4,000 analyzed trips), the percentages of reported trips that were analyzed ranged from 72.8 to 87.2%.

TYPES OF FISHING GEAR EFFECTS

A number of scientific reviews summarize existing information on the effects of fishing gear to habitat (Auster and Langton 1999, Blaber et al. 2000, Collie et al. 2000a, ICES 1992, Jennings and Kaiser 1998, McAllister 1991). Within these reviews, types of effects fall into specific categories, including alteration of physical structure, sediment suspension, chemical modifications, benthic community changes, and ecosystem changes. These effects are discussed below.

ALTERATION OF PHYSICAL STRUCTURE

Physical effects of fishing gear can include scraping, ploughing, burial of mounds, smoothing of sand ripples, removal of stones or dragging and turning of boulders, removal of taxa that produce structure, and removal or shredding of submerged aquatic vegetation (Lindeboom and deGroot 1998, Schwinghamer et al. 1998, Gordon et al. 1998, Messieh et al. 1991, Black and Parry 1994, Auster and Langton 1999, Ardizzone et al. 2000, Kaiser et al. 1998, 1999, Fonseca et al.1984). These physical alterations reduce the heterogeneity of the sediment surface, alter the texture of the sediments, and reduce the structure available to biota as habitat. As mobile gear is dragged across the seafloor, parts of the gear can penetrate up to 5-30 cm into the substrate under usual fishing conditions, and likely to greater depths under unusual conditions (Drew and Larsen 1994). Direct effects on the seafloor are evident in tracks left by mobile gear that can endure for up to 16 hours in hard sand sediments or for as long as 5 years in soft sediments (Thompson 1993). Effects on hard substrates, such as coral reefs, can persist much longer. Within these tracks, large percentages of emergent epifauna, such as sponges, corals or gorgonians, are often removed, crushed, or broken (Behnken 1994, Van Dolah et al. 1987).

A number of review papers have focused specifically on the physical effects of bottom trawls. According to an ICES working report (1973), otter trawls, beam trawls and dredges are all similar in their types of impacts on the seabed, but the magnitude of impact increases from shrimp beam to sole beam with tickler and stone guards, to Rapido trawl to mollusc dredge. Moran and Stephenson (2000) conclude that semi-pelagic trawls towed above the seafloor inflict less damage/mortality on benthos, but result in lower catches of target fishes and that the light trawl gear currently in use in northwest Australia results in less mortality (15.5% vs. 89% documented by Sainsbury et al. in 1997) than heavy gear used in the past. This statement should be evaluated for trawl gear used in U.S. fisheries.

SEDIMENT SUSPENSION

Resuspension of sediments occurs as fishing gear is dragged along the seafloor. Effects of sediment suspension can include reduction of light available for photosynthetic organisms, burying benthic biota, smothering of spawning areas, and negative effects on feeding and metabolic rates of organisms. If resuspension occurs over a large enough area it can actually cause large scale redistribution of sediments (Messieh et al. 1991, Black and Parry 1994). Resuspension can also have important implications for regional nutrient budgets due to burial of fresh organic matter and exposure of deep anaerobic sediment, upward flux of dissolved nutrients in pore water, and change in metabolism of benthic infauna.

Effects of sediment resuspension are site-specific and depend on sediment grain size and type, hydrological conditions, faunal influences, and water mass size and configuration (Coen 1995, Hayes et al. 1984, Barnes et al. 1991, LaSalle 1990). Effects are likely more significant in waters that are normally clear compared with areas that are already highly perturbed by physical forces (Kaiser 2000). Schoellhamer (1996) concluded that resuspension by natural mechanisms in a shallow estuary in west-central Florida was less frequent and of smaller magnitude than anthropogenic mechanisms (i.e., fishing) and that sediments disturbed by fishing were more susceptible to resuspension by tidal currents. Modeling by Churchill (1989) concluded that resuspension by trawling is the primary source of suspended sediment over the outer continental shelf, where storm-related stresses are weak. In the Kategat Sea, Sweden, sandy sediments above the halocline were more affected by wind induced impacts than by fishing effort, but mud sediments below the halocline experienced an increase in the frequency of disturbance by 90% in the spring and summer and by 75-85% in the autumn and winter due to fishing (Floderus and Pihil 1990). Thus, even when recovery times are fast, persistent disturbance by fishing could lead to cumulative impacts. In contrast, Dyekjaer et al. (1995) found that in Denmark, although local effects of short duration might occur, annual release of suspended particles by mobile fishing gear is relatively unimportant compared with that resulting from wind and land runoff.

Chronic suspension of sediments and resulting turbidity can also affect aquatic organisms through behavioral, sublethal and lethal effects, depending on exposure. Species reaction to turbidity depends on life history characteristics of the species. Mobile organisms can move out of the affected area and quickly return once the disturbance dissipates (Simenstad 1990, Coen 1995). Even if species experience high mortality within the affected area, species with short life history stages and high levels of recruitment or high mobility can repopulate the affected area quickly. However, if effects are protracted and occur over a large area relative to undisturbed area, recovery through recruitment or immigration will be hampered. Furthermore, chronic resuspension of sediments may lead to shifts in species composition by favoring those species that are better suited to recover or those that can take advantage of the pulsed nutrient supply as nutrients are released from the seafloor to the euphotic zone (Churchill 1998).

CHANGES IN CHEMISTRY

Fishing gear can result in changes to the chemical makeup of both the sediments and overlying water mass through mixing of subsurface sediments and porewater. In shallow water this mixing might be insignificant in relation to that from tidal and storm surge and wave action, but in deeper, more stable, waters, this mixing can have significant effects (Rumohr 1989). In a shallow, eutrophic sound in the North Sea, fishing caused an increase in average ammonia content (although horizontal variations prevented interpretations of these increases) and a decrease in oxygen due to the mixing of reduced particles from within the sediments (Reimann and Hoffman 1991). Also in the North Sea, fishing enhances phosphate released from sediment by 70-380 tonnes per year for otter trawls and by10,000-70,000 tones per year for beam trawlers (ICES 1992).

It is unclear how changes in chemistry might affect fish populations. During seasons when nutrients are low, the effective mixing of the sediments could cause increased phytoplankton primary production and/or eutrophication. Rijnsdorp and Van Leeuwen (1996) found increased growth (based on back calculated growth from otolith growth zones) in the smallest size classes of plaice in the North Sea correlated to eutrophication in nearshore areas and both eutrophication and increased beam trawling farther offshore. The authors hypothesized that increased nutrient release (availability) due to anthropogenic activities, including fishing, increased prey availability, and thus resulted in higher growth. Alternatively, ICES (1992) concluded that these pulses are compensated by lower fluxes after the trawl has passed, and that the releases from fishing gear that recycle existing nutrients are probably less influential than new inputs from rivers and land runoff (ICES 1992).

CHANGES TO BENTHIC COMMUNITY

Benthic communities are affected by fishing gear through damage to the benthos in the path of the gear and disturbance of the seafloor to a depth of up to 30 cm. Many kinds of epibenthic animals are crushed or buried, while infauna is excavated and exposed on the seabed.

Specific impacts from fishing depend on the life history, ecology and physical characteristics of the biota present (Bergman and Van Santbrink 1997). Mobile species that exhibit high fecundities and rapid generation times will recover more quickly than non-mobile, slow-growing organisms. In Mission Bay, California, polychaetes with reduced larval phases and postlarval movements had small-scale dispersal abilities which permitted rapid recolonization of disturbed patches and resulted in maintenance of high infaunal densities (Levin 1984). Those with long-lived larvae were only available for successful recolonization if the timing of disturbance coincided with periods of peak larval abundance, however, these species were able to colonize over much larger distances. In the Wadden Sea, 60 years of observations revealed long-term changes in abundance and species composition of benthic communities as a result of continued trawling (Rinjsdorp 1988). Slow growing and reproducing epibenthic species had been replaced by fast growing species, the total number of individuals had grown, and the diversity of species of molluscs and crustaceans had decreased while that of polychaetes had increased.

The physical structure of biota also affects their ability to sustain and recover from physical impacts with fishing gear. Thin shelled bivalves and starfish show higher damage than solid-shelled bivalves in fished areas (Rumohr and Krost 1991). Animals that are able to retract below the surface of the seafloor or live below the penetration depth of the fishing gear will sustain much less damage than epibenthic organisms. Animals that are more elastic and can bend upon contact with fishing gear will suffer much less damage than those that are hard and inflexible (Eno et al. 2001). Kaiser et al. (2000a) found that chronic fishing around the Isle of Mann, UK had removed large-bodied fauna such that benthic communities are now dominated by smaller-bodied organisms that are less susceptible to physical disturbance.

Increased fishing pressure can also lead to changes in distribution of species, either through movement of animals away from or towards the fished area (Bradshaw et al. 2000, Demestre et al. 2000, Kaiser and Ramsay 1997, Kaiser and Spencer 1993, 1996, Ramsay et al. 1996, 1998). For example, Morgan et al. (1997) documented large scale changes in the structure of spawning cod shoals after otter trawling, and concluded that high trawling effort could lead to persistent disturbances over large distances. On the other hand, opportunistic feeders are attracted to areas disturbed by mobile fishing gear. Frid and Hall (1999) found higher prevalence of fish remains and scavengers and a lower abundance of sedentary polychaetes in stomach contents of dabs in the North Sea in areas of higher fishing effort. Kaiser and Spencer (1994) document that gurnards and whiting aggregate over beam trawl tracks and have higher numbers of prey items in their stomachs shortly after trawling. Based on these studies, researchers have speculated that mobile fishing may lead to increased populations of species that exhibit opportunistic feeding behavior. Fonds and Groenewold (2000) modeled results for the southern North Sea indicated that the annual amount of food supplied by beam trawling is approximately 7% of the food demand of common benthic predators. This level could help maintain populations but is insufficient to support further population growth.

CHANGES TO ECOSYSTEM

The role these physical and community effects have on harvested populations is unknown in most cases. However, a growing body of empirical observations and modeling demonstrates suggests that effects can be seen in population responses. For example, population models for Atlantic cod indicate that when the adult stock is at low levels (i.e., spawning and larval survivorship does not produce sufficient recruits to saturate available habitats), a reduction in habitat complexity has measurable effects on population dynamics. Off the northwest shelf of Australia, removal of epibenthic fauna by trawling resulted in a switch of dominant species from Lethrinids and Lutjanids (which are almost exclusively associated with habitats supporting large epibenthos) to Saurids and Nemipterids (which were found on open sand; Sainsbury 1998). The ICES Impact II Report edited by Lindeboom and deGroot (2001) concludes that bottom trawling affected the food web structure of the North Sea and Irish Sea, although the magnitudes and seriousness of the consequences of these effects on ecosystem properties are uncertain.

SUMMARY OF LITERATURE REVIEWS ON GEAR EFFECTS

A number of authors have reviewed existing scientific literature on the effects of fishing on habitat (Barnett 2001, Collie et al. 2000, Lindeboom and de Groot 2000, Hall 1999, Collie 1998, Jennings and Kaiser 1998, Rogers et al. 1998, Auster et al. 1996, Auster and Langton 1999, Kenchington 1995).

Collie et al. (2000) analyzed 39 published studies to compile and evaluate current findings regarding fishing gear effects on habitat. Regarding the type and use of research, the authors found: (1) 89% of the studies were undertaken at depths less than 60 m; (2) otter trawl gear is the most frequently studied; (3) most studies have been done in Northern Europe and East North America. The authors also had several conclusions pertaining to effects of fishing gear: (1) intertidal dredging and scallop dredging have the greatest initial effects on benthic biota, followed by otter trawling and then beam trawling (although beam trawling studies were conducted in dynamic sandy areas, where effects might be less apparent); (2) fauna in stable gravel, mud and biogenic habitats are more adversely affected than those in less consolidated coarse sediments; (3) recovery appears most rapid in less physically stable habitats (inhabited generally by more opportunistic species); (4) we may accurately predict recovery rates for small-bodied taxa, but communities often contain one or two long-lived, vulnerable species; (5) large-bodied organisms are more prevalent before trawling (Greenstreet and Hall 1996, Frid and Clark 1999, Veale et al. 2000); and (6) the mean initial response to fishing impacts is negative (55% reduction of individual taxa). Based on these findings, the authors suggest that the scientific community abandon short-term small-scale experiments and argue for support to undertake larger scale press and relaxation experiments that mirror the timing and frequency of disturbance by commercial fishing.

Auster et al. (1996) reviewed 3 studies of mobile fishing gear in the Gulf of Maine and concluded that mobile fishing gear alters the seafloor, and reduces complexity, sedimentary structures, and emergent epifauna. Collie (1998) reviewed studies from New England and concluded that results indicate significant impacts of bottom fishing gear on benthic habitats. Auster and Langton (1999) discuss both long-term and short-term effects on structural components of habitat, community structure, and ecosystem processes, as well as the implications of these effects for management. Kenchington (1995) reviewed studies on effects of mobile gear in the North Sea, Atlantic Canada, and Scotland. While many of these reviews focus on a given gear type or a specific geographic area, most agree that fishing has at least some negative impact on the seabed and benthos. Furthermore, literature presented in these reviews suggest that chronic fishing has led to changes in community structure in many areas of the world (Jennings and Kaiser 1998, Collie et al. 2000a,b, Dayton et al. 1995).

BOTTOM-TENDING MOBILE GEAR

BOTTOM TRAWLS

BOTTOM TRAWLS - General Description

Trawls are classified by their function, bag construction, or method of maintaining the mouth opening. Function may be defined by the part of the water column where it operates (bottom) or by the species that it targets (Hayes 1983). On bottom trawls most of the components of the gear contact and interact with the sea bottom. These components include: the otter boards (trawl doors), trawl head shoes on beam trawls, foot rope (chain sweeps, cookies, rollers and rockhoppers), tickler chains, bridles, and the bottom of the net itself. Below are the most common bottom trawls used in waters of the Northeast.

BOTTOM TRAWLS - Fishing Trips

Bottom trawling (all trawl gears) in the Northeast region was dominated by fish trawls, which accounted for 83.8% of all the trip reports that were included in the analysis. The distribution of trips (Figure 10) closely resembled the distribution of fish trawl trips (Figure 11), with the addition of shrimp trawling along the central Maine coast (Figure 12).

BOTTOM TRAWLS - Impacts and Recovery

Based on the information available to date, the predominant effects caused by bottom trawling include smoothing of sediments, moving and turning of rocks and boulders, resuspension and mixing of sediments, removal of seagrasses, damage to corals, and removal of epibenthic communities (ICES 1973, Hutchings 1990, Auster et al. 1996, Heiftez 1997, Lindeboom and de Groot 1998). A total of 37 fishermen, all of whom were retired with at least 15 years experience in a commercial fishery, stated that trawls stir up fine sediments, flatten topography, and remove epifaunal coverage, and that specifically, rollers alter bottom structure by removing lumps and turning over boulders (Fuller and Cameron 1998). In 1971, de Groot and Appledorn published a review of trawl damage to biota, and stated that nemertea, annelids, bivalves, and sea potatoes are all damaged extensively by trawl tickler chains. A review of the effects of trawling by species group in the North Sea concluded that nearly all coelenterates in the trawl path are destroyed, damage to bryozoans is insignificant, annelids suffer considerable damage, damage to molluscs depends on the thickness of the shell, ophiuroids and sea potatoes are badly damaged, and sea stars are readily caught in trawl nets (deGroot 1984). Lindeboom and deGroot (1998) conclude that if trawling intensity remains high, biological communities affected by trawling may never recover to their original condition.

Most research agrees that short-term and long-term effects result from trawling, but is unable to relate these effects on changes in the populations of commercially harvested species. DeGroot (1984) concludes that although individual animals might be affected, food sources are readily available such that disturbance is not affecting fish at the population level. Fonds and Groenewold (2000) conclude that although mobile fishing might attract scavengers to fished areas, the annual amount of food made accessible by beam trawling is insufficient to support further population growth.

See also Multiple Mobile Gears below.

BOTTOM TRAWLS - Management Implications

The majority of specific recommendations offered in the literature relate to gear design and deployment. Van Marlen (2000) recommends that more effort be put into developing electrified beam trawls that use electrical stimulation rather than mechanical disturbance to catch fish. While this method requires large investments up front, and could possibly require higher repair costs, the huge decrease in resistance of the gear should lower fuel costs considerably. West (1987) states that sweeps and lower bridles of trawls should be fitted with large diameter discs, widely separated along the span of the wires, to decrease the area of bottom contacted by the riggings. A 1999 ICES working group report (ICES 1999) recommends that further research and development be completed for wheels used on beam trawls, ways to reduce friction or compression forces, and ways to reduce the number of weights on groundropes. Furthermore, they recommend a reduction of the sweep contact, possibly through use of semi-pelagic riggings and alternatives to mechanical stimulation. West (1987) notes that discs herd and capture fish as effectively as the ground rope and might have less direct contact with the seafloor.

Other recommendations focus on reducing gear interactions with certain habitat types. Lindeboom and de Groot (1998) recommend that the areas impacted by bottom trawls and the number of bottom trawlers be restricted from expanding and that the interactions with groups working on conservation of ecosystems be strengthened to improve our ability to measure impacts. For specific mitigation measures, they recommend: spatial closures, reduced of effort, gear substitution (i.e., static for mobile gear), and gear modifications (although this would only moderatly reduce impacts). Many authors recommend the protection of specific, vulnerable habitats such as seamounts (Probert et al. 1997, Koslow and Garrett-Holmes 1995), seagrasses (Godcharles 1971), and gravel beds (Auster et al. 1996).

BOTTOM OTTER TRAWLS

BOTTOM OTTER TRAWLS - Description

Otter trawls developed as fishermen sought to further increase the horizontal opening of the trawl mouth, but without the cumbersome rigid beam. In the late 1880s, Musgrave invented the otter board, a water-plane device that when used in pairs, each towed from a separate wire, served to open the net mouth horizontally and hold the net on the bottom. Initially, all otter boards were connected to the wing ends of the trawl, as they are today in the shrimp trawl fishery. In the 1930s, the Dan Leno gear was developed by Frenchmen, Vigarnon and Dahl, that allowed the otter boards (doors) to be separated from the trawl wing ends using cables or "ground gear." This technology increased the effective area swept by trawl from the distance between the net wings to the distance between the doors. The ground gear can be as long as 200 m, thus increasing the area swept by the trawl by as much as three fold. It is the spreading action of the doors resulting from the angle at which they are mounted that creates the hydrodynamic forces needed to push them apart. These forces also push them down towards the sea floor. On fine-grained sediments, the doors also function to create a silt cloud that aids in herding fish into the mouth of the trawl net (Carr and Milliken 1998).

The bottom trawl net is a funnel-shaped net composed of upper and lower sections joined at seams referred to as "gores." Some bottom trawls also have side panels to increase the vertical opening, and therefore have four seams. The mouth of the trawl net consists of jib and wing sections in both the upper and lower panels. A "square" section forms a roof over the net mouth. The body of the trawl net includes belly sections, leading to the cod-end where the catch is collected. The webbing is attached to a rope frame consisting of a headrope, along the upper panel leading edge, and a footrope, along the lower panel leading edge. The sweep which tends bottom as the net is towed, is attached to the footrope. The headrope is equipped with floats that provide buoyancy to open the net mouth vertically. The headrope and footrope/sweep are attached to bridles (also referred to as legs) at the wing ends, that lead to the ground wires and the trawl doors. The sweep also comes in contact with the bottom as it acts to collect fish that lie or congregate before it. The configuration of the sweep can vary considerably and is dependent upon both the bottom type and species of fish targeted (Carr and Milliken 1998).

On smooth bottoms, the footrope may be weighted with chain or leadline, or may be rope wrapped with wire. This is the simplest and lightest sweep, known as a chain sweep. On soft or slightly irregular bottoms, rubber discs (known as "cookies") stamped from automobile tires can be strung along the sweep (Carr and Milliken 1998). On rougher bottoms, rubber rollers or steel bobbins are rigged to the footrope to assist the trawl's passage over the bottom. Both the rollers and the bobbins use small steel or rubber spacers between the much larger roller and bobbins. In New England, the rollers have been largely replaced with "rockhopper" gear, that uses larger rollers that are actually fixed in place, spaced with the smaller rubber discs (Carr and Milliken 1998). This setup enables the trawl to pass over, yet still effectively fish, areas with large rocks and boulders.

A newly developed gear known as "street-sweeper" trawl gear, is constructed of a series of rubber disc spacers and bristle brushes, as found in actual street sweepers. The distinguishing component of this sweep is the brushes made of stiff bristles mounted on a cylinder core. The brush cylinders are up to 31 inches in diameter and have smaller diameter rubber disc(s) placed between them. The discs are strung on a cable or chain and aligned in series forming the sweep of the trawl net. This innovation probably allows the trawl to be fished on rougher bottom than any other design and it is lighter than the rockhopper (Carr and Milliken 1998).

The raised-footrope trawl was designed especially for fishing for whiting, red hake, and dogfish. It was designed to provide vessels with a means of continuing to fish for small mesh species without catching groundfish. The configuration consists of a 42 inch long chain connecting the sweep to the footrope, which results in the trawl fishing about 18 - 24 inches above the bottom (Carr and Milliken 1998). The raised footrope keeps the net slightly above the bottom, allowing complete flatfish escapement, and theoretically it is supposed to travel over codfish and other roundfish (whiting and red hake tend to swim slightly above the other groundfish). Carr and Milliken (1998) report that studies have confirmed that the raised footrope sweep has much less contact with the sea floor that does the traditional cookie sweep that it replaces.

Bottom trawl vessels are classified as to the location of the pilothouse, and manner in which the net is set and hauled. Eastern rig vessels handle the trawl gear from the side of the vessel and the pilothouse is located aft of the working deck. Western rig vessels handle the trawl gear over the stern of the vessel and the pilothouse is forward of the working deck. Most western rig or stern trawlers stow the trawl net on a reel located at the stern of the vessel.

Bottom trawl fisheries are prosecuted for demersal species on all coasts of the U.S. In the northeast, vessels from 15 to 50 m fish in waters ranging from 10 to 400 m in depth. Large mesh trawls are used to harvest cod, haddock, flounder and other large species. These trawls are typically rigged with long ground wires that create sand clouds on the seabed, herding the fish into the trawl mouth. The largest trawlers, from 50-100 m in length, catch, process and freeze their products onboard, and are referred to as factory, catcher, or processor trawlers (DeAlteris 1998).

Small mesh bottom trawls are used to capture northern and southern shrimp, whiting, butterfish and squid. Crabs, scallops, and lobsters are also harvested in large mesh bottom trawls. Small-mesh trawls are designed, rigged, and used differently than large-mesh fish trawls. Bottom trawls used to catch northern shrimp in the Gulf of Maine, for example, are smaller than most fish trawls and are towed at slower speeds (<2 knots versus 4 knots or so for a fish trawl). Footropes range in length from 40 to over 100 feet, but most are 50-90 ft. Because shrimp inhabit flatter bottom than many fish do, roller frames tend to be smaller in diameter on shrimp nets because they are not towed over rough bottom (Dan Schick, Maine Dept. of Marine Resources, personal communication). Many groundfish trawls have long legs with cookies, which, along with the doors, stir up the sediment that tends to herd the fish into the net. Because shrimp can not be herded in this way, bottom legs on shrimp trawls are bare (no cookies) and are limited to 15 fathoms in length (D. Schick, personal communication). Northern shrimp trawls are also equipped with Nordmore grates in the funnel of the net that reduced the by-catch of groundfish.

Southern shrimp trawlers that catch brown and white shrimp typically tow 2-4 small trawls from large booms extended from each side of the vessel (DeAlteris 1998). Northern shrimp trawlers tow a single net astern. Southern shrimp trawls are equipped with turtle excluder devices.

[Are scallop trawls identical to fish trawls? Need some information].

BOTTOM OTTER TRAWLS - Fishing Trips

Fish Trawls

Almost 180,000 trips were analyzed for this gear, more than for any other mobile gear type used in the study area during 1995 – 2000. Bottom trawling was conducted throughout most of the Gulf of Maine and on the continental shelf from Georges Bank to Cape Hatteras. Little to no bottom trawling (for fish) was reported in eastern Maine coastal waters, in an area off the New Jersey coast, and off the entrance to Chesapeake Bay (Figure 11). Three areas closed to groundfishing in 1995 are clearly visible on Georges Bank. More intensive bottom trawling (>136 trips) was reported in coastal waters from central Maine and around Cape Cod to the New York Bight, in the vicinity of Cultivator Shoals on Georges Bank, in the Great South Channel east of Nantucket, and on the shelf slope off southern New England between 70° and 73° W longitude. Another fishing ground was located south of Delaware Bay, between Cape May and Ocean City, MD. Areas exposed to the greatest amount of trawling (>1,185 trips) were located in nearshore waters off Portland, ME and the NH coast, southeast of Cape Ann, in Nantucket Sound, off RI and in eastern Long Island Sound, on the eastern south shore of Long Island, and in the New York Bight.

Shrimp Trawls

Analyzed trips for this gear type exceeded 30,000 and were located primarily in the Gulf of Maine, with a few in southern New England and near Cape Hatteras (Fig. 12). The highest concentration of trips (204 – 2500 trips per 100 mi^2) occurred within 60 miles from shore off the southern and central Maine coast and north of Cape Ann. Shrimp trawling also occurs in deeper water of the Gulf of Maine, but at a reduced level (5 – 203 trips). Virtually no shrimp trawling is conducted off the mid-Atlantic states. Shrimp trawls are used to harvest northern shrimp

(*Pandalus montagui*) in New England and penaeid shrimp in North Carolina. Northern shrimp inhabit shallow inshore and deep offshore water whereas penaeid shrimp are restricted to shallow coastal waters.

Scallop Trawls

Only 1,702 scallop trawl trips were analyzed. Bottom trawling for scallops takes place almost entirely in the mid-Atlantic region and was concentrated along the 50 fathom depth contour at the shelf edge between 36° and 40° N latitude (Figure 13). Ten minute squares here were exposed to 14 – 75 trips during the six year period.

BOTTOM OTTER TRAWLS - Impacts and Recovery

Studies in the Northeast Region

Sand/silt/clay (Long Island Sound): Diver observations in 1983-1984 (Smith et al. 1985) showed minor surface sediment disturbance (less than 1" deep) within the sweep path of the net. Much of the disturbance was by wake turbulence suspending small epifaunal organisms, silt and flocculent material as the net passed, rather than by the direct physical contact of the net with the bottom. A "chumming effect" attracted mobile predators due to exposure of prey organisms. A possible increase in sea floor productivity due to "cultivation" of the seabed was hypothesized. Trawl door tracks (in sand, less than 2" deep; in mud, 4-10" wide, 2-6" deep) were the most notable evidence of trawl passage. These tracks were soon obscured by tidal currents, but attracted mobile predators and appparently offered temporary habitat for some species. The tracks did not cause habitat loss, and in mud they may have increased excavation sites for formation of lobster burrows. Alteration of existing lobster burrows was minor and appeared easily repairable by resident lobsters. Roller gear of unspecified size on mud bottom left shallow scoured depressions; spacers between discs reduced scouring.

Mud (Maine coast): Mayer et al. (1991) conducted experimental trawling off the coast of Maine in 8 m water depth over poorly sorted mud and shell hash and in 20 m water depth over protected, fine grain, mud areas. Organic matter profiles were strongly affected by dragging; diatom mats were lost, and both total organic carbon and total nitrogen were reduced in the new sediment-water interface. These changes could lead to shifts in dominance from surficial communities to subsurface communities, with stronger dominance of bacterial decomposition.

Gravel and gravel/boulder (Jeffreys Bank, central Gulf of Maine): From 1987 to 1993, modifications to fishing gear allowed fishermen to trawl rocky, boulder habitat. Bottom conditions were observed in a July 1987 submersible dive to 94 m depth near the top of Jeffreys Bank (Auster et al. 1996). At that time the presence of large (>2m diameter) boulders in the area precluded fishing. A thin layer of mud covered the gravel and boulders. The rock surfaces supported large numbers of erect sponges, as well as sea spiders, bryozoans, hydroids, anemones, crinoid sea stars, and ascidians. Smaller mobile fauna, including several species of crustaceans, snails, and scallops, were also abundant. When the area was resurveyed in August 1993, much of the mud veneer was gone and there was evidence that boulders had been moved, apparently by otter trawling. Abundance of erect sponges was greatly reduced, and most of the associated epifaunal species were not present.. Laboratory predation experiments (Lindholm et al. 1999) demonstrated that decreased habitat complexity lead to increased predator success, and therefore, decreased survival of 0-year cod. Thus reduction in benthic epifauna by mobile fishing could have a major effect on fish populations.

See section on Multiple Mobile Gears for information on effects of otter trawling and scallop dredging in various locations in the Northeast region.

National and International Studies

Otter trawls affect the seafloor through contact of the otter boards, footropes and footrope gear, and the net sweeping along the seafloor (Goudley and Loverish 1987). Otter trawl doors leave furrows in the sediments that vary in depth and width depending on the shoe size, door weight, and seabed composition. The footropes and net disrupt benthic biota and dislodge stones sitting on or protruding above the surface. If the footrope is rigged with tickler chains the effects of the footrope are amplified (Bridger 1972, High 1998). Otter trawls also result in turbidity plumes that can extend up to 15 ft off the bottom and 10 or more feet horizontally. Similar to beam trawls, benthic fauna in the path of the trawl can be killed, damaged, removed or affected by physical alteration to their habitat. However, otter trawls are used extensively over a wider range of habitat types and depths (Canadian Department of Fisheries and Ocean 1993, Kaiser et al. 1996a, Collie et al. 2000b).

Frid et al. (1999) developed a priori predictions concerning the effects of fishing effort on species abundances, and tested those predictions using time series data from sand habitats in 55 m of water and silt/clay habitats in 80 m of water off NE England. Taxa predicted to increase with fishing effort included errant or mobile polychaetes and asteroid echinoderms. Taxa predicted to decrease with fishing effort included sedentary or fragile taxa such as echinoid echinoderms, large bivalves, and sedentary polychaetes. Outside fishing grounds those species predicted to increase and/or decrease with fishing remained constant. Inside heavily fished areas those predicted to increase with fishing did, but those predicted to decline remained the same. Results indicate that species abundances in unfished areas are determined by natural changes in organic input, but that inside fished areas species abundances were more dependent on fishing effort than on natural influences.

Thrush et al. (1998) tested hypotheses regarding trends for benthic fauna along a gradient of fishing effort by sampling 18 locations with similar habitats but varying fishing effort in the Hauraki Gulf, New Zealand. Sediments were described as 1- 48% mud and depths ranged from 17-35 m. After accounting for differences of location and sediment, 15-20% of the variability in macrofauna community composition was attributed to fishing. With a decrease in fishing effort, large epifauna, echinoderms, and the number of species and diversity of fauna increased and the number of deposit feeders and small opportunists decreased. These results indicate broad-scale changes in benthic communities directly related to fishing, and because they were taken over a large sampling area, suggest ramifications for the entire ecosystem.

<u>Fine sand (Grand Banks, Newfoundland)</u>: Schwinghamer et al. (1998) examined physical effects of experimental otter trawling (12 times a year for 3 years) over sandy habitat (120-146 m) in the Grand Banks, Newfoundland that had been closed to fishing since 1980. Trawled areas were smoother and cleaner while untrawled areas were hummocky, mottled, and had more flocculated organic matter. Otter door tracks were visible for at least 10 weeks and in some cases for up to a year. Prena et al. (1999) found that trawling in this location decreased the biomass of sand dollars, brittle stars, soft corals, snow crabs and sea urchins and resulted in physical effects on habitat (i.e., trawl tracks, reduced habitat complexity) that took one year to recover. Trawling reduced the complexity of the sediment structure down to a depth of 4.5 cm and resulted in a decrease in the biomass of epibenthic organisms and an influx of scavenging crabs (Gordon et al.

1998). Kenchington et al. (2001) also found immediate reduction of benthos, but concluded that there was little indication of long-term effects and that when disturbance was evident, it mimicked natural disturbance.

McConnaughey et al. (2000) sampled megafauna from unfished and heavily fished areas (between 40-80 m depth) in the eastern Bering Sea and concluded that: 1) sedentary megafauna (i.e., anemones, soft corals, sponges, whelk eggs, ascidians), neptunid whelks and empty shells were more abundant in unfished areas; 2) motile groups (i.e., crabs, sea stars, whelks) and infaunal bivalves exhibited mixed responses, suggesting the importance of life history considerations, such as habitat requirements and feeding modes; and 3) overall diversity and niche breadth of sedentary taxa was greater in unfished areas. Furthermore, long-lived, slow-growing taxa were significantly more patchy in highly fished areas, suggesting a slow impact recovery process.

Intertidal estuary (Bay of Fundy): Brylinsky et al. (1994) examined physical and biological effects of experimental fishing using a flounder trawl with rubber rollers and no tickler chains in an intertidal estuary in the Bay of Fundy, Nova Scotia. Trawl doors made furrows that were visible for 2-7 months and rollers compressed sediments. Biological communities that inhabit sand and mud habitats differ in species composition, and thus, in their ability to recover from disturbance. Brylinsky et al. (1994) sampled chlorophyll a (as an indicator of benthic diatoms) and abundance of nematodes before and after trawling and found that both were reduced for approximately 1 month after trawling. Nematodes recovered fully after 4-6 weeks and cholorphyll a concentrations increased by fourfold after 80 days, prompting the authors to conclude that no significant effects occurred to either benthic diatoms or macrobenthos. The authors also state that the quick recovery was expected since sediments in the area are commonly exposed to natural stresses by storms and winter ice.

Mud (Irish and Scottish Sea): Ball et al. (2000) reviewed two studies of trawling in 30-40 m water depth over mud areas of the Western Irish Sea and Scottish Sea (Tuck et al. 1998), which used closed areas and shipwrecks as controls for experimental trawling. Based on the results, prolonged trawling reduced the abundance of large-bodied fragile organisms and increased the abundance of opportunists, and ultimately resulted in an altered, but stable, community with fewer number of species and an increase in the number of small polychaetes. This altered state was maintained due to long recovery times (up to 18 months) of the habitats even when fishing was restricted during parts of the year.

Gravel, sand, and silt-clay (central California): Engel and Kvitek (1998) sampled lightly and heavily fished areas off central California with similar sediments. Results indicated that heavily fished sites have more trawl tracks, exposed sediment/shell fragments, fewer rocks and mounds, and less flocculent material. Invertebrate epifauna were more abundant in lightly trawled areas and nematodes and polychaetes were more abundant in heavily trawled areas. The authors concluded that trawling reduces habitat complexity and biodiversity while increasing opportunistic infauna and prey important in the diet of some commercially important species.

Hard bottom (eastern Gulf of Alaska): Freese et al. (1999) document the effects of a single passage of a bottom trawl (with tires, rockhopper discs, and steel bobbins) over pebble habitat (seabed composition 93% pebble) in the eastern Gulf of Alaska (water depth 206-274 m). The trawl moved and overturned boulders and caused significant decreases in emergent epifauna (i.e., anemones, sea whips and some sponges). Of the sponges affected, 14% of finger sponges were knocked over, 67% of vase sponges were damaged, and morel sponges were crushed and torn apart. Fifty five percent of seawhips counted were broken or pulled out of the substrate. Brittle stars were damaged, but reticulate anenomes and motile invertebrates were not. The authors did not record recovery rates, but concluded that chronic trawling would probably show greater reduction in density of these taxa.

Live bottom (various locations): A number of studies have recorded damage to coral reef habitats due to trawling. Submersible observations recorded pieces of broken coral and displaced boulders along trawl tracks over hard-bottom habitats in southeast Alaska (Behnken 1994). A single trawl tow over a newly discovered coral reef at 230-280 fathoms in the Gulf of Mexico brought over 300 lbs of coral to the surface (Moore and Bullis 1960). A single pass with a trawl in a hard bottom sponge and coral community at 20 m in Grays Reef, Georgia, damaged finger sponge, vase sponge, barrel sponges, whip coral, fan coral, stick coral, and stony tree coral, and caused a decrease in density of barrel sponges (Van Dolah et al. 1987). In this case, the community took a year to recover. Authors speculate that because these species harbor numerous invertebrate prey species, damage could affect important nearshore fish populations. During the 1970s and 1980s chains, bobbins, sweep wires and otter boards of mobile fishing gear caused extensive destruction to coral-like bryozoan growths in the Tasman Bay, New Zealand (Bradstock and Grodon 1983) in turn reducing juvenile trakihi and snapper abundance.

Seamounts/coral (various locations): Seamounts have also suffered extensive damage from trawl fishing. Corals from seamount slope areas comprised the largest bycatch in trawl tows (using otter trawls with large bobbins along the ground rope) taken in depths of 662-1524 m in tropical New Zealand. These coral patches may require over 100 years to recover, and many were probably crushed or overturned without coming to the surface in the net (Probert et al. 1997). Koslow and Garrett-Holmes (1995) sampled benthic fauna over seamounts in Tasmania subject to varying levels of fishing effort. Results demonstrated that in heavily fished areas, substrates were predominantly bare rock or coral rubble and sand, that colonial corals and associated fauna were lacking, and that species abundance and richness were lower than in lightly fished areas. Authors attribute these differences to fishing effort and recommend permanent closed areas to protect the seamount ecosystem.

Seagrass beds (various locations): Studies have shown that trawling with side frame trawls in seagrass beds gathers unattached algae and deciduous leaves, but does not decrease mean shoot density, number of blades, blade length or below ground biomass (Meyer et al. 1991, Futch and Beaumariage 1965, Tabb 1958) as long as rake teeth do not extend below the roller. Authors agree, however, that shrimp trawls should include gear specifications to minimize damage to seagrasses. Long-term, chronic effects have not been studied.

BOTTOM OTTER TRAWLS - Management Implications

Text to be inserted

BEAM TRAWLS

BEAM TRAWLS - Description

The beam trawl is essentially a trawl net much like an otter trawl, only the net is spread horizontally by a wooden or steel beam that runs the horizontal width of the trawl rather than with otter boards. The trawl net is spread vertically by heavy steel trawl heads that generally have skid-type devices with a heavy shoe attached. The otter boards and quarter ropes of the more common otter trawl are not needed. The net's headrope is fastened directly to the beam and the groundrope is connected loosely between the bases of the shoes. Modern beam trawls range in size from 4 to 12 meters beam width and the beam is held about 1 meter above the bottom. Depending on the ground being fished, beam trawl nets may be fitted with a number of tickler chains or a heavy chain mat. The tickler chains are usually rigged between the ends of the shoes to dig out fish lying on or buried in sand and mud and the number of chains that will be used depends on the species being targeted. A chain mat is generally used in place of the tickler chains on hard and rocky grounds.

Towing speeds of at least five knots are generally considered most effective for the capture of flatfish with a beam trawl. The advantages claimed for beam trawls over otter trawls in catching demersal species, especially flatfish include:

- The warp length has less influence on performance;
- The size of the net opening remains constant during turns;
- The effectiveness of the gear is less affected by soft muddy bottoms;
- The gear has less drag (reducing the power required); and,

Smaller vessels with restricted warp capacity can fish deeper since less scope is needed.

Modern beam trawlers often use double beam trawls, in which two beam trawls are towed from heavy booms rigged from a large A-frame mounted to the deck of the vessel. Additional recent modifications to this gear type include:

- Replacing the chain mat with an electrode array fed by an on-board generator;
- Replacing the trawl head shoes with wheels; and,
- The development of a high-lift net design where the headline is not attached to the beam but rather allowed to billow upwards.

BEAM TRAWLS - Fishing Trips

Beam trawls accounted for a very small proportion (<1%) of all bottom trawl trips reported during 1995 – 2000. Trips reported for this gear type were scattered primarily throughout southern New England and south of Long Island, off Delaware Bay, and in the southwestern Gulf of Maine (Figure 14).

BEAM TRAWLS - Impacts and Recovery

Studies in the Northeast Region

No studies have been conducted.

National and International Studies

Based on observations of a 4-m beam trawl over Goote Bank off Belgium and the Netherlands, Fonteyne (2000) concluded that beam trawls flatten the seabed, expose shell debris, remove the silt layer from densely packed sand, and leave detectable marks on the seabed that remain visible for 52 hours in coarse sand and for 37 hours in fine sediments. Margetts and Bridger (1971) used scuba and camera observations with beam trawls at a water depth of 22 m in the English Channel and found that trawls smoothed ripples over hard sand, but were much more discernible on muddy sediment. When beam trawls are arranged with a series of tickler chains along the leading edge, the chains effectively emulsified the seafloor sediments.

Of the different types of bottom trawls, beam trawls penetrate more deeply into softer sediment and, therefore, cause higher mortalities to benthic fauna (Bergman and Van Santbrink 1997). Philippart (1998) documented increased bycatch of demersal fishes and invertebrates when the bottom fishery in the southeast North Sea changed from otter to beam trawling. Beam trawlers caught proportionally more invertebrate species than otter trawls and had a catch efficiency (for both targeted and non-targeted species) of 10 times higher than that of the otter trawl. Kaiser et al. (1996a) and Collie (2000a) state that, because beam trawls are used almost exclusively in areas that are adapted to frequent wave/tidal action, they are less likely to result in adverse effects on habitat.

Sand (Irish Sea): The effects of beam trawls have been studied extensively in two specific areas in the eastern Irish Sea. One site consists of stable, coarse sand and gravel and the other consists of mobile sand ribbons and megaribbons (Kaiser and Spencer 1996, Kaiser et al. 1996a, 1998, 1999). Following experimental trawls (10-12 passes) sand ripples were flattened, sediments were less consolidated (due to the chain matrix), and fine materials were suspended and moved away by tidal currents. Short-term changes to biota in the more stable environment included a 54% reduction in the number of infaunal species and 40% reduction in individuals (due to removal of less common species), a decrease in slow-moving epifauna and an increase in mobile species. Furthermore, serpulid worm tubeheads were significantly lower in fished sites, but densities were unaffected at the scale and intensity of fishing in the study because the worms were often attached to rocks that passed through the net, and thus could recolonize between sampling. These changes in biota were detectable for up to 6 months. No differences in biota were detected at the sites with more mobile sediments. Authors comment that although effects were short-term, the length that effects endure depends on the timing of the impact. For example, effects might be less evident if they coincide with peak settlement of benthic fauna or during a time of frequent natural disturbances.

Sand (North Sea): Bergman et al. (1990) and Bergman and Hup (1992) studied the effects of beam trawls in the North Sea. Their study site was in a lightly fished area with water depth of 30 m and medium-hard sandy sediments. Experimental trawling resulted in physical penetration of the gear to at least 6 cm, and a 40-65% decrease in density of starfishes, small heart urchins, tube-dwelling polychaete worms, and small crustaceans. Many other species did not change and a few increased, possibly due to a change in vertical distribution with trawling disturbance. Authors discuss the possibility that because the area has been fished, alterations to the biota may have already occurred during past decades. Bergman and Van Santbrink (1997) sampled the biological community following a single tow of a beam trawl in shallow (exact depths were not provided) sandy area of the Netherlands and found a 5-50% reduction of bivalves, crustaceans, and annelid worms. Authors speculate that mortalities would increase in the summer months when animals migrate to the sediment surface. These studies did not address recovery times or long-term, cumulative impacts.

Rijnsdorp and Vingerhoed (2001) examined stomach contents of plaice and sole in the North Sea. No clear differences in stomach contents were found between areas inside and outside of the "plaice box" which has reduced trawling effort. However, a comparison between recent (1996) and historic (~1990) data revealed a shift in major prey types from dominance of bivalves to dominance of polychaetes. Authors comment that the observed changes agree with those predicted from trawl damage studies (i.e., increase in short-lived taxa and decrease in long-lived taxa), but note that similar changes could also be a result of eutrophication and pollution.

BEAM TRAWLS - Management Implications

Text to be inserted

DREDGES

DREDGES - General Description

Dredges are rugged, frame supported box- or bag-shaped devices used to harvest benthic species when dragged over the bottom. They are often equipped with blades, rake-like teeth, or hydraulic jets to scrape or dig into the substrate (Hayes 1983). On dredges, most components of the gear contacts and interacts with the bottom. These components include: the rakes or blades, the dredge frame, chain sweeps, the bag or box, as well as the water jets of the cutter head in hydraulic dredges. Below are the most common dredges used in waters of the Northeast U.S.

DREDGES - Fishing Trips

Dredging (all gears) was dominated by scallop dredges, which accounted for 81.5% of all the trips that were included in this analysis. Surfclam and quahog dredges accounted for an additional 13.7%. The distribution of all dredge trips (Figure 15) closely resembled the distribution of trips for these two gear types.

DREDGES - Impacts and Recovery

Dredges are towed more slowly and cover less ground per haul (Stewart 1999), but have more area in contact with the bottom than trawls, and unlike trawls, are designed to penetrate the substrate to remove infaunal invertebrates (Collie 2001, Rogers et al. 1998). Hydraulic dredges, in general, affect the benthos to a higher degree than mechanical dredges, creating trenches up to 25 cm deep and resuspending large quantities of sediments, and affecting high abundances of infauna through removal and/or burial.

See also multiple mobile gear below.

DREDGES - Management Implications

Many authors have voiced concern over the use of hydraulic dredges in seagrass habitats because of the extensive damage and slow recovery of grasses within the dredge tracks (Chesapeake Bay Program 1995, Godcharles 1971, Jolley 1972, Manning and Dunnington 1955, Orth et al. 1998). No recommendations regarding use of dredges in other habitat types were offered in the literature.

HYDRAULIC CLAM DREDGES

HYDRAULIC CLAM DREDGES - Description

Hydraulic dredges are used to extract clams from the sediment. In hydraulic dredging, high pressure water jets ahead of the rake teeth or blade are used to scour out the shells which are then dug up by the blades and passed back into the bag. High pressure water is supplied to the jets through a hose from the operating vessel by a diesel pump and the bag is generally carried on a heavy sled. This gear is generally fished in relatively shallow inshore and estuarine areas (Sainsbury 1996).

In the ocean surfclam (*Spisula solidissima*) fishery, large vessels (>30 m), tow dredges up to 4.5 m in width slowly across the seabed. The vessels are equipped with large pumps, connected to the dredges via flexible hoses, that use water and inject it into the sediment through a manifold with multiple nozzles, ahead of the blade of the dredge. The dredge must be towed slowly so as to not exceed the liquefaction rate. These dredges, operated correctly, are highly efficient, taking as much as 90% of clams in their path. A secondary species that is also harvested in this fishery is the mahogany quahog, *Arctica islandica*.

In the estuarine soft-clam (*Mya arenaria*) fishery, the dredge head (manifold and blade) is attached to an escalator that continuously carries the materials retained on the blade to the working deck of the vessel to be selected by the fishermen. These vessels are restricted to water depths less than one-half the length of the escalator. However, the soft clam is a shallow water clam, so the technology is most appropriate and is typically operated from 15 m vessels in water depths of 2-6 m (DeAlteris 1998).

HYDRAULIC CLAM DREDGES - Fishing Trips

[Data not available, will be added in next draft].

HYDRAULIC CLAM DREDGES - Impacts and Recovery

Studies in the Northeast Region

<u>Sand and mud (Mid-Atlantic)</u>: Murawski and Serchuk (1989) reported that hydraulic dredges in the Mid-Atlantic penetrate deeper into the sediments and result in greater short-term disruption of the benthic community and underlying sediments than scallop dredges. In coarse gravel, the sides of the dredge-created trench soon collapsed, leaving little evidence of dredge passage. There was also a transient increase in bottom water turbidity. In finer-grained, hard-packed sediments, tracks persisted several days after dredging. Non-harvested organisms (e. g., sand dollars, crustaceans, worms) were significantly disrupted by the dredge. Sand dollar assemblages appeared to recover quickly, but short-term reductions in infaunal biomass were considered likely. Starfish and benthic feeding fish were abundant in dredge tracks, probably feeding on exposed infauna. Non-harvest mortality of ocean quahogs (40-60%: Mid-Atlantic Fishery Management Council 1977) was considerably higher than for sea scallops. More recent stock assessments indicate that non-harvest mortality of ocean quahogs was negligible (NEFSC 2000b) while non-harvest mortality for surfclams was 20% (NEFSC 2000a). Murawski and Serchuk (1989) noted that clam dredgers report heavily dredged beds often accumulate large amounts of clam tissue. The excess decaying clam biomass creates biological oxygen demand which can lead to "sour bottom", with localized hypoxia and (in extreme cases) mortality of otherwise healthy clams [and presumably other species]. Observations after dredging indicated numerous fish and invertebrate predators were consuming broken quahogs, which reduces the potential for hypoxia effects.

<u>Silty sand (Long Island, New York)</u>: Meyer et al. (1981) used SCUBA to observe effects of a small (4' wide) hydraulic clam dredge at 36' depth in a surfclam bed. The dredge formed trenches which were initially rectangular, as wide as the dredge, and ~ 9" deep. Mounds of sand were formed on either side of the trenches. The dredge raised a cloud of silt, which settled within 4 minutes. Two hours after dredging, slumping of the trench walls had rounded the depression. After 24 hours the dredge track was less distinct, appearing as a series of shallow depressions, and was difficult to recognize. The dredging attracted predators, with lady and rock

crab preying on damaged clams, and starfish, horseshoe crabs and moon snails attacking exposed but undamaged clams. By 24 hours after dredging, the abundance of predators appeared to have returned to normal, and the most obvious evidence of dredging was whole and broken clam shells without meat.

Sand (southern New Jersey): MacKenzie (1982) sampled benthic invertebrate assemblages in three ocean quahog beds with contrasting fishing histories: one had never been fished, one was actively fished for the two years prior to the October 1978 sampling, and one had been fished for about a year but then abandoned in May-June 1978. All three beds were in sandy sediments in ~ 120' depths off southern New Jersey. No statistically significant differences were found among the areas in numbers of invertebrate individuals or species. There were also no clear differences in species composition. Hydraulic dredging thus did not appear to alter the invertebrate populations in these beds. Polychaetes and bivalves exposed by the dredging were presumed to be able to reburrow and survive.

Muddy sand (Delaware Bay): Experimental dredging conducted in Delaware Bay, NJ, in muddy sand decreased median grain size at one site, as fines were brought to the surface, but grain size increased at another site where fines were presumably washed away. Sorting coefficient increased at both sites. In addition, dredging lowered the average density of benthic fauna (by 59%), and decreased the number of species present (Ismail 1985). The two species that disappeared, however, were found infrequently and only in low numbers before the experimental fishing. Within 3-6 months the number of species returned to pre-dredging and within 3-10 months diversity and total abundance recovered.

National and International Studies

Sand and sand/mud (Nova Scotia): Medcof and Caddy (1971) completed scuba observations to compare effects of hydraulic dredges to non-hydraulic dredges with teeth in shallow water (7-12 m) sand inlets in south Nova Scotia. On sand and sand-mud habitats, hydraulic dredges left smooth tracks with steeply cut walls that were an average of 20 cm deep and slowly filled in by slump, whereas non-hydraulic dredges left tracks that were 3-10 cm deep and had a raked appearance. In addition to physical effects, hydraulic clam dredging reduces the diversity and abundance of benthic fauna within its path (Kaiser et al. 1996b, Pranovi and Giovanardi 1994).

Sand (various locations in Europe): Dredging removes seafloor features, leaves trough marks, lowers sediment consolidation and resuspends sediments (Brambati and Fontolan 1990, Pickett 1973, Hall 1994). Based on physical alterations from hydraulic dredging in the Thames estuary, United Kingdom, Pickett (1973) hypothesized that impacts are likely only detrimental in confined, sheltered areas where sand is not moved or replaced rapidly by natural processes. Similarly, Hall et al. (1990) comment that localized effects are likely to persist only if the habitat and/or fauna is immobile or if the affected area is large relative to the undisturbed area. However, Brambati and Fontolan (1990) concluded that in the Gulf of Venice, dredging can cause an increase in erosion and offshore transport of sediments even in relatively calm sea conditions. Experimental dredging in 7 m water depth over sandy, rippled sediment in a Scottish sea loch significantly reduced the number of individuals and proportion of benthic species and left dead and damaged invertebrates in the dredge track (Hall et al. 1990).

Muddy sand (South Carolina): Maier et al. (1995) studied differences in turbidity, benthic infauna and fishes caused by mechanical elevator dredges in muddy sand tidal creeks in South Carolina. Sediment plumes extended up to 2 m into the water column but only persisted for a few hours after each dredging pass. Although turbidity levels within the sediment plumes exceeded those documented to inhibit feeding in southern flounder, croaker, pinfish and brown shrimp, authors surmised that areas affected by the plumes were small enough that they could be avoided by mobile fish.

Seagrass beds (Tampa Bay, Florida): Godcharles (1971) conducted experimental hydraulic dredging in seagrass beds, *Caulerpa* algae beds, and sand bottoms in Tampa Bay, FL. The dredge water jets were capable of penetrating the sediments to a depth of 18 inches and left trenches that were 12 inches deep. Virtually all attached vegetation in the path of the dredge was uprooted leaving bare, open bottom areas. Dredges also uncovered a deep stratum of broken shells. Trenches were visible from 1-86 days, and while most sediments had hardened within a month, some remained soft over 500 days. Differences in silt/clay content between tracks and undisturbed areas became negligible after a year, but seagrasses had still not recolonized. Based on these findings, the author recommend a complete prohibition of dredging in areas with seagrasses and algae.

The time it takes for benthic fauna to recover to pre-dredge conditions is highly variable. In silty, intertidal habitats in Auchenciairn Bay, Scotland, dredging resulted in a decrease in the number of species and number of individuals within the dredge tracks (Kaiser et al. 1996b). Recovery took 56 days. Recovery of the benthic community studied by Hall et al. (1990) recovered fully within 40 days. Authors note, however, that the recovery period was especially stormy and that active migration and passive suspension during storms might increase immigration and recruitment, thus diluting the dredging effects. On shallow (exact depths not provided) mudflats in Kent, decreased diversity and abundance of benthic fauna due to dredging took 7 months to recover (Kaiser et al. 1996b). In subtidal (7 m) mud habitats in Tampa, FL, hydraulic dredging dislodged polychaete tubes, and reduced the number of species by 40%, densities of macroinfauna by 60%, and total biomass of invertebrates by 90% (Connor and Simon 1979). This community took 6-12 months to recover. While studying effects of hydraulic dredging in mud sediments, Pranovi and Giovanardi (1994) found that recovery of benthic fauna in previously undredged sites took longer than fauna in previously dredged sites. The authors hypothesized that if an area is continually disturbed, it might develop an increased capacity for recovery, but that the recovery might be to an altered state rather than to the true, pre-disturbed state. Thus, the recovery times stated above may be misleading if not interpreted with reference to historic benthic samples and fishing effort in the area.

Hydraulic dredges penetrate mud sediments up to 30 cm, flatten natural mounds and topography, and leave troughs in their path that have been shown to last anywhere from a few hours to 6 months (Connor and Simon 1979, Meyer et al. 1981). As the dredge moves along the seafloor, it also creates a turbidity plume behind the dredge that extends up to 1-2 m into the water column. These plumes can have sediment concentrations that are orders of magnitude higher than background levels, or equivalent to or greater than levels generated by storms, and persist from minutes up to hours (Ruffin 1995, Kaiser et al. 1996b). Dredging also breaks down the cohesive bonds in the sediment, thus increasing the likelihood of resuspension in the future. The immediate resuspension of sediments and increased likelihood of resuspension with future disturbances can lead to large scale redistribution of fine sediments and resorting of sediments by grain size (Ruffin 1995, Pranovi and Giovanardi 1994, Kaiser et al. 1996b).

HYDRAULIC CLAM DREDGES - Management Implications

Text to be inserted.

SEA SCALLOP DREDGES

SEA SCALLOP DREDGES - Description

In the open ocean, a large dredge is used to harvest sea scallops. Scallops inhabit sandy, gravelly, and cobble bottom, and live on the surface of the sea bed as epifauna. Scallops are mobile animals and can evade a dredge approaching too slowly. Therefore, scallop dredges have to be towed at speeds up to 2.5 m/sec. The scallop dredge includes a steel frame with a tongue with an eye, a blade with no teeth, and a bag. Scallop dredges are usually defined by the width of the dredge frame, the width or mouth opening of which ranges from 1 - 4.5 meters, with the weight of the dredge varying from 20 to 1000 kg. The New Bedford style dredge is usually between 4 and 4.5 meters wide. Scallop dredges used in Maine state waters are smaller, limited by law to widths of 5.5 to 8.5 feet (Dan Schick, Maine Dept. of Marine Resources, personal communication). The front of the steel frame of the dredge, called the bale, usually rides up off the bottom. The bottom of the frame is called the cutting bar and it tends to ride up off the bottom about four inches on flat, smooth bottoms. On rougher bottoms, the cutting bar will come in contact with the higher areas of the sea floor.

There is a chain sweep that attaches to the ends of the frame at the shoes, reinforced bottom pads. The bag of the dredge is known as a "ring bag" and is made of rings and chain-links on the bottom and webbing on top. Using a scallop dredge on hard bottom usually requires the addition of "rock chains" that run front to back, along with the side-to-side tickler chains used on all types of scallop dredges. The rougher the bottom, the more rock chains are used, to prevent rocks and boulders from getting into the ring bag. Selectivity of the dredge is controlled by the size of the rings in the ring bag. The smallest dredges are towed by 6 m vessels and hauled by hand. The largest scallop vessels, about 30 m in length, tow two 4.5 meter dredges, one from each side of the vessel, and use winches and navigational electronics to maintain high efficiency (DeAlteris 1998 and Smolowitz 1998).

SEA SCALLOP DREDGES - Fishing Trips

Over 24,000 of the trips reported for this gear type during 1995 – 2000 were analyzed. They were concentrated in coastal waters of eastern Maine, off Ipswich and Scituate, MA, in Cape Cod and Massachusetts Bays, from Cape Cod to the Great South Channel, on the northern and southern edges of Georges Bank, and over a large area of the mid-Atlantic shelf between Montauk Point, Long Island and the Virginia – North Carolina border (Figure 17). Dredging on the southern edge of Georges Bank is conducted primarily in depths of 40 – 50 fathoms. The highest concentration of fishing trips for this gear type (185 – 758 per 100 mi^2) occurred on the Maine coast, in the southwestern Gulf of Maine, and southeast of Cape Cod. Areas closed to scallop dredging in 1995 for groundfish management purposes are visible on Georges Bank.

SEA SCALLOP DREDGES - Impacts and Recovery

Studies in the Northeast Region

<u>Sand (Gulf of Maine)</u>: Photographic observations of fishing impacts over gravelly sand habitats in 56-84 m of water in the Gulf of Maine showed disruption of amphipod tube mats and decline in dominant megafaunal species (i.e., scallops, burrowing anemones and sabellid worms;

Langton and Robinson 1990). Photographs also showed piles of rock and shells, presumably formed when fishermen emptied the dredges after fishing, and a high presence of small polychaetes. Because the timing of the fishing was unknown, it was impossible to estimate recovery time.

Sand and mud (Mid-Atlantic): Submersibles were used in 1986-1988 to study environmental effects of commercial scallop dredging (and hydraulic clam dredging) on sand and mud bottoms of the Middle Atlantic shelf (Murawski and Serchuk 1989). Scallop dredges appeared to create less short-term disruption of sediments and benthic communities than did hydraulic clam dredges. There was also no evidence of scallop dredging leaving enough dead or injured biomass on the bottom to lead to hypoxia, as has been reported for clam dredging (see below). Less than 5% of all scallops observed in and near the dredge path were broken or mutilated. This incidental mortality was well below that observed in the Gulf of St. Lawrence, Canada, where Caddy (1973) had reported rates of at least 13-17%, with higher incidence in rocky areas than in sand. Murawski and Serchuk (1989) felt those higher mortality rates were probably due to both the crushing of scallops against rocks, and the heavier dredges used in rocky areas. In the Mid-Atlantic studies, scallop dredging did not lead to significant feeding aggregations as were seen in the tracks of hydraulic clam dredges. Predation on discarded scallop viscera did, however, appear to be an important pathway for energy transfer in demersal foodwebs. In 1988, after a year of moderate scallop landings (13,000 metric tons of meats), it was calculated that 26,000 MT of viscera were recycled as potential fish and invertebrate food (Murawski and Serchuk 1989). The potential value of discarded scallop shell as habitat was not discussed.

See section on Multiple Mobile Gears for information on effects of otter trawling and scallop dredging in various locations in the Northeast region.

National and International Studies

A few studies have attempted to elucidate long-term effects of dredging to habitat. Reise (1982) and Reise and Schubert (1987) compared benthic fauna in a scallop fishing ground in the Wadden Sea to historic (1920s) records of benthic fauna for the same area prior to commercial fishing. The sediments in the area in question ranged from mud to coarse sand and pebbles. Between the two sampling periods, 26 subtidal and 2 intertidal species had declined, and 23 species (more than half of which were polychaetes) had increased in abundance. Many of the species are presumed to have disappeared because of fishing impacts on specific habitats (i.e., overexploitation of oyster reefs and destruction of colonial polychaete reefs by shrimp fishery). The increase in polychaetes is attributed to an increase in coastal eutrophication. Hill et al. (1999) compared infaunal samples taken in the Irish Sea during the 1990s to those taken in the 1950s. Community composition overlapped between the two periods, but the dominant species had changed, the recent samples had a higher polychaete to mollusk ratio and higher abundances of tube-dwelling worms, sedentary chitons and bivalves, and the historical samples included high densities of burrowing bivalves and fragile echinoids that were absent in the recent samples. All of these studies indicate that long-term changes could have occurred as a result of dredging. However, without direct evidence, the reasons for the changes are speculative.

Gravel (Irish Sea): Bradshaw et al. (2000) sampled gravel habitats to depths as great as 70 m in the Irish Sea subject to varying levels of fishing intensity. Species composition was not affected by dredging, although abundance of some species was consistently higher on undredged sites (echinoids and crustaceans with brittle, hard tests), while other species with tough, protective shells (gastropods and hermit crabs) were consistently higher on dredged sites. The infaunal communities of the experimentally dredged plots were more similar to those in areas open to commercial dredging than to areas closed to commercial dredging since 1989. Furthermore, epifaunal abundance has increased continuously in closed areas since they were established. Authors conclude that dredging results in long-term effects on gravel habitats, but that some effects appear to be reversible.

Sand (Scotland): Eleftheriou and Robertson (1992) studied effects of experimental scallop dredging (with teeth) in a high energy sandy habitat in 10 m water depth in Scotland and found no significant effects on sediment deposition, organic carbon or chlorophyll content of the sediment, or abundance of mollusc or crustacean infauna. Large epifauna and burrowing sand eel *Ammodytes* were, however, killed in the path of the trawl.

Sand (Wales): Butcher et al. (1981) documented diver observations of scallop dredging in Jervis Bay, Wales, over large-grained firm white sand shaped in parallel ridges. The dredge was outfitted with teeth that extend up to 5 cm into the seafloor. Operation of the dredge flattened sand ridges and resulted in a sediment plume extending up to 5 m into the water column. Although the study did not include samples of the benthic infauna, the authors concluded that, because the sediment plume settled within 15 minutes, and because no long-term changes in scallop densities had occurred, dredging was having no long-term effects on the seafloor. The authors did not provide a description of water movement or depth in the study area.

Sand (New Zealand): Dredging broke down natural surface features (emergent tubes, sediment ripples), created grooves (2-3 cm deep) and resulted in a decrease in density for the common macrofauna in subtidal (24 m) sandflats (Thrush et al. 1995). Fauna recovered completely within a few months.

Mud and sand (Australia): In Queensland, Australia, experimental scallop dredging in mud and sand habitat penetrated up to 40-60 cm into the substrate, caused redistribution of fine sediments, and created turbidity plumes (1-2 m into the water column) of magnitudes up to 2-3 times that of storm conditions (Black and Parry 1994). Video observations showed that the sediment plume was entrained across the full width of the dredge, mostly by the cutterbar. As the dredge travelled across the irregular seabed, the cutterbar trimmed off the high regions, creating turbulent pulses of sediment. Smaller sediment plumes were also produced by the skids. The depth of disturbance was usually less than 2 cm (Black and Parry 1999). Dredging that was typical of normal commercial operations in its spatial extent, intensity, and duration reduced the abundance of 6 of the 10 most common benthic infaunal species (and increased the abundance of one); most species decreased in abundance by 20-30%. Dredging impacts became undetectable for most species following their next recruitment; most species recruited within 6 months, but a few still had not recruited after 14 months (Currie and Parry 1996). However, changes to benthic community structure (species composition) caused by dredging were small compared with differences between study areas with different soft substrates (Currie and Parry 1999).

Maerl beds (Clyde Sea, Scotland): Scallop dredging has been shown to cause extensive damage to living calcareous rhodophytes, one of the oldest marine macrophytes in the North Atlantic (Hall-Spencer and Moore 2000). A single passage of a scallop dredge killed 70% of the living maerl in its path and damaged most of the flora and megafauna to a depth of 10 cm beneath the maerl sediment surface. Recovery of this organism from disturbance is slow due to infrequent recruitment and very slow growth rates.

SEA SCALLOP DREDGES - Management Implications

Text to be inserted

OTHER (NON-HYDRAULIC) DREDGES

OTHER (NON-HYDRAULIC) DREDGES - Descriptions

Oyster or Crab Dredge/Scrape

Crabs are harvested during the winter months with dredges similar to oyster dredges. The oyster dredge consists of a steel frame 0.5-2.0 m in width, with an eye and "nose" or "tongue," and a blade with teeth. Attached to the frame is the tow chain or wire, and a bag to collect the catch. The bag is constructed of rings and chain-links on the bottom to reduce the abrasive effects of the seabed, and twine or webbing on top. The dredge is towed slowly (<1 m/sec) in circles, from vessels 7 to 30 m in length. Stern-rig dredge boats (» 15 m in length) tow two dredges in tandem from a single chain warp. The dredges are equipped with long teeth (10 cm) that rake the crabs out of the bottom. (DeAlteris 1998). The toothed dredge is also used for harvesting mussels (Hayes 1983).

Bay Scallop Dredge

Since scallops usually lie on the bottom, on clear bottoms no raking teeth are needed, and the dredge is actually quite a simple gear. The bay scallop dredge may be 1 to 1 1/2 meters wide and about twice as long. The simplest bay scallop dredge can be just a mesh bag attached to metal frame that is pulled along the bottom. For bay scallops that are located on sand and pebble ground, a small set of raking teeth are set on a steel frame, and skids are used to align the teeth and the bag (Sainsbury 1996).

Sea Urchin Dredge

Similar to a simple bay scallop dredge, the sea urchin dredge is designed to avoid damaging the catch. It consists of an up-turned sled-like shape at the front that includes several leaf springs tied together with a steel bar. A tow bail is welded to one of the springs and a chain mat is rigged behind the mouth box frame. The frame is fitted with skids or wheels. The springs act as runners, enabling the sled to move over rocks without hanging up. The chain mat scrapes up the urchins. The bag is fitted with a codend for ease of emptying. This gear is generally only used in waters up to 100 meters deep (Sainsbury 1996).

Mussel Dredge

Text to be inserted.

Quahog Dredge

Mahogany quahogs are harvested in eastern Maine coastal waters using a dredge that is essentially a large metal cage on skis with 6 inch long teeth projecting at an angle off the leading bottom edge (Pete Thayer, Maine Dept. of Marine Resources, personal communication). Maine state regulations limit the length of the cutter bar to 36 inches. The teeth rake the bottom and lift the quahogs into the cage. These dredges are towed by fairly small vessels over level bottom consisting of sand and sandy mud in depths of 30 feet to over 40 fathoms (Chenoweth and Dennison 1993 and Jay McGowan, Maine Dept. of Marine Resources, personal communication).

Clam Kicking

Clam kicking is a mechanical form of hard clam harvest practiced in North Carolina which involves the modification of boat engines so that the propeller is directed downwards instead of backwards (Guthrie and Lewis 1982). In shallow water the propeller wash is powerful enough to suspend bottom sediments and clams into a plume in the water column, which allows them to be collected in a trawl net towed behind the boat (Stephan et al. 2000).

OTHER (NON-HYDRAULIC) DREDGES - Fishing Trips

Mussel Dredges

Analyzed mussel dredge trips only totaled 440. Fishing (>11 trips) was almost completely limited to three inshore 10 minute squares in eastern Maine, one south of Cape Ann, one west of Monomoy Island on the south shore of Cape Cod, two in Narragansett Bay, and one in Delaware Bay (Figure 18).

Sea Urchin Dredges

Fewer than 1,000 trips were analyzed for this gear type during the six-year period. Sea urchins were harvested with dredges in the Gulf of Maine, primarily along the Maine coast and in Massachusetts Bay (Figure 19). Dredging east of Boston amounted to 12-167 trips per 100 $mi.^2$ A few trips were also reported at various offshore locations in the Gulf of Maine (deeper than 50 fathoms) south of 44°N latitude.

OTHER (NON-HYDRAULIC) DREDGES - Impacts and Recovery

Studies in the Northeast Region

Mud (Narragansett Bay, Rhode Island): For the most part, research on effects of mechanical dredging to mud habitat consists of short-term experimental manipulations. In Narragansett Bay, Rhode Island, Glude and Landers (1953) found that 6 m sandy, mud sediments, that had been fished with either a clamshell dredge or bullrake, appeared softer and more mixed, had a lesser odor of decomposition, and had fewer living bottom forms and tube worms. The appearance of the seafloor returned to pre-dredge conditions after 1-3 months. Recovery time for the species was not recorded.

Seagrass (Back Bay, North Carolina): Fonseca et al. (1984) observed significant reduction in eelgrass biomass and shoot number on both compacted sand and soft silt/clay sediments due to experimental dredging (hand pulled rakes) in a shallow marine lagoon in Back Bay, North Carolina. Even at low levels of effort, sand raking and mechanical dredging decreased seagrass biomass by 25% . Heavy effort reduced seagrass biomass by 65% and beds were still reduced by 35% after 2 years. Authors conclude that, because scallop harvesting occurs when eelgrass biomass is seasonally low and during peak settlement for scallops, which require eelgrass blades for attachment, it could have a potentially negative impact on the fishery.

Submerged aquatic vegetation (Chincoteague Bay, Virginia): Orth et al. (1998) used aerial photography and field sampling to describe effects on submerged aquatic vegetation (SAV) in Chincoteague Bay, Virginia, caused by mechanical dredging. Dredges left large (29-36 m) scars excavated 10-20 cm into the sediment. Field surveys documented 70-100% cover by SAV outside the scars, 15% cover at the edges of the scar, and very low to no cover within the scar. The loss of sediment inside the scars is sustained by the lack of SAV, which in turn is sustained by the loss of sediment. Thus, recovery was expected to take about 5 years.

Oyster bed (Piscataqua River): Oyster dredging degrades oyster habitat by flattening the reef profile and ultimately removing reefs (Rothschild 1994). Langton (1998) sampled invertebrates throughout an oyster bed in the Piscataqua River that divides the states of Maine and New Hampshire. On one side of the state line, the oyster bed is dredged. On the other side, the oyster bed is not dredged. There were no significant differences in invertebrate abundances between the two sides, but polychaetes were slightly higher on the unharvested side, while the crustacea and mollusks were more numerous on the harvested side. It should be noted that the unharvested side might provide a supply of recruits and/or immigrants that could mask any effects of dredging on the harvested side of the river.

National and International Studies

Sand (Adriatic Sea): Pranovi et al. (2000) used sandy sediment areas around shipwrecks (as unfished area) in the Adriatic Sea for experimental fishing with Rapido trawls (box dredge with teeth). Although fishing removed debris from the seafloor surface and resulted in a 50% reduction of epifaunal organisms, densities and biomass increased again after only 1 week. However, a comparison of the shipwreck control areas to fishing areas demonstrated that several taxa were significantly less abundant in the fished areas, which authors suggest indicate a long-term cumulative effect not evident from the short-term experimental study design, thus bringing into question the conclusions made in the studies described above. The authors also recognize that the presence of the wreck in the control area could modify the local benthic community, thus confounding results.

Silt (Gulf of Venice, Italy): Rapido trawls (box dredges with teeth) used in silty areas of the Gulf of Venice, Italy, erased infaunal burrow openings, decreased slow moving/sessile benthos, and increased mobile scavengers (Hall-Spencer et al. 1999). Authors did not discuss recovery times. In Port Phillip Bay, Australia, no significant differences in macroinvertebrates were found between pre- and post-dredged samples in Port Phillip Bay, Australia (dominated by polychaetes [78%] and crustaceans [13%]) taken from mud habitat (depths not provided; McShane 1981). It is important to note, however, that cumulative effects of intense fishing, which had occurred in the study area for close to 20 years (since 1963) may have altered the communities such that effects of experimental dredging were masked.

Oyster bed (North Carolina): Lenihan and Peterson (1998) studied oyster loss in the Neuse River Estuary (North Carolina) and found that over the course of one season, dredging removed the top 30% of the oyster reef. Although the deeper 70% of the reef was left in place, the part that remained fell below the line of stratification during summer months and was thus subject to mortality from oxygen depletion (which has increased in frequency with nutrient input). Thus, the combination of fishing and other anthropogenic activities are acting cumulatively to degrade the system.

OTHER (NON-HYDRAULIC) DREDGES - Management Implications

Text to be inserted

RAKES AND TONGS

RAKES AND TONGS - Description

Rakes and tongs are used to harvest shellfish such as oysters and clams from shallow coastal waters. Generally, this type of gear is manually operated by a fisherman from a small boat. Below are the most common rakes and tongs used in waters of the Northeast.

Rakes

A bull rake is used to harvest hard clams and consists of a long shaft with a rake and basket attached. The length of the shaft can be variable but usually does not exceed three times the water depth. The length and spacing of the teeth as well as the openings of the basket are regulated to protect juvenile clams from harvest (DeAlteris 1998). Rakes are typically fished off the side of a small boat.

Tongs

Tongs are more efficient device for harvesting shellfish. Shaft-tongs are a scissor-like device with a rake and basket at the end of each shaft. The fisherman stands on the edge of the boat and progressively opens and closes the baskets on the bottom gathering the shellfish into a mound. The tongs are closed a final time, brought to the surface, and the catch emptied on the culling board for sorting. The length of the shaft must be adjusted for water depth. Oysters are traditionally harvested with shaft tongs in water depths up to 6 meters, with shaft tongs 8 meters in length (DeAlteris 1998). Patent tongs are used to harvest clams and oysters and are opened and closed with a drop latch or with a hydraulic ram and require a mechanized vessel with a mast or boom and a winch (DeAlteris 1998). Patent tongs are regulated by weight, length of teeth, and bar spacing in the basket.

RAKES AND TONGS - Fishing Trips

No available information. Rakes and tongs are not used in federal waters.

RAKES AND TONGS - Impacts and Recovery

No available information.

RAKES AND TONGS - Management Implications

Not considered in this report.

HAUL SEINES

HAUL SEINES - Description

Haul seining is a general term describing operations where a net is set out between the surface and sea bed to encircle fish. It may be undertaken from the shore (beach seining), or away from shore in the shallows waters of rivers, estuaries or lakes (Sainsbury 1996). Seines typically contact the sea bottom along the lead line. Additionally the net itself may scrape along the bottom as it is dragged to shore or the recovery vessel. Below are the most common seines used in waters of the Northeast.

Beach Haul Seines

The beach seine resembles a wall of netting of sufficient depth to fish from the sea surface to the sea bed, with mesh small enough that the fish do not become gilled. A floatline runs along the top to provide floatation and a leadline with a large number of weights attached ensures that the net maintains good contact with the bottom. Tow lines are fitted to both ends. The use of a beach seine generally starts with the net on the beach. One end is pulled away from the beach, usually with a small skiff or dory, and is taken out and around and finally back in to shore. Each end of the net is then pulled in towards the beach, concentrating the fish in the middle of the net.

This is eventually brought onshore as well and the fish removed. This gear is generally used in relatively shallow inshore areas. (Sainsbury 1996)

Long Haul Seines

The long-haul seine is set and hauled in shallow water estuaries from a boat (about 15 m). The net is a single wall of small mesh webbing (< 5 cm), and is usually greater than 400 m in length and about 3 m in depth. The end of the net is attached to a pole driven into the bottom, and the net is set in a circle so as to surround fish feeding on the tidal flat. After closing the circle, the net is hauled into the boat, reducing the size of the circle, and concentrating the fish. Finally, the live fish are brailed or dip-netted out of the net. (DeAlteris 1998)

Stop Seines

These are seines that are used in coastal embayments to "shut off" schools of fish such as herring, once they enter the embayment.

Danish and Scottish Seines

Danish or Long seining or anchor dragging was developed in the 1850s prior to the advent of otter trawling. The Danish seine is a bag net with long wings, that includes long warps set out on the seabed enclosing a defined area. As the warps are retrieved, the enclosed area (a triangle) reduces in size. The warps dragging along the bottom herd the fish into a smaller area, and eventually into the net mouth. The gear is deployed by setting out one warp, the net, then the other warp. On retrieval of the gear, the vessel is anchored. This technique of fishing is aimed at specific schools of fish located on smooth bottom. In contrast to Danish seining, if the vessel tows ahead while retrieving the gear, then this is referred to as Scottish Seining or fly-dragging. This method of fishing is considered more appropriate for working small areas of smooth bottom, surrounded by rough bottom. Scottish and Danish seines have been used experimentally in U.S. demersal fisheries. Space conflicts with other mobile and fixed gears, have precluded the further development of this gear in the U.S., as compared to Northern Europe (DeAlteris 1998).

HAUL SEINES - Fishing Trips

The only available information was for Danish and Scottish seines. During 1995 – 2000, Danish seines were used primarily in nearshore waters in Raritan Bay and south along the New Jersey coast to Cape May and Delaware Bay, where the number of reported trips in five 10 minute squares ranged between 10 and 87 (Figure 20). Trips reported east of the continental shelf and in the Gulf of Maine were probably erroneous. Scottish seine trips (55 – 149 per 100 mi^2) were reported in coastal waters east and south of Cape Cod (Figure 21). A few trips were also reported in offshore areas in the Gulf of Maine, on Georges Bank, and southeast of Georges Bank. Less than a thousand trips were reported for these two gear types.

HAUL SEINES - Impacts and Recovery

No available information.

HAUL SEINES - Management Implications

Not considered in this report.

HAND HARVEST

HAND HARVEST - Description

Hand harvest describes activities that capture numerous species such as lobsters, scallops, urchins, crabs, conch and other invertebrates by hand. Below are the most common hand harvest devices used in waters of the Northeast region.

Hand Hoes

Intertidal flats are frequently harvested for clams and baitworms using hand-held hoes. These are short handled rake-like devices which are often modified gardening tools (Creaser et. al. 1983). Baitworm hoes have 5 to 7 tines, 21 to 22 cm in length for bloodworms and 34 to 39 cm for sandworms. Clam hoes in Maine typically have 4 to 5 tines, 15 cm long (Wallace 1997).

Diving

By either free diving or using SCUBA, divers collect crustaceans, mollusks and some reef fish in shallow water. Most often a support vessel is used to transport the diver(s) to the fishing site and carry the landings to port. In deeper waters, helmet diving systems are used and the diver is tethered to the vessel with air pumped from the surface. This method is most often used by sea urchin divers and some lobster divers. Divers normally use small rakes or hoes to scrape creatures off rocks or dig them out of the seabed. Generally, the catch is placed in bags which are either towed to the surface by the boat or floated to the surface using an air source and a lift bag. Divers rarely work deeper than about 50 meters (Sainsbury 1996).

HAND HARVEST - Fishing Trips

No available information. Hand harvesting is not practiced in federal waters.

HAND HARVEST - Impacts and Recovery

No available information.

HAND HARVEST - Management Implications

Not considered in this report.

MULTIPLE MOBILE GEARS

MULTIPLE MOBILE GEARS - Description

See individual gear descriptions above.

MULTIPLE MOBILE GEARS - Fishing Trips

See individual gear descriptions above.

MULTIPLE MOBILE GEARS - Impacts and Recovery

Studies in the Northeast Region

In many geographic regions, the same areas within fishing grounds are fished by a number of different mobile gears including otter trawls, beam trawls, mechanical dredges and/or hydraulic dredges (ICES 1993, DeAlteris et al. 1999, Kaiser 2000). Within these areas, it is difficult to differentiate effects on habitat and biota from any single specific gear type, but an opportunity exists to examine cumulative effects of multiple gear types. For example, in Narragansett Bay, Rhode Island, shallow, sand substrate subject to daily disturbance by natural physical processes recovered almost immediately, despite the impacts of multiple gear types. In deep, mud substrate, where natural disturbances are rare, recovery from fishing took more than 60 days.

Otter trawling and scallop dredging in sand/shell (Swans Island Conservation Area, northwest Gulf of Maine): In July 1993, a remotely operated vehicle (ROV) was used to compare conditions in and outside the Swans Island Conservation Area in northern Gulf of Maine; the area had been closed to mobile fishing gear in 1983 (Auster et al. 1996). Video transects indicated that on sand/shell bottom, habitat complexity was provided mostly by sea cucumbers and by depressions created by mobile fauna. Both of these habitat features were significantly less common outside the closed area; this was attributed to harvesting or bycatch of the structure-providing species (Auster et al. 1996).

Otter trawling and scallop dredging in sand/shell (Stellwagen Bank, southwest Gulf of Maine): Side-scan sonar mapping in 1993 showed that storm-created coarse sand ripples (30-60 cm between crests and 10-20 cm high) were disturbed by scallop dredging (Auster et al. 1996). Sand waves (15-35 m between crests) had troughs filled with shell deposits that increased habitat complexity; there was evidence of dispersion of these deposits by mobile gear. The largest bottom disturbances in this area are created by strong "Northeastern" storms, but these are of very low frequency (i.e., not every year) compared to disturbances by mobile gear. ROV observations on the bank's crest (32-43 m depths) in July 1993 indicated otter trawls and scallop dredges were removing aggregations of an emergent hydroid which attaches to the coarse sand. Benthic microalgal cover was also disturbed. Several shrimp species which were abundant in the hydroid aggregations were not observed in a swath from which hydroids had been removed by fishing gear. In July 1994, no hydroids were seen; an ascidian species (which slightly increased bottom complexity) was widely distributed, but was not present in otter trawl paths.

Otter trawling and scallop dredging in sand (Closed Area II, Georges Bank): The southern half of Closed Area II was sampled in June 1999, 4½ years after it had been closed to fishing (Almeida et al. 2000). Preliminary conclusions from sampling paired stations just inside and outside the closed area included: 1) species composition, species diversity and richness of trawl-caught organisms inside the closed area were similar to those immediately outside the area; 2) numbers and biomass of haddock and yellowtail flounder were greater inside; 3) most other groundfish species had similar abundances inside and outside; some were slightly more abundant outside; 4) size distributions of fish and megainvertebrates were similar inside and outside, except sea scallops were significantly larger inside; and 5) total organic carbon in sediments was generally higher inside, and was related to sediment grain size. From analysis of videotapes and still photographs, greater abundance of emergent sponges inside the closed area was the only significant difference in microhabitat resources attributable to gear effects. It was speculated that the lack of major differences inside and outside the closed area was probably due to the area's sandy habitat type.

Otter trawling and scallop/mussel dredging in sand (Narragansett Bay, RI): DeAlteris et al. (1999) analyzed data from a 1995 side-scan sonar survey to assess effects of otter trawls and scallop/mussel dredges in lower Narragansett Bay. The dredges are 2-3 m wide, are used primarily on pebble and cobble bottoms at the bay's edges, and represent less than 5% of the total fishing effort; the trawls are used mostly in sand and mud habitats. Video surveillance showed that the dredges disturbed the bottom considerably more than did the trawls. Dredges moved gravel, pebbles and boulders; flattened sand and mud bedforms; and re-suspended fine sediments. Scars from otter trawl doors were evident in the side-scan sonar images, and were confined to deep mud-bottom channels. The total area scarred was estimated to be 0.12 km^2, or 0.9% of the area surveyed. The longevity of scars was studied by using SCUBA to monitor trenches, approximately 15 cm deep and 1.2 m long, which were dug into the bottom. Scars at a 7 m deep sandy site lasted 1-4 days; scars at a 14 m deep mud site persisted more than 60 days, and were occupied by rock crabs. A quantitative model was developed to compare the magnitude and frequency of trawling and dredging impacts to those of natural physical and biological disturbances. In shallow sandy areas, where sediments are eroded daily, added impacts of fishing gear may be inconsequential. At the deeper mud-bottom site studied, erosion was predicted to occur less than 5% of the time, and gear impacts would be relatively larger and longer-lasting.

Scallop dredging and otter trawling in gravel (northeastern Georges Bank): Valentine and Lough (1991) reported, based on observations from 1986-1990, that gravelly areas of the Northern Edge and Northeast Peak which were unfished (due to the presence of large boulders) had a biologically diverse community with abundant attached organisms. Conversely, on much of eastern Georges Bank the seabed had been disturbed and overturned by dredging and trawling, the attached epifaunal community was sparse, and the bottom was smoother. Where abundant, the epifauna increased bottom complexity, and it was thought that the epifauna might be an important component of fisheries habitat. Both trawled and untrawled gravel habitats were considered important for survival of juvenile cod, however.

Scallop dredging and otter trawling in gravel (Georges Bank): In 1994 Collie et al. (1997, 2000) sampled two shallow (42-49 m) sites and three deep (80-90 m) sites which had varying histories of disturbance (as determined by side-scan sonar, bottom photographs and fishing records) by scallop dredging and otter trawling. Only one shallow and one deep site were classified as disturbed, but the other shallow site may have been previously fished (it had no boulders large enough to prevent fishing), and one of the two deep "undisturbed" sites had evidence of light dredging disturbance. Samples of megabenthic organisms taken with a 1 m wide Naturalists' dredge showed lower densities, biomass, species richness and species diversity at the disturbed sites than the undisturbed sites (Collie et al. 1997). Small polychaetes, shrimps and brittle stars were among the species that were less abundant or absent at the dredged sites. Some of these species are known prey of demersal fish on Georges Bank. Analysis of videos and still photographs (Collie et al. 2000) revealed the undisturbed sites had significantly higher percent cover of the colonial, rock-encrusting polychaete, *Filograna implexa*, and bushy colonial epifauna such as bryozoans and hydroids. This emergent epifauna was considered to provide a complex habitat for mobile invertebrates and small fish at the undisturbed sites. It was concluded that fishing disturbance was the most likely explanation for the reduction in complexity and species diversity at the disturbed sites, but that a more experimental approach, directly controlling the level of disturbance, would be needed to prove cause-effect relationships (Collie et al. 2000).

Trawling and scallop dredging in gravel (Gulf of Maine): Video transects taken by Auster et al. (1996) in and near Swans Island Conservation Area in the northern Gulf of Maine indicated the dominant features on cobble/shell bottom were sea cucumbers and emergent attached epifauna (hydroids, bryozoans, sponges, serpulid worms). There was significantly less cover provided by the emergent epifauna outside than inside the closed area. At the area's border, swaths cleared in the epifauna cover by scallop dredges and trawl doors were evident.

National and International Studies

Multiple mobile gears and sediments (Nova Scotia): Side scan sonar and video observations were used to document the cumulative effects of various mobile fishing gears used in Bras D'Or Lakes and St. Peters Canal, Nova Scotia (Canadian Department of Fisheries and Oceans 1993). Water depths range from 10 - 500 m, and bottom sediments include rich organic mud, clay, pebbly mud, well-sorted sand, gravel and boulders. Groundfish trawls were responsible for most observed disturbance because of their widespread use, but hydraulic clam dredges disrupted more sediment per unit area than either trawls or scallop rakes. Trawls produced thick suspended sediment plumes, overturned sand dollars, crabs and gastropods, dislodged anemones and cucumbers, plowed polychaetes, and crushed brittle stars. Scallop rakes dug deeply into sediment and dislodged benthic epifauna and infauna. Long-term effects include change in grain size and texture of the seabed.

Trawls and dredges, variety of sediments (Gulf of St. Lawrence): Caddy (1968, 1973) completed diver observations of tracks from commercial trawls and dredges (both offshore and inshore) in sand habitat overlain by glacial gravel with occasional boulders in the Gulf of St. Lawrence. In fished areas, gravel fragments were less frequent, boulders were dislodged and overturned, 13-17% of scallops suffered incidental mortality, and predatory fish and crab abundances were 3-30 times higher than unfished areas. No information on recovery was recorded.

Trawling and pots/traps (south coast of England): Kaiser et al. (2000) sampled three areas along the south Devon coast in England: one area was open to all fishing, one was open to draggers part of the year but pots/traps year round, and one was only open to pots/traps. Sediments were characterized as fine sand, coarse-medium sand and medium sand. Depths sampled were 15-17 m and 53-70 m. Areas closed to draggers had higher total biomass, and higher abundances of emergent fauna (i.e., soft corals and hydroids) that increased habitat complexity. Areas open to draggers were dominated by smaller-bodied fauna and scavenging taxa. The authors concluded that high fishing effort had degraded the topographic complexity of the seabed habitat, possibly causing the biological community to be in an alternative stable state. In contrast, Hall et al. (1993) found no differences in benthic fauna in the North Sea along a gradient of fishing using distance from shipwrecks as a proxy for fishing intensity. Rather, abundance was strongly related to sediment characteristics.

Trawling and ??? in mud (Gulf of Carpentaria, Australia): Harris and Poiner (1991) compared 1964 surveys taken from mud transition areas in water depths of 17 - 21 m in the Gulf of Carpentaria, Australia prior to commercial fishing, with 1985/86 surveys taken in the same areas after 20 years of commercial fishing. Between the sampling periods, total demersal fish abundance decreased from 897 fish/ha to 283 fish/ha, 18 of 82 species (found mostly at the deeper sampling depth) decreased, and 12 of 82 species (bentho-pelagic species found mostly at nearshore sites) increased. There were no significant correlations between fishing effort and changes in species abundance, but the data suggest the decreased abundance in 18 taxa was a result of fishing effort and bycatch. The authors speculate that the increase in the 12 bentho-pelagic taxa might be related to disposal of fish bycatch.

MULTIPLE MOBILE GEARS - Management Implications

Text to be inserted.

BOTTOM-TENDING STATIC GEAR

POTS AND TRAPS

POTS AND TRAPS - Description

The essential element of any pot or trap is a non-return device, that allows the animal to voluntarily enter the gear, but makes escape difficult, if not impossible. The terminology used to identify pots and traps is confusing, as both terms have been applied to the small portable, 3-dimensional gear. In this document, a pot is defined as a small, portable, 3-dimensional device, whereas a trap is identified as large, permanent, 2-dimensional gear. Generally, pots and traps are deployed on the sea bottom. Pots may be strung together in a "trawl" and these trawl lines may also have contact with the sea bottom particularly when the pots are retrieved. Below are the most common pot and trap gear used in waters of the Northeast region.

Pots

The principle of operation of pot gear is that animals enter the device seeking food, shelter, or both. The non-return device, while allowing the animal to enter the gear, restricts escape. The holding area retains the catch until the gear is retrieved. Bait is placed in a bag or cage within the pot. Culling rings or escape vents are added to the exterior wall of the pot to allow for the release of undersize sub-legal animals. Finfish, shellfish and crustaceans are all harvested with pots in the estuarine, coastal and offshore waters of the U.S.

Lobster Pots

Clawed lobsters are harvested with pots in the waters of the northwest Atlantic. The pots were previously constructed of wood lath over steam bent frames, but because wood boring bivalves destroy wood, in many cases vinyl coated wire pots have replaced them (DeAlteris 1998). Cost is another factor leading to the switch to vinyl coated wire pots. The pots are typically divided into two sections. Lobsters enter the pot into the "kitchen area," via either of two funnels in response to the bait, then move into the "parlor" area via a second funnel. Escape vents, sized to minimize the retention of sub-legal lobsters are occasionally installed in both areas of the pot. The pots are fished individually or in "trawls" attached to a mainline in shallow water, and only in trawls of 20-50 pots in deep water. Buoys and lines mark both the single pots, and the ends of the trawls of pots. Fishermen haul pots either by hand in shallow water, or use a hydraulically powered pot hauler in both shallow and deep water. The pot hauler was a significant mechanization introduced into the pot fishery that allowed for the development of deep-water fisheries.

Crab pots

The crab fisheries conducted in the inshore waters of the mid- and south Atlantic regions also use a wire mesh pot. The design of the pot incorporates two sections, an "upstairs" and "downstairs." Crabs attracted by bait, enter the "downstairs" via one of two-four entrance funnels. Once in the pot, the escape reaction is to swim upward, so a partition with two funnels separates the two sections. The "upstairs" section serves to hold the catch for harvest. Escape vents or cull rings may be installed in the pot to reduce juvenile by-catch. Crab pots are always fished as singles and are hauled by hand from small boats, or with a pot hauler in larger vessels. Crab pots are generally fished after an overnight soak, except early and late in the season (DeAlteris 1998).

[Need to say something about offshore red crab fishery. Pots used in this fishery must be different in design and certainly in use from pots used in coastal waters to capture rock crabs and blue crabs].

No description of conch/whelk pots, eel pots, hagfish pots, or shrimp pots. Skip them?

Traps

A trap is generally a large scale, 2-dimensional device that uses the seabed and sea surface as boundaries for the vertical dimension. The gear is fixed, that is installed at a location for a season, and is passive, as the animals voluntarily enter the gear. Traps consist of a leader or fence, that interrupts the coast parallel migratory pattern of the target prey, a heart or parlor that leads fish via a funnel into the bay section, and a bay or trap section that serves to hold the catch for harvest by the fishermen. The non-return device is the funnel linking the heart and bay sections. The bay, if constructed of webbing, is harvested by concentrating the catch in one corner, a process referred to as "bagging" or "hardening" the net." The catch is removed by "brailing," with a dip net. The advantages of traps are that the catch is alive when harvested, resulting in high quality, that the gear is very fuel efficient, and that there is the potential for very large catches. The disadvantages are that the initial cost of the gear is high, that there is competition for space by other users of the estuarine and coastal ecosystem, and finally that the fish must pass by the gear to be captured, so any alterations in migratory routes will radically affect catch.

Fish Pound Nets

Pound nets are constructed of netting staked into the sea bed by driven piles (Sainsbury 1996). Pound nets have three sections: the leader, the heart, and the pound. The leader (there may be more than one) may be as long as 400 meters and is used to direct fish into the heart(s). One or more hearts are used to further funnel fish into the pound and prevent escapement. The pound may be 15 meters square and is the hold for the fish until the net is emptied. These nets are generally fished in waters less than 50 meters deep. Pound nets are also used to catch crabs.

Fyke and Hoop Nets

Constructed of wood or metal hoops covered with netting, hoop nets are long (2.5 - 5 meter) "Y-shaped" nets, with wings at the entrance and one or more internal funnels to direct fish inside, where they become trapped. Occasionally, a long leader is used to direct fish to the entrance. Fish are removed by lifting the rear end out of the water and loosening a rope securing the closed end. These nets are generally fished to about 50 meters deep (Sainsbury 1996).

On a smaller scale, a fyke trap is a small, unbaited cylindrical pot that includes the addition of a leader and heart to direct migrating fish into the funnel of the pot. This gear is set in shallow ponds and estuarine embayments for animals migrating in this habitat. The leader, constructed of webbing supported by stakes is only 10-30 m in length and 1-2 m in height. The trap is cylindrical, constructed of hoops 1-2 m in diameter, surrounded by webbing with 1-2 funnels, non-return devices, leading into the conical holding area (DeAlteris 1998).

Weirs

In Maine, Nova Scotia, and Alaska, large traps constructed of stakes set so close to each other, that they form a fence are referred to as weirs (DeAlteris 1998). The target species are migrating small pelagic fishers including herring and sardines. Sometimes the design is asymmetric so as to only capture fish migrating in one direction.

Shallow Floating Traps

In New England, because of the rocky shoreline and shallow subtidal environment, stakes can not be driven into the bottom, so the webbing is supported by floats at the sea surface, and held in place with large anchors. These traps are locally referred to as "floating traps." The catch, design elements and scale of these floating traps is similar to pound nets (DeAlteris 1998).

The floating trap is designed to fish from top to bottom, and is built especially to suit its location. The trap is held in position by a series of anchors and buoys. The net is usually somewhat "T-shaped," with the long portion of the net (the leader net) designed to funnel fish into a box of net at the top of the T. The leader net is often made fast to a ring bolt ashore (Sainsbury 1996).

POTS AND TRAPS - Fishing Trips

Lobster pots dominated the total number of reported pot trips, accounting for 93.2% of all the trips that were analyzed. The distribution of all pot fishing trips (Figure 22) therefore looked very much like the distribution of lobster pot trips (Figure 23) even though it included data for crab pots, whelk/conch pots, and fish pots. Trap gears described above are used almost exclusively in inshore state waters and are therefore not represented in the vessel trip report data.

Lobster Pots

A large number of lobster pot trips (almost 178,000) were analyzed, many more than for any other gear type used in the study area except otter trawls and handlines. Heavy use of lobster pots (2,382-8,694 trips per 10 minute square) was reported on the central Maine coast, in extreme southern Maine and NH, between Cape Ann and Scituate, MA, off the tip of Cape Cod, in RI coastal waters, and east of Sandy Hook, NJ (Figure 23). At least 288 lobster pot trips per 100 mi^2 were reported along most of the Gulf of Maine coast. Fewer numbers of trips (10 – 287) were made in a large number of squares in offshore Gulf of Maine waters, on Georges Bank, in deep water (>50 fathoms) on the edge of the shelf on Georges Bank, off southern New England, and in the mid-Atlantic region.

Fish Pots

This was a reasonably well-represented gear type, with almost 8,000 trips analyzed. With the exception of a few trips in the Gulf of Maine, fish pot trips were primarily made in southern New England, the New York Bight, and along the coast of New Jersey and the Delmarva peninsula from Little Egg Inlet to Chincoteague Inlet (Figure 24). The majority of trips were made in the NJ-Delmarva area. The highest concentration of trips (129 – 420 per 100 mi^2) in southern New England was in Buzzards Bay and Nantucket Sound.

Crab Pots

Crab pot trips occurred in fairly discrete groupings dispersed over a wide area in shallow and deep water (Figure 25). The total number of trips analyzed for this gear type during 1995 – 2000 was 1,050. A few trips (1-8) were made to areas beyond the 50 fathom contour, especially on the southern edge of Georges Bank. The highest densities of crab pot trips (45-136 per 100 mi^2) were made inside the barrier islands at Cape Hatteras, east of Cape Ann, and in Penobscot Bay, Maine. Blue crabs are harvested in nearshore waters of the mid-Atlantic, rock crabs in southern New England and the Gulf of Maine, and red crabs in deep water along the shelf break.

Conch/Whelk Pots

The two primary areas where this gear type was deployed during 1995 – 2000 were on the south shore of Cape Cod and on in the inner continental shelf from Little Egg Inlet, New Jersey, south to North Carolina (Figure 26). The total number of trips analyzed for this gear type during 1995 – 2000 was 1,700. A few trips (1 – 19) were reported in deep water beyond the 50 fathom depth contour off the mid-Atlantic states. There were a few 10 minute squares in coastal waters where the number of trips reached 67 – 241 per 100 $mi.^2$

POTS AND TRAPS - Impacts and Recovery

Pots and traps are considered to be less damaging than mobile gear, because they are stationary in nature, and thus, come into direct contact with a much smaller area of the seafloor (Eno et al. 2001, Stewart 1999). Traps affect habitat when they settle to the bottom and when they are hauled back to the surface. While soaking, traps and pots with buoy lines of insufficient length may bounce or drag along the seafloor during rough seas. This movement will increase the amount and areal extent of damage. In some locations, traps are strung together by trotlines or longlines. These trotlines may cause further damage during retrieval by catching and shearing organisms if they are dragged along the bottom. Grappling hooks used to retrieve pots and traps can also cause damage by scraping the benthos.

Physical damage from pots is highly dependent on habitat type. Sand and soft sediments are less likely to be affected, whereas reef-building corals, sponges, and gorgonians are more likely to be damaged because of their three-dimensional structure above the seafloor (Quandt 1999). Damage by traps also makes coral more susceptible to secondary infections.

Although pots and traps might be considered less damaging to habitat than mobile gears, lost pots can have considerable effects on populations of fish and crustaceans. Bullimore et al. (2000) observed traps left out off the coast of Wales to fish for 398 days and reported that lost pots continued to fish for as long as they were left out, even though the bait was gone after 13-27 days. In south Florida, Sutherland et al. (1983) completed a submersible survey of derelict trap/pots following the closure of the trap fishery in the state. Traps set either singly or in lines, and most were set within 20-45 m of a coral reef and rock ledge. Of 23 derelict/ghost traps, 15 were on sand or algal flats, 4 were on high profile reef, and 4 were in live bottom area.

Studies in the Northeast Region

No available information.

National and International Studies

Crustacean pots, variety of sediments (Great Britain): Eno et al. (2001) observed effects of crustacean pots set in water depths from approximately 14-23 m over a wide range of sediment types in Great Britain: mud communities with sea pens, limestone slabs covered by sediment, large boulders interspersed with coarse sediment, and rock. Observations demonstrated that sea pens were able to recover fully from pot impact (left in place for 24-48hrs) within 72-144 hours of the pots being removed. Pots remained static on the seafloor, except in cases where insufficient line and large swells caused pots to bounce off the bottom. When pots were hauled back along the bottom, a track was left in the sediments, but abundances of organisms within that track were not affected. Authors did record incidences of detachment of ascidians and sponges and damage to ross coral, but it was not clear if these resulted from this study or from previous damage. Authors conclude that no short-term effects result from the use of pots, even for sensitive species. The study did not examine chronic impacts.

Fish traps and pots (U.S. Virgin Islands/South Florida): Garrison (1997, 1998) observed commercial fish traps in the U.S. Virgin Islands, and found that 82% were set directly upon live substrate (e.g., stony corals, gorgonians, sponges, seagrasses or algae/sponge). In south Florida, Taylor and McMichael (1983) observed that preferred substrates for wire fish pots are coral reefs, live bottom (coral-sponge), limestone ledges, and outcroppings. A total of 2,000 out of 5,000 fish pots observed by Quandt (1999) were set on coral reefs in St. Thomas, U.S. Virgin Islands. These pots resulted in scrapes and breakage to 5% of all corals observed and tissue damage to 47% of all gorgonians observed (tissue damage to 20% of each gorgonian). Based on the number of pots fished per year and the average area of coral reef damaged per pot, Quandt estimated that a total of 104 square meters of coral reef is damaged by wire pot fishing per year in the U.S. Virgin Islands.

Fish pots (Puerto Rico): Appledoorn et al. (2000) observed wire fish pots set by commercial fishermen in La Parguera, Puerto Rico, and recorded sediment type and damage caused by deployment, soaking, and rehauling of traps. Of the traps observed, 45% were set on sand or mud and 44% were set on hard bottom or reef. Of the habitat types observed under traps, 23% of coral colonies, 34% of gorgonian colonies, and 30% of sponges were damaged by deployment. All traps deployed on hard bottoms or reef caused at least some damage to corals and gorgonians. Additional damage from hauling the traps to the surface occurred for 30% of the traps observed. The author estimated that approximately 64.7 m^2 of coral, 47.0 m^2 of gorgonians, and 4.7 m^2 of sponges are damaged within La Pargueara per year (total damage of 116.4 m^2 with 95% confidence limits of 35 to 202 m^2). The long-term fate of these individuals was not determined. Furthermore, the author found that trap induced habitat damage was concentrated in certain areas, and concluded that there would be a higher potential for repeated damage within those areas. This concentration of effort is expected to have greater impacts than if the trap activity were spread over the whole shelf.

Fish traps (Netherlands): Van der Knapp (1993) also recorded injury to staghorn coral, other corals, sponges, and gorgonians from commercial traps in Bonaire, Netherlands. However, the author examined recovery times and found that gorgonians recover within a month, and staghorn corals begin to regenerate after 35 days. Recovery times are longer, however, if algae begins to grow in the damaged areas.

POTS AND TRAPS - Management Implications

Eno et al. (2001) note that pots and traps fitted with escape gaps or biodegradable panels are relatively inexpensive and would reduce losses to the fisheries through ghost fishing. Taylor and McMichael (1983) recommend that a minimum mesh size be implemented and that fish pots be restricted to deeper waters to avoid catches of small non-target fishes. Van der Knapp (1993) emphasizes the need for regulations that restrict trap fishing to sand areas or coral areas that regenerate completely (i.e., staghorn coral). Quandt (1999) recognized that regulations were needed to help control habitat impacts from trap fishing, but offered no specific recommendations for those regulations.

GILL NETS

GILL NETS - Description

Gill nets are vertical walls of netting normally set out in a straight line. There are three ways in which fish are caught by gill nets: 1) wedged – held by the mesh around the body, 2) gilled – held by the mesh slipping behind the opercula, or 3) tangled – held by the teeth, spines are other protrusions (Hubert 1983). The net is stationary and typically contacts the bottom along the lead line and is anchored at both ends. The net may also drag over the bottom during retrieval. Below are the most common gill nets used in waters of the Northeast region.

Sink/Anchor Gill Nets

Anchored sink gillnets are used to harvest demersal fish along all coasts of the U.S. The nets are rigged so that the weight of the leadline exceeds the buoyancy of the floatline, thus the net tends the seabed, and fishes into the near bottom water column. Anchors are used at either ends of the net to hold the gear in a fixed location. The nets vary in length from 100 to 200 m, and in depth from 2-10 m. Multiple nets are attached together to form a string of nets, up to 2000 m in length. In shallow water, sink gillnets may fish from bottom to surface, if the webbing is of sufficient depth (DeAlteris 1998).

Stake Gill Nets

Generally a small boat is used inshore so that a gill net is set across a tidal flow and is lifted at slack tide to remove fish. Wooden or metal stakes run from the surface of the water into the sediment and are placed every few meters along the net to hold it in place. When the net is lifted, the stakes remain in place. These nets are generally fished from the surface to about 50 meters deep (Sainsbury 1996).

GILL NETS - Fishing Trips

This was a well-represented gear type, with almost 66,000 trips analyzed during 1995 – 2000. Sink gill nets were set in shallow and deep water over a large area of the Gulf of Maine, around Cape Cod and south throughout southern New England and the mid-Atlantic region (Figure 27). The areas with the highest density of trips (513 – 3,203 per 100 mi^2) were the southwestern Gulf of Maine from Jeffreys Ledge into Massachusetts Bay, in coastal waters east and southeast of Cape Cod, 30 miles south of the Rhode Island coast (Cox Ledge area), and scattered locations on the south shore of Long Island.

GILL NETS - Impacts and Recovery

The majority of research concerning impacts of gillnets focus on effects on populations resulting from ghost fishing by lost gear; few studies have examined adverse effects of gillnets on habitat. A few studies have noted that, upon retrieval, gillnets can become entangled in hard bottom areas, and snag and break coral (Breen 1990, Erzini et al. 1997, ICES 2000, Jennings and Polunin 1996, Kaiser et al. 1996c, Ohman 1993). Lost gillnets, in particular, often get caught on and damage or cover hard bottoms and reefs. However, these nets are quickly covered by encrusting epifauna, and eventually blend into the background habitat (Carr et al. 1985, Cooper et al. 1988, Erzini et al. 1997, ICES 2000). Erzini et al. (1997) observed that lost gillnets became incorporated into the reef and provided a complex habitat which was attractive to many organisms. Carr and Milliken (1998) noted that in the Gulf of Maine, cod reacted to lost gillnets as if they were part of the seafloor. Thus, other than damage to coral reefs, effects on habitat by gillnets are thought to be minimal (ASMFC 2000, ICES 1991, 1995).

GILL NETS - Management Implications

Text to be inserted.

HOOK AND LINE (ROD AND REEL) GEAR

HOOK AND LINE GEAR - Description

Hook and line fishing methods have evolved from the simple act of attaching bait to a line, lowering that line into the sea, then carefully retrieving it with the prey still attached. This technique is still used to catch crabs. More advanced methods involved the placement of the bait on a hook and the use of a reel to hold the line and a rod to facilitate casting. Although not always associated with the bottom, there are several hook and line gear types used to commercially harvest demersal fish that either make quick descents to the bottom and are then retrieved or are actually set or anchored on the bottom for longer periods of time. A large variety of rods and reels are used in recreational fisheries to catch demersal species of fish. However, in any case interaction with the bottom is very minimal and short-term. Below are the most common hook and line gear used in waters of the Northeast region.

Bottom Longlines

With the guiding philosophy that if one hook is good, many hooks are better, commercial fishermen developed bottom longline gear (DeAlteris 1998). The principle element of this gear is the mainline or groundline that can extend up to 50 km in length. Branching off the mainline at regular intervals are leaders or snoods, and hooks. Anchors hold each end of the mainline in place, and surface buoys attached via float lines to the anchors mark the location of the gear. The mainline was initially constructed of natural fiber lines, that was replaced by a hard-lay, twisted, tarred nylon, and now monofilament and wire cables are typically used. Leaders were initially tied to the mainline, and now they typically snap on to the mainline allowing separate storage of the hooks and leaders and the mainline. All bottom-set, longline gear is considered fixed and passive because once deployed the gear does not move, and the fish voluntarily takes the hook.

In the early 1900s, fishermen on the northwest Atlantic banks, set longlines from dories deployed from sailing schooners. The longlines were stored in tubs or baskets neatly coiled with hooks placed around the outside perimeter of the tub (hence, the term "tub trawling"). Nearly 100 years later this form of fishing continues aboard intermediate-sized coastal vessels fishing for cod and other species. Today, longliners typically use a groundline of approximately 1800 feet per tub of gear. A single set typically consists of connecting from two to four tubs of gear. The groundline is heavy parachute cord with gangions (leaders) spaced at roughly six foot intervals. Usually, the hooks are baited on shore.

Some boats have replaced the tubs with large, hydraulically powered reels as the storage device for the mainline, and leaders with their hooks are snapped onto or off the mainline as the gear is set or hauled respectively. The tilefish fishery on the U.S. east coast uses this type of gear, and a typical 25 m vessel sets and hauls 50 km of mainline with thousands of hooks set and hauled daily, while operating in the canyons on the edge of the continental shelf. More mechanized bottom longline systems have been developed in Norway by Mustad for operation by large vessels (> 25 m). These auto-line systems include baiting machines, variable hook spacing, etc., and enable these vessels to fish up to 10,000 hooks per day.

Hand Lines

The simplest form of hook and line fishing is the hand line. It consists of a line, sinker, leader and at least one hook. The line is usually stored on a small spool and rack and can vary in length from 1-10^2 m (DeAlteris 1998). The line varies in material from a natural fiber to synthetic nylon. The sinkers vary from stones to cast lead. The hooks are single to multiple arrangements in umbrella rigs. An attraction device must be incorporated into the hook, usually a natural bait and artificial lure. There are both recreational and commercial hand line fisheries in the U.S. In fact, although this is a technologically sophisticated fishery with fish finding and navigation electronics, it is still conducted by individual or pairs of fishermen in small boats (< 10m), so it may be considered an artisanal fishery. Operationally, hand lines offered a high degree of efficiency, so that the fisherman is able to feel the fish bite the bait, and then set the hook. Hand lines can be used as a fixed or static gear or towed as a mobile gear. Hand lines are usually a passive gear because the fisherman attracts the target, and the fish then voluntarily takes the hook. However, in certain cases, if the hand line is equipped with a treble or ripper hook, then the hand line becomes an active device, as the hook snags the prey. Although not typically associated with bottom impacts, this gear can be fished in such as manner so as to hit bottom and bounce or be carried by currents until retrieved.

Electric or Hydraulic Reel

Mechanized line hauling systems have been developed to allow more lines to be worked by smaller crews. Electric or hydraulic reel systems, termed bandits, are mounted on the vessel bulwarks. The reels have a spool around which the mainline is wound. Each line may have a number of branches and baited hooks, and the line is taken from the spool over a block at the end of a flexible arm. The vessel's movement combined with the flexible arm provides a fishing action to the line and the hooks. This gear is used to target several species of groundfish, especially cod and pollock and it has the advantage of being effective in areas where other gears cannot be used. Jigging machine lines are generally fished in waters up to 600 meters deep (Sainsbury 1996). This gear may also have the ability to contact the bottom depending upon the method selected to fish.

HOOK AND LINE GEAR - Fishing Trips

Hand Lines/Rod and Reel

A large number of handline trips (about 163,000) were analyzed. Most trips during 1995 – 2000 were made in coastal waters from the southwestern Gulf of Maine to Delaware Bay (Figure 28). Areas with >481 trips per 100 mi^2 were located north of Cape Ann and in Massachusetts Bay, southeast of Cape Cod, in Rhode Island and Connecticut coastal waters, on the south shore of western Long Island, in the New York Bight, and along the New Jersey coast.

Bottom Longlines

Analyzed trips for this gear type during 1995 – 2000 totaled 13,614. Bottom longline trips were distributed in coastal waters along the central and eastern Maine coast, in shallow and deep water of the Gulf of Maine, on Georges Bank and southeast of Cape Cod, in nearshore waters off RI, and along the edge of the continental shelf south of Georges Bank and southern New England (Figure 29. Longlines are not used to a significant extent in the mid-Atlantic region. The heaviest concentration of bottom longline trips (36 – 948 per 10 minute square) were made in a 120 mile stretch of inner shelf water running southeast from Cape Ann to the Great South Channel.

HOOK AND LINE GEAR - Impacts and Recovery

Very little information exists on the effects of longlining on benthic habitat. The principal components of the longline that can produce seabed effects are the anchors or weights, hooks and the mainline (ICES 2000). During submersible dives off southeast Alaska, NMFS scientists observed the following regarding halibut longline gear (NPFMC 1992): "Setline gear often lies slack on the seafloor and meanders considerably along the bottom. During the retrieval process, the line sweeps the bottom for considerable distances before lifting off the bottom. It snags on whatever objects are in its path, including rocks and corals. Smaller rocks are upended, hard corals are broken, and soft corals appear unaffected by the passing line. Invertebrates and other light weight objects are dislodged and pass over or under the line. Fish, notably halibut, frequently moved the groundline numerous feet along the bottom and up into the water column during escape runs disturbing objects in their path. This line motion was noted for distances of 50 feet or more on either side of the hooked fish".

HOOK AND LINE GEAR - Management Implications

Text to be inserted

MOBILE AND STATIC PELAGIC GEAR

Mid-water and pelagic gear are used to capture species that school between the sea surface and the sea bed throughout the water column (Sainsbury 1996). Many of these gear types are modifications of similar gears that tend the sea bottom. Although not specifically intended to contact or interact with the sea bottom, some configurations or improper deployment of this type of gear are capable of being towed along the bottom or hit bottom for a short period of time. Below are the most common mid-water and pelagic gear used in waters of the Northeast region.

MID-WATER TRAWLS

MID-WATER TRAWLS - Description

Mid-Water Otter Trawl

Pelagic fishes are harvested using off-bottom or mid-water trawl nets (DeAlteris 1998). The nets must be aimed or directed at specific concentrations of fish. Therefore, the fishermen must be able to identify the location of fish both laterally and vertically, and to direct the pelagic trawl to that position. Hydroacoustic instruments are used to locate both fish and the fishing gear. Sonar, a forward searching acoustic device is initially used to locate the fish ahead of the vessel. As the fisherman directs the vessel over the fish, the echosounder is used to verify the exact size and depth of the school. As the fisherman is approaching fish, he is also using the net sounder, an acoustic device on the pelagic trawl mouth, to determine the depth and vertical opening of the trawl. By adjusting the length of the tow warp and speed of the tow vessel, the fishing depth of the trawl mouth is adjusted to match the depth of the fish. In general, pelagic fish have a high visual acuity and are fast swimmers, so pelagic trawls are very large and must be towed fast. Thus, pelagic trawl vessels must be equipped with relatively more horsepower than similarly sized demersal trawlers.

The pelagic trawl mouth is opened horizontally by high aspect otter boards, that act as foils or wings oriented vertically in the water column. The net initially is opened vertically, by the floats along the headrope and weights along the footrope. After stabilizing position in the water column, water flow acting on the tapered panels of the funnel shaped net opens the net. The net is always constructed of four panels, with a gentle taper, so as to appear as an endless tunnel to the fish. Generally, the net employs webbing of multiple mesh sizes, the largest in the jibs and forward bellies, reducing to smaller mesh sizes in aft bellies, and the smallest mesh size in the cod-end, suitable for retaining the target species.

Paired Mid-Water Trawl

Large pelagic species are also harvested with a huge pelagic pair trawl towed at high speed near the surface. The nets have meshes exceeding 10 m in length in the jibs and first belly sections, and reduce to cod-end mesh sizes of 20 cm (DeAlteris 1998).

MID-WATER TRAWLS - Fishing Trips

Vessel trip report data for this gear type were not analyzed for this report.

MID-WATER TRAWLS - Impacts and Recovery

No available information.

MID-WATER TRAWLS - Management Implications

Text to be inserted

SEINES

SEINES - Description

Purse Seines

The purse seine is an evolution of the ring net (DeAlteris 1998). The ring net is a single wall of webbing that is also used to surround concentrations of pelagic fish. A discontinuous line, the hauling rope, attached to the center bunt section of the net, is used to close the bottom of the net after a school of fish has been circled. The ring net is usually a relatively small net (about 200 m in length) and is typically used in fresh water fisheries. The discontinuous hauling line has been replaced by a continuous purse line. Functionally, purse seines are used to surround a concentration of fish, (menhaden, herring, tuna) then the purse seine is hauled in so as to close the bottom of the net. Critical aspects of the design and operation of a purse seine include:

- sufficient weight on the leadline to achieve a rapid submersion of the net.
- adequate floatation to support the webbing and leadline.
- the net must be of correct length to allow for the complete enclosure of the school of fish.
- the mesh size must neither be too big so as to allow escape or gilling of fish, and not so small as to create excess bulk and drag.

The puretic power block developed in the early 1950s, was a significant mechanization of the purse seine fishery. The V-shaped sheave, attached to a beam end, and powered by a hydraulic motor, has replaced 10-20 men that used to haul in the long wings of the small seines (300 m) used to harvest menhaden in Chesapeake Bay. The largest purse seines now used on tuna fish in the open ocean are more than 2000 m in length and 200 m in depth. Without the power block, these fisheries would not have developed.

Due to the large depth of the net for tuna purse seines, they have been shown to contact and interact with the sea bottom when fishing in some shallow water locations such as Massachusetts Bay and vicinity (NMFS Observer data, 1996). However, these interactions are unintended and rare.

SEINES - Fishing Trips

Vessel trip report data for this gear type were not analyzed for this report.

SEINES - Impacts and Recovery

No available information.

SEINES - Management Implications

Text to be inserted

DRIFT GILL NETS

DRIFT GILL NETS - Description

Gillnets operate principally by wedging and gilling fish, and secondarily by entangling (DeAlteris 1998). The nets are a single wall of webbing, with float and lead lines. The nets are designed and rigged to operate as either sink or floating nets, and are anchored or drift. The webbing is usually monofilament nylon due to its transparency; but multifilament, synthetic or natural fibers are also used. Drift gillnets are designed so as to float from the sea surface and extend downward into the water column and are used to catch pelagic fish. In this case the buoyancy of the floatline exceeds the weight of the leadline. Drift gillnets may be anchored at one end or set-out to drift, usually with the fishing vessel attached at one end.

DRIFT GILL NETS - Fishing Trips

Vessel trip report data for this gear type were not analyzed for this report.

DRIFT GILL NETS - Impacts and Recovery

No available information.

DRIFT GILL NETS - Management Implications

Text to be inserted

PELAGIC LONGLINE GEAR

PELAGIC LONGLINE GEAR - Description

An evolution from bottom longline gear was the development of pelagic longline fishing methods (DeAlteris 1998). The mainline is suspended at depth from buoys and dropper lines, with the minimum depth (about 20 m), being that required to avoid entanglement by coastal maritime traffic. The length of the mainline varies from 300 to 100 km depending on the size of the vessel. The mainline material began as 3-strand twisted, hard-lay, tarred nylon, but has been entirely replaced by monofilament. The line is stored on a reel equipped with a level-winder to prevent tangles on the reels. Hooks, leaders and dropper lines are stored on small reels end to end. If the mainline is set level at a fixed depth, then the leader length varies from 2-40 m, so as to ensure the hooks are distributed over a range of depths. If a line-shooter is used to set the mainline in a catenary shape with regard to depth, then the leaders are usually a single minimal length, but are still distributed by depth.

PELAGIC LONGLINE GEAR - Fishing Trips

Vessel trip report data for this gear type were not analyzed for this report.

PELAGIC LONGLINE GEAR - Impacts and Recovery

No available information.

PELAGIC LONGLINE GEAR - Management Implications

Text to be inserted.

TROLL LINES

TROLL LINES - Description

Essentially, trolling involves the use of a baited hook or lure maintained at a desired speed and depth in the water (Sainsbury 1996). Usually, two to four or more lines are spread to varying widths by the use of outrigger poles connected to the deck by hinged plates. Line retrieval is often accomplished by means of a mechanized spool. Each line is weighted to accomplish the desired depth and may have any number of leaders attached, each with a hook and bait or appropriate lure. This gear is generally fished from the surface to about 20 meters.

TROLL LINES - Fishing Trips

No vessel trip report data were available for this gear type.

TROLL LINES - Impacts and Recovery

No available information.

TROLL LINES - Management Implications

Text to be inserted.

SPEARS

SPEARS - Description

A pole or shaft with a point on it can be used as a spear and a fisherman operating from shore, floating raft, and boat would be able to capture an animal previously out-of-reach (DeAlteris 1998). However, the single prong spear required an accurate aim, and fish easily escaped. With the addition of a barb, fish retention was improved; and spears with multi-prong heads increased the likelihood of hitting the target. Spears were initially hand-held, then thrown, then placed in launching devices including cross-bows, spear guns for divers, etc. Spears with long shafts (gigs) are used by fishermen in small boats at night in the Carolina sounds for flounder, through the ice for eels in New England bays, and by divers for fish in coastal waters.

SPEARS - Fishing Trips

No vessel trip report data were available for this gear type.

SPEARS - Impacts and Recovery

No available information.

SPEARS - Management Implications

Text to be inserted.

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Tables and Figures

Table 1. Gulf of Maine benthic community types as identified by Watling et al. 1988. Distribution is shown in Figure 4.

Benthic Community Type	Benthic Community Description
Nearshore Shallow	All combinations of sediment type. Most diverse community with greatest total number of individuals. Depth: 0-50m. Organic input from terrestrial sources, attached macroalgae, and phytoplankton. Many species reproduce in summer; some boreal forms reproduce in winter (e.g. *Unciola*).
Boreal Mud	Fine sediments influenced by cold Maine intermediate water mass. Seasonal reproductive cue is input of spring phytoplankton bloom since temperature is seasonally uniform. Species diversity is high but number of individuals is reduced because of reduced organic inputs. Representative megafauna include sea pen (*Pennatula aculeata*) and cerianthid anemone (probably *Cerianthus borealis*).
Sand Bank	Sediment is sand and gravel with little or no fine material. Predominately Maine intermediate water mass. Jeffreys and Fippenies Ledges are typical habitats. Megafauna include sea scallops (*Placopecten magellanicus*), other filter feeders (e.g. *Myxicola infundibulum*) and sponges. Banks protrude into photic zone, and are subject to localized upwelling.
Rock Ledge	Substrate mostly rocky outcrops. Predominately Maine intermediate water. Filter feeders do not cover available surfaces since quality and quantity of food particles are low.
Boreal-Slope Transition	Sediment is primarily mud veneer overlying sand and gravel. Transition zone between boreal mud and upper continental slope. Located in Jordan Basin, swells west of Georges Basin, and limited in Wilkinson Basin. Maine bottom & intermediate water mix here, so bottom temperatures vary. Characteristic species include brittle star (*Ophiura sarsi*) and amphipod *Erichthonius*.
Upper Slope Mimic	Sediments are generally sand mixed with both fine particles and gravel. Upwelling brings in upper slope water and the species representative of this community. Deepest part of GOM where slopwater is not strongly diluted with Maine intermediate water. Characteristic species include foraminiferan *Bathysiphon* and deepwater isopods.

Table 2. Sedimentary provinces of Georges Bank, as defined by Valentine *et al.* (1993).

Sedimentary Province	Depth (m)	Description
Northern edge	40-200	Dominated by gravel with portions of sand, common boulder areas, and tightly packed pebbles. Epifauna (bryozoa, hydrozoa, and worm tubes) are abundant in areas of boulders where bottom trawling is low.
Northern slope & northeast channel	200-240	Variable sediment type (gravel, gravel-sand, and sand) with ripples and scattered bedforms. This is a transition zone between the northern edge and southern slope.
North/central shelf	60-120	Highly variable sediment type (ranging from gravel to sand) with rippled sand, large bedforms, and patchy gravel lag deposits.
Central & south-western shelf; shoal ridges	10-80	Dominated by sand (fine and medium grain) with large sand ridges, dunes, waves, and ripples. Small bedforms in southern part.
Shoal troughs	40-60	Gravel (including gravel lag) and gravel-sand between large sand ridges. Patch large bedforms. Strong currents. (Few samples – submersible observation noted presence of gravel lag, rippled gravel-sand, and large bedforms.
Southeastern shelf	80-200	Rippled gravel-sand (medium and fine-grained sand) with patchy large bedforms and gravel lag. Weaker currents.
Southeastern slope	400-2000	Dominated by silt and clay with portions of sand (medium and fine) with rippled sand on shallow slope and smooth silt-sand deeper.

Table. 3 Demersal fish assemblages of Georges Bank and Gulf of Maine identified using trawl survey data dating 1963-1978 (Overholtz and Tyler 1985).

Assemblage	Species
Slope & Canyon	whiting, white hake, red hake, offshore hake, monkfish
Intermediate	whiting, red hake, Atlantic cod, haddock, monkfish, ocean pout, yellowtail flounder
Shallow	whiting, white hake, red hake, Atlantic cod, haddock, pollock, monkfish, ocean pout, yellowtail flounder, windowpane
Gulf of Maine-Deep	whiting, white hake, Atlantic cod, haddock, American plaice, witch flounder
Northeast Peak	white hake, Atlantic cod, haddock, pollock, ocean pout, winter flounder

Table 4. Mid-Atlantic habitat types as described by Pratt (1973) and Boesch (1979) with characteristic macrofauna as identified in Boesch 1979.

Habitat Type (after Boesch 1979)	Description		
	Depth (m)	**Characterization (Pratt faunal zone)**	**Characteristic Benthic Macrofauna**
Inner shelf	0-30	characterized by coarse sands with finer sands off MD and VA (sand zone)	Polychaetes: *Polygordius, Goniadella, Spiophanes*
Central shelf	30-50	(sand zone)	Polychaetes: *Spiophanes, Goniadella* Amphipod: *Pseudunciola*
Central and inner shelf swales	0-50	occurs in swales between sand ridges (sand zone)	Polychaetes: *Spiophanes, Lumbrineris, Polygordius*
Outer shelf	50-100	(silty sand zone)	Amphipods: *Ampelisca vadorum, Erichthonius* Polychaetes: *Spiophanes*
Outer shelf swales	50-100	occurs in swales between sand ridges (silty sand zone)	Amphipods: *Ampelisca agassizi, Unciola, Erichthonius*
Shelf break	100-200	(silt-clay zone)	not given
Continental slope	>200	(none)	not given

Table 5. Major recurrent demersal species assemblages of the Mid-Atlantic bight during spring and fall as determined by Colvocoresses and Musik (1983).

Season	Species Assemblage				
	Boreal	**Warm temperate**	**Inner shelf**	**Outer shelf**	**Slope**
Spring	Atlantic cod little skate sea raven monkfish winter flounder longhorn sculpin ocean pout whiting red hake white hake spiny dogfish	black sea bass summer flounder butterfish scup spotted hake northern searobin	windowpane	fourspot flounder	shortnose greeneye offshore hake blackbelly rosefish white hake
Fall	white hake whiting red hake monkfish longhorn sculpin winter flounder yellowtail flounder witch flounder little skate spiny dogfish	black sea bass summer flounder butterfish scup spotted hake northern searobin smooth dogfish	windowpane	fourspot flounder fawn cusk eel gulf stream flounder	shortnose greeneye offshore hake blackbelly rosefish white hake witch flounder

Table 6. Percentage of Landings for Each Fishing Gear Type Used in Northeast Region in 1999

	NORTHEAST SPECIES																													
GEAR	BLUEFISH	BUTTERFISH	SURFCLAM	OCEANQUAHOG	ATLANTIC COD	RED CRAB	SUMMER FLNDR	WINDOW FLNDR	WINTER FLNDR	WITCH FLNDR	YTAIL FLNDR	MONKFISH	HADDOCK	HAKE, RED	HAKE, SILVER	HAKE, WHITE	HALIBUT, ATL	HERRING, ATL	MACKEREL, ATL	PLAICE, AMERICAN	POLLOCK	POUT, OCEAN	REDFISH	SCALLOP, SEA	SCUP	BLK. SEABASS	SKATES	SQUID LOLIGO	SQUID ILLEX	TILEFISH
Bag Nets		-																											-	
Beam Trawls, Other	-	-		-					-	-	-	-		-	-									-	-			-		
Cast Nets	-						-																		-					
Combined Gears	-																									-				-
Diving Outfits, Other																								-	-					
Dredge Clam			92	100			-		-			-												-	-					
Dredge Conch							-																				-			
Dredge Scallop, Bay									-	-		-												-						
Dredge Scallop, Sea	-	-			-		2	-	-	-	1	16			-	-				-	-			90	-	-	-	-	-	-
Floating Traps (Shallow)	1	-			-		-		-			-			-			-	2		-				9	-	-	-		
Fyke And Hoop Nets, Fish	-	-					-	-	-	-	-	-															-			
Gill Nets, Drift, Other	9	-					-		-		-	-		-	-			-	-			-			-	-	-	-		
Gill Nets, Drift, Runaround	5	-																												
Gill Nets, Other	5	-					-					-							-							-	-			
Gill Nets, Sink/Anchor, Other	16	-			20		-	-	4	2	8	20	7	-	-	35	8	-	1	2	55	3	16	-	-	-	12	-	-	-
Gill Nets, Stake	-	-					-					-						-	-											
Haul Seines, Beach	1	-					-		-					-	-			-	-								-			
Haul Seines, Long	-	-																												
Haul Seines, Long(Danish)					-				-	-	-	-	-		-	-				-	-		-				-			
Lines Hand, Other	5	-			5		2	-	-	-	-	-	-	-	-	-		-	-	-	-	4	-		12	14	-	-		2
Lines Long Set With Hooks	-	-			17		-		-	-	-	-	2	-	-	5	-		-	-	2	7	-	-	-	-	-	-		61
Lines Long, Reef Fish																														32
Lines Troll, Other	-	-					-																			-				-
Lines Troll With Baits							-																							

Table 6. Continued

GEAR	BLUEFISH	BUTTERFISH	SURFCLAM	OCEAN QUAHOG	ATLANTIC COD	RED CRAB	SUMMER FLNDR	WINDOW FLNDR	WINTER FLNDR	WITCH FLNDR	YTAIL FLNDR	MONKFISH	HADDOCK	HAKE, RED	HAKE, SILVER	HAKE, WHITE	HALIBUT, ATL.	HERRING, ATL.	MACKEREL, ATL	PLAICE, AMERICAN	POLLOCK	POUT, OCEAN	REDFIS	SCALLOP, SEA	SCUP	BLK. SEABASS	SKATES	SQUID LOLIGO	SQUID ILLEX	TILEFISH
Otter Trawl Bottom, Fish	20	93			57		82	98	95	97	92	53	91	98	99	58	89	2	83	97	42	77	83	-	66	25	86	99	100	4
Otter Trawl Bottom, Scallop	-				-		-		-	-	-	-	-							-	-			9		-	-	-		
Otter Trawl Midwater																		53	-											
Pots And Traps, Conch	-	-			-																	-				-				
Pots And Traps, Crab, Blue	-	-					-																			-				
Pots and Traps, Crab, Blue Peeler	-																													
Pots And Traps, Crab, Other	-					60	-																							
Pots And Traps, Fish	-	-			-		-		-					-	-	-		-	-		-	7	-		5	53	-	-		-
Pots And Traps, Lobster Inshore	-	-			-		-		-			-	-	-	-	-			-		-	-	-	-	-	-	-	-		
Pots And Traps, Lobster Offshore	-	-			-	40	-		-			-		-		-						-	-		-	-		-		-
Pots And Traps, Other	-						-																		-	3				
Pound Nets, Crab	-						-																							
Pound Nets, Fish	5	3			-		2	-	-		-			-	-			-	-						-	-	-	-		
Pound Nets, Other	-	-					-		-										2						2	-		-		
Purse Seines, Herring																		31												
Purse Seines, Other	3																													
Reel, Electric or Hydraulic																										-				
Rod and Reel																										-				
Scottish Seine	-	-			-		-	-	-	-	-	-	-	-	-	-			-	-	-	-			-	-	-	-		
Scrapes							-																							
Spears	-																									-				
Stop Seines																		-												
Trawl Midwater, Paired																		14												
Weirs																		-												

"#" Indicates percent landings associated with this gear type for this species
"-" Indicates there was less than 1% landings associated with this gear type for this species
"Blank" Indicates there were no landings recorded for this gear type for this species
"Shading" Indicates gear that caught 1% or greater of the landings for any species.

Table 7. Gear Reported to Land 1 % or Greater of Total Landings for Each State in 1999

	Percent of Landings for All Species by State											
Gear	CT	DE	MA	MD	ME	NC	NH	NJ	NY	RI	VA	% All States Combined
By Hand, Other		18										
Diving Outfits, Other					5							1
Dredge Clam			9	10				39	1	1		6
Dredge Crab		11									1	
Dredge Mussel					1							
Dredge Other					3							
Dredge Scallop, Sea	7		10		1		1	2			1	2
Dredge Urchin, Sea					1							
Floating Traps (Shallow)										1		
Fyke And Hoop Nets, Fish				2								
Gill Nets, Drift, Other		4		3				2				1
Gill Nets, Drift, Runaround						1						
Gill Nets, Other						14						1
Gill Nets, Sink/Anchor,			12	5	1		42	5	5	4	3	4
Gill Nets, Stake		7										
Haul Seines, Beach				2							1	
Haul Seines, Long						1						
Hoes					1							
Lines Hand, Other		1	2	1		1	1		1			1
Lines Long Set With Hooks			4			1		1	4			1
Lines Long, Shark						1						
Lines Troll, Other						1						
Lines Trot With Baits				17								1
Not Coded	16				1			1	30			2
Otter Trawl Bottom, Shrimp					1	6	3					1
Otter Trawl Midwater			11		21		8			18		6
Pots And Traps, Conch		2										
Pots And Traps, Crab, Blue		51		36		36		3			6	8
Pots And Traps, Crab, Other			2							1		
Pots And Traps, Eel		2		1								
Pots And Traps, Fish		1		3								
Pots And Traps, Lobster Inshore	13		5		25		9			4		5
Pots And Traps, Lobster Ofshore	2		4				9	1		2		1
Pots And Traps, Other			1		1							
Pound Nets, Crab				1								
Otter Trawl Bottom, Crab						1						
Otter Trawl Bottom, Fish	61		38	3	9	7	26	26	58	56	2	18
Pound Nets, Fish				14		1			1		4	2
Purse Seines, Herring			1		23							4
Purse Seines, Menhadon						27		18			74	28
Purse Seines, Other											7	2

Table 8. Fishing gears used in estuaries and bays, coastal waters, and offshore waters of the EEZ, from Maine to North Carolina. Includes all gear responsible for 1% or greater of any state's total landings and all gear that harvested any amount of federally managed species. Includes gear used in estuarine waters as identified by ASMFC. Based upon 1999 NMFS landings data and 2000 ASMFC Gear Report.

GEAR	Estuary or Bay	Coastal 0-3 Miles	Offshore 3-200 Miles
Bag Nets	X	X	X
Beam Trawls	X	X	X
By Hand	X	X	
Cast Nets	X	X	X
Clam Kicking	X		
Diving Outfits	X	X	X
Dredge Clam	X	X	X
Dredge Conch	X		
Dredge Crab	X	X	
Dredge Mussel	X	X	
Dredge Oyster, Common	X		
Dredge Scallop, Bay	X		
Dredge Scallop, Sea		X	X
Dredge Urchin, Sea		X	X
Floating Traps (Shallow)	X	X	
Fyke And Hoop Nets, Fish	X	X	
Gill Nets, Drift, Other			X
Gill Nets, Drift, Runaround			X
Gill Nets, Sink/Anchor, Other	X		X
Gill Nets, Stake	X		X
Haul Seines, Beach	X		
Haul Seines, Long	X		
Haul Seines, Long(Danish)		X	X
Hoes	X		
Lines Hand, Other	X	X	X
Lines Long Set With Hooks			X
Lines Long, Reef Fish			X
Lines Long, Shark			X
Lines Troll, Other		X	X
Lines Trot With Baits		X	X
Otter Trawl Bottom, Crab	X		X
Otter Trawl Bottom, Fish	X	X	X
Otter Trawl Bottom, Scallop		X	X
Otter Trawl Bottom, Shrimp		X	X
Otter Trawl Midwater		X	X
Pots And Traps, Conch	X		
Pots and Traps, Crab, Blue Peeler	X		
Pots And Traps, Crab, Blue	X		
Pots And Traps, Crab, Other	X	X	X

Table 8. Continued

GEAR	Estuary or Bay	Coastal 0-3 Miles	Offshore 3-200 Miles
Pots And Traps, Eel	X		
Pots and Traps, Lobster Inshore	X	X	
Pots and Traps, Lobster Offshore			X
Pots and Traps, Fish	X	X	X
Pound Nets, Crab	X		
Pound Nets, Fish	X	X	
Purse Seines, Herring		X	X
Purse Seines, Menhaden		X	X
Purse Seines, Tuna		X	X
Rakes	X		
Reel, Electric or Hydraulic		X	X
Rod and Reel	X	X	X
Scottish Seine		X	X
Scrapes	X		
Spears	X	X	X
Stop Seines	X		
Tongs and Grabs, Oyster	X		
Tongs Patent, Clam Other	X		
Tongs Patent, Oyster	X		
Trawl Midwater, Paired		X	X
Weirs	X		

Table 9. Number of vessel trip reports received, analyzed, and displayed (in GIS plots) and the percentage of total reported trips analyzed and displayed for 17 gear types used in the Northeast region of the U.S.

Gear type	Total number of trips reported	Number of trips analyzed	Number of trips displayed	Percent trips analyzed	Percent trips displayed
Otter trawl – fish	218,668	177,594	174,617	81.2	79.9
Otter trawl – shrimp	43,353	31,571	30,865	72.8	71.2
Otter trawl- scallops	1,952	1,702	1,702	87.2	87.2
Beam trawl	1,926	1,112	1,112	57.7	57.7
All bottom trawls	**265,899**	**211,979**	**208,296**	**79.7**	**78.3**
Quahog/surf clam dredge	Data	Not	Available		
Scallop dredge	32,248	24,232	23,206	75.1	72.0
Mussel dredge	571	440	440	77.1	77.1
Sea urchin dredge	1,675	968	968	57.8	57.8
All dredges	**34,494**	**25,640**	**24,614**	**74.3**	**71.4**
Lobster pots	241,725	180,746	177,879	74.8	73.6
Fish pots	10,486	7,898	7,697	75.3	73.4
Crab pots	1,609	1,050	1,050	65.3	65.3
Conch/whelk pots	2,448	1,700	1,700	69.4	69.4
All pots	**256,268**	**191,394**	**188,326**	**74.7**	**73.5**
Sink gill nets	86,580	67,402	66,096	77.8	76.3
Bottom longlines	18,261	13,855	13,614	75.9	74.6
Handlines	200,291	165,178	163,058	83.0	81.4
Danish seines	897	276	276	30.8	30.8
Scottish seines	827	520	520	62.9	62.9
TOTAL	**863,517**	**677,244**	**664,800**	**78.4**	**77.0**

Table 10. Species included in the Northeast Multispecies Fishery Management Plan

Common Name	**Scientific Name**
Atlantic cod	*Gadus morhua*
Witch flounder	*Glyptocephalus cynoglossus*
American plaice	*Hippoglossoides platessoides*
Yellowtail flounder	*Pleuronectes ferruginea*
Ocean pout	*Macrozoarces americanus*
Haddock	*Melanogrammus aeglefinus*
Whiting	*Merluccius bilinearis*
Pollock	*Pollachius virens*
Winter flounder	*Pleuronectes americanus*
Windowpane flounder	*Scophthalmus aquosus*
Redfish	*Sebastes marinus*
Red hake	*Urophycis chuss*
White hake	*Urophycis tenuis*
Atlantic halibut	*Hippoglossus hippoglossus*
Offshore hake	*Merluccius albidus*

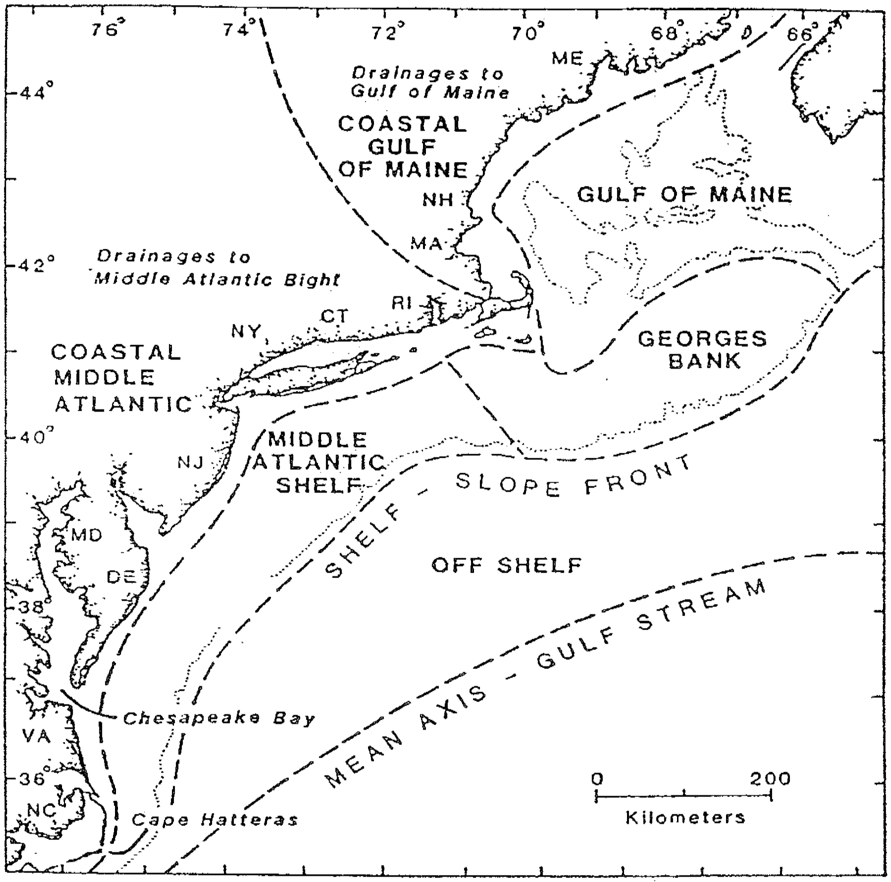


Figure 1. Northeast Shelf Ecosystem, including mean axis of Gulf Stream (from Pacheco 1988)

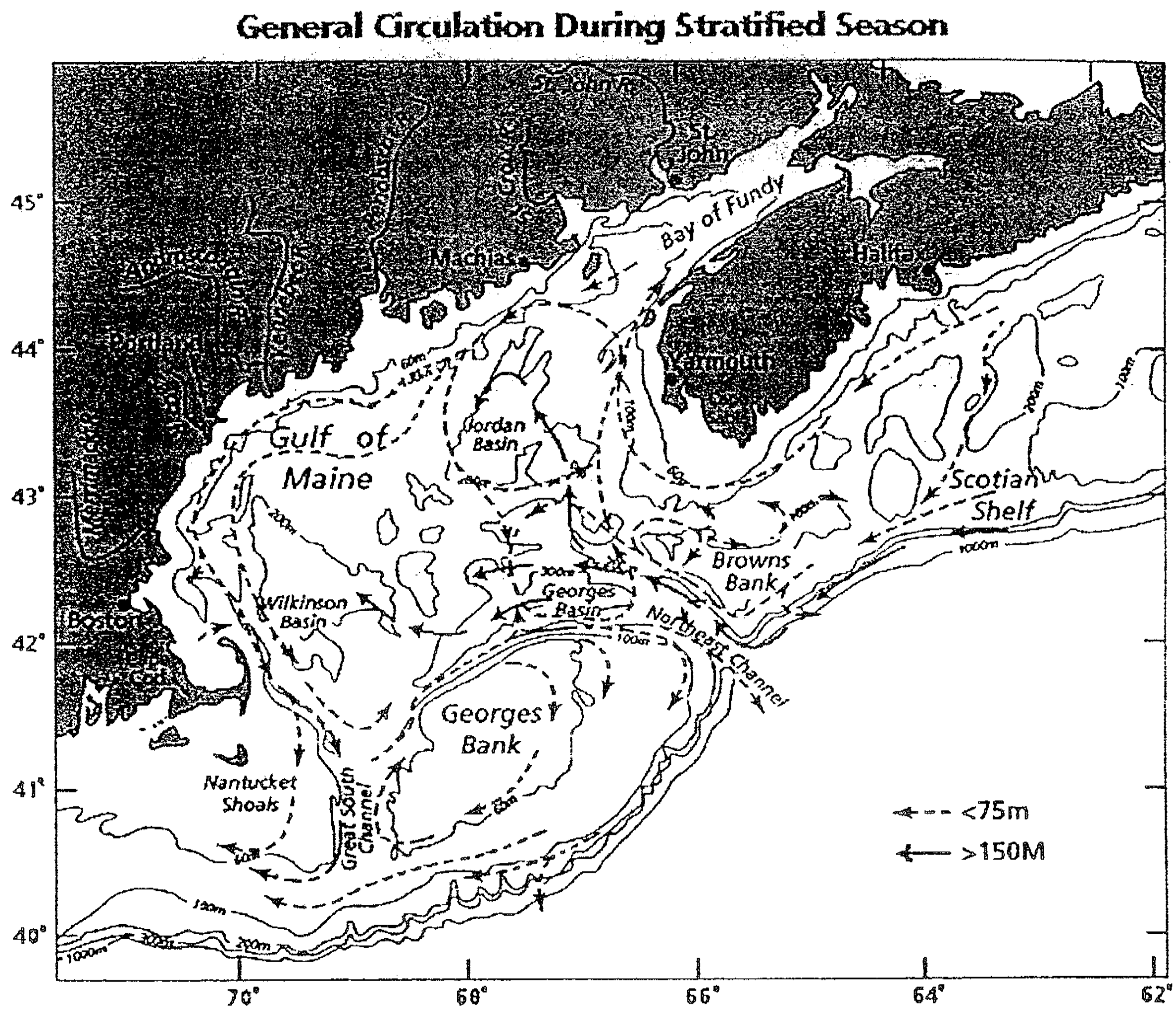


Figure 2. Circulation in the Gulf of Maine and Georges Bank

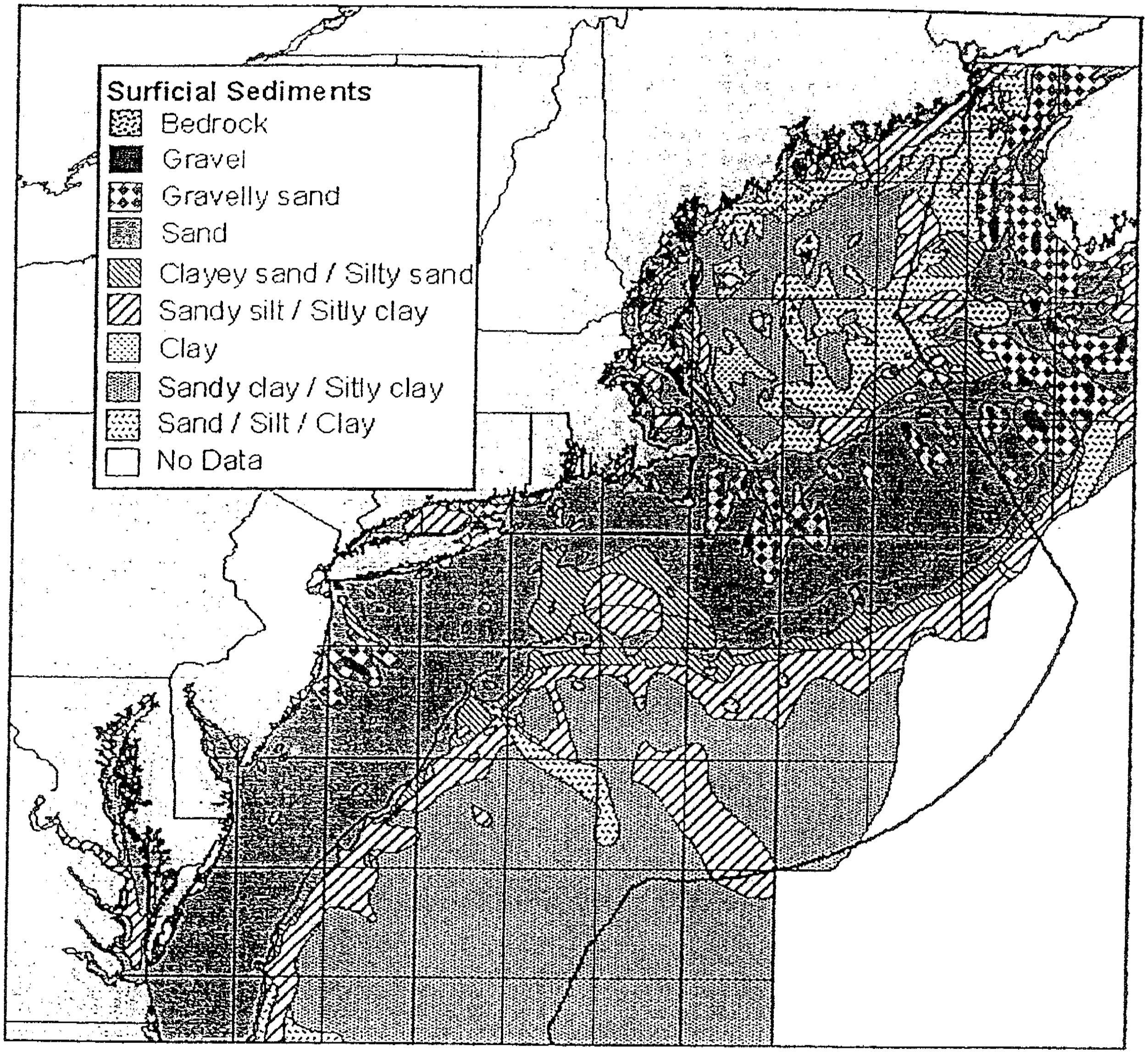


Figure 3. Distribution of surficial sediments in the Northeast shelf ecosystem (Poppe *et al.* 1986).

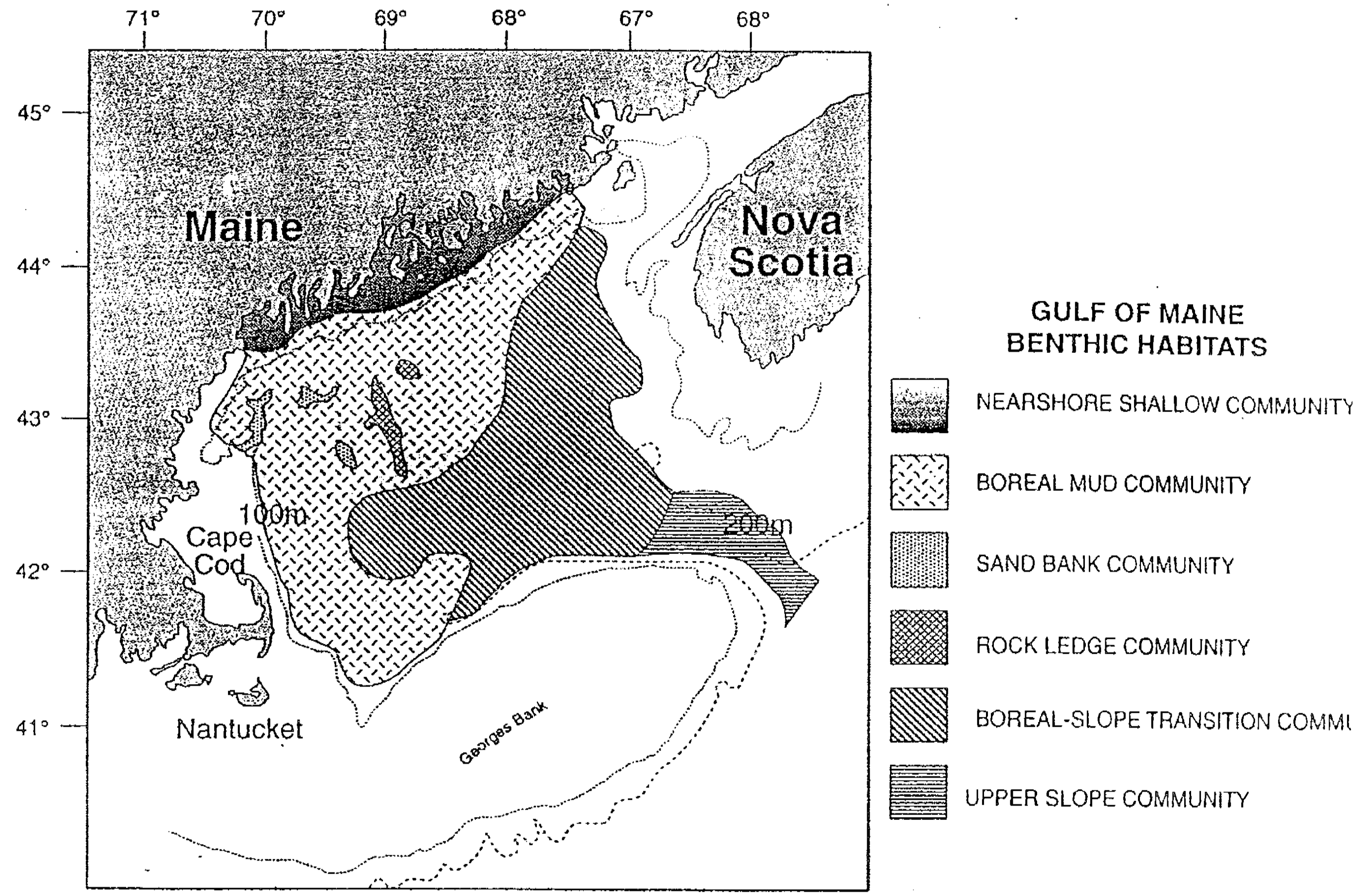


Figure 4. Location of Gulf of Maine benthic communities after Watling *et al.* 1988.

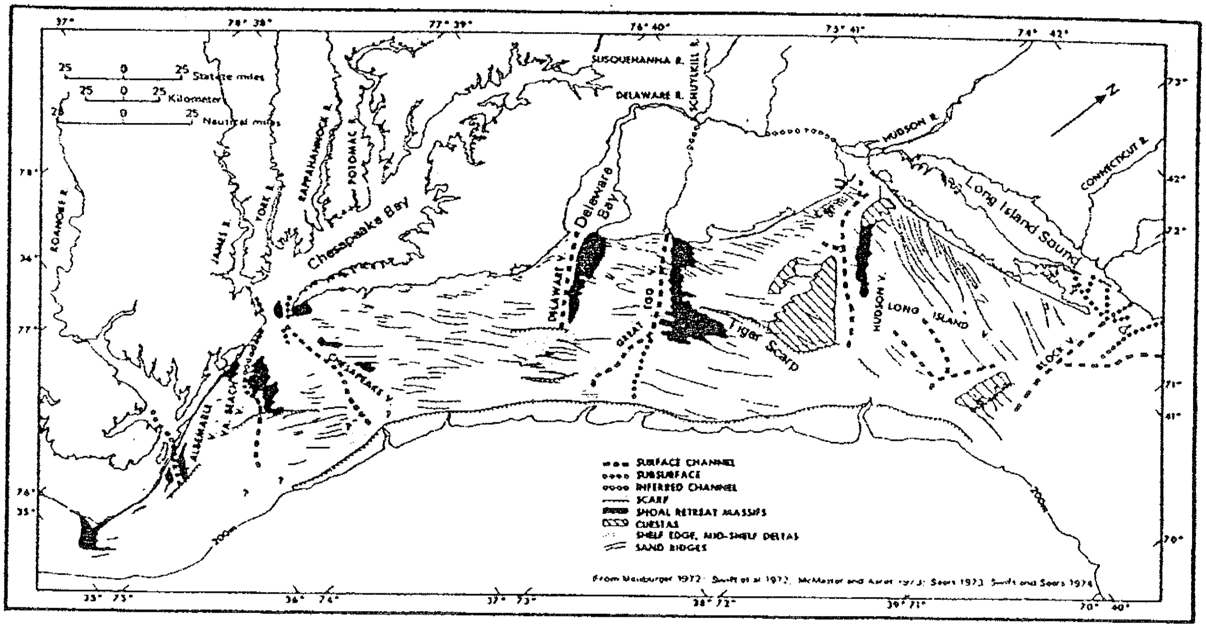


Figure 5. Middle Atlantic Bight morphology, including subsurface channels, scarps, massifs, shelf deltas and sand ridges (from Freeland and Swift, 1978).

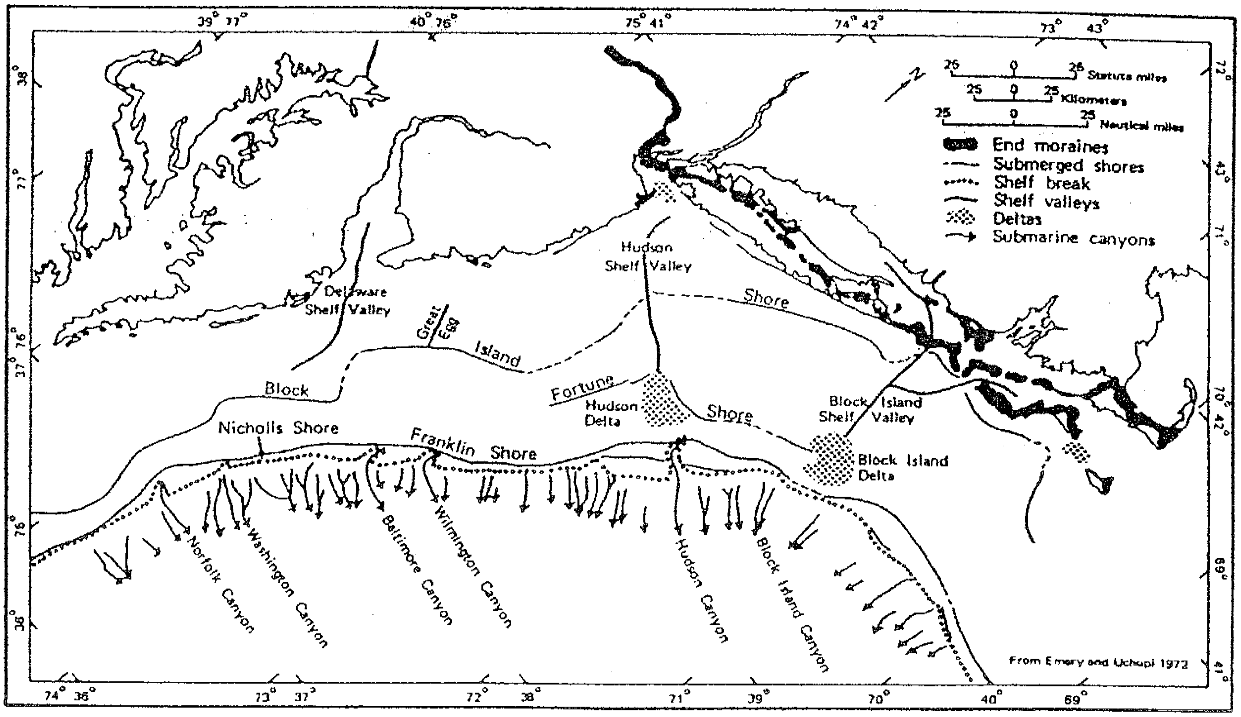


Figure 6. Major geologic features of the Middle Atlantic Bight region, including submarine canyons, submerged shores, shelf valleys deltas, and end moraines (from Freeland and Swift, 1978).

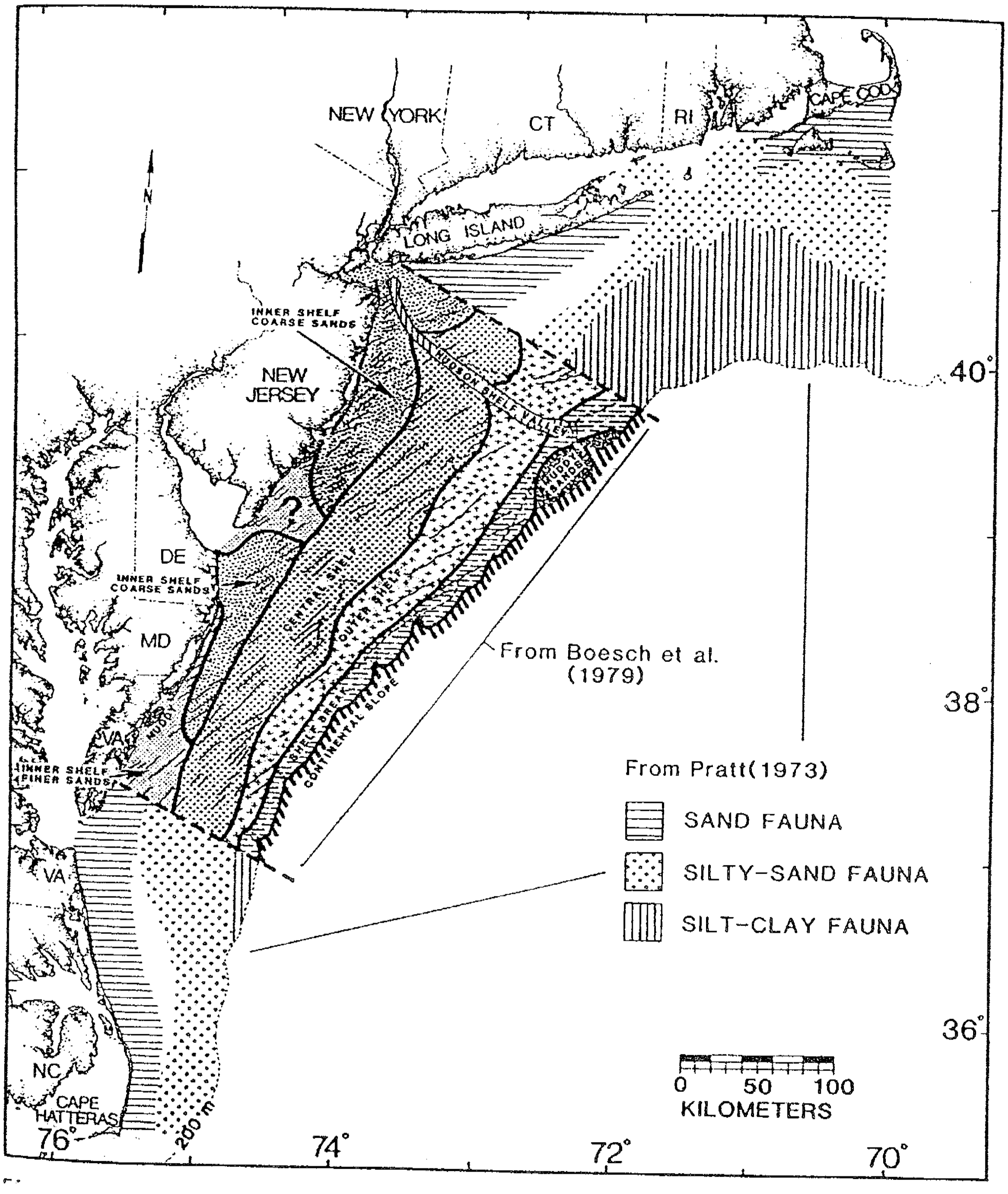


Figure 7. Comparison of Mid-Atlantic faunal zones identified by Pratt (1973) and Boesch (1979).

Figure 8. Inshore vs Offshore Landings by Area, 1999

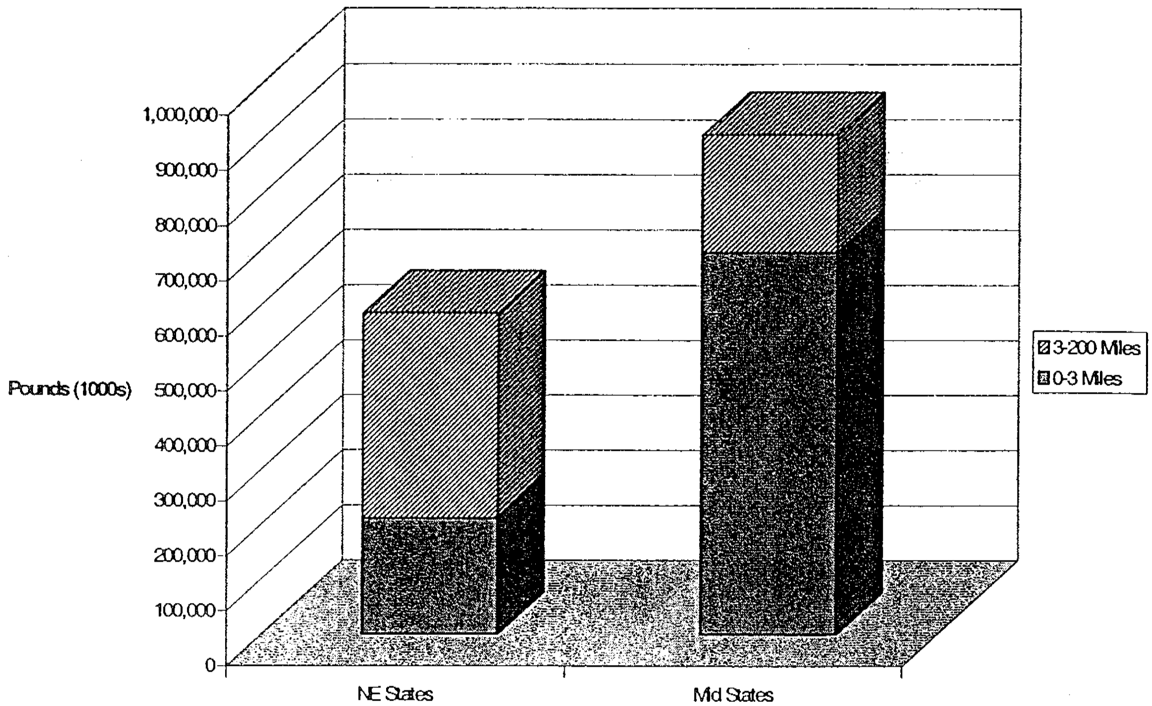


Figure 9. Inshore vs Offshore Landings by State, 1999

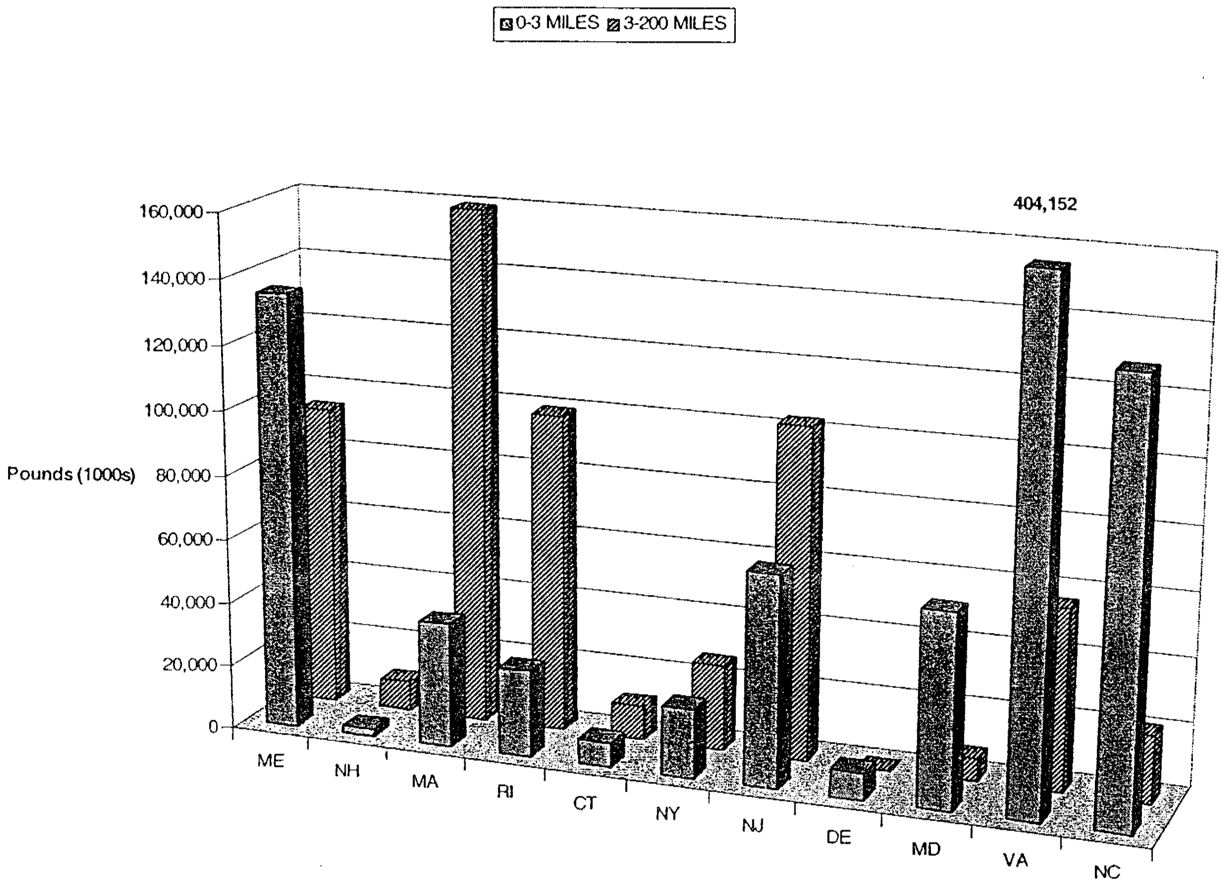


Figure 10

All Bottom Trawls
1995-2000
N = 209,468

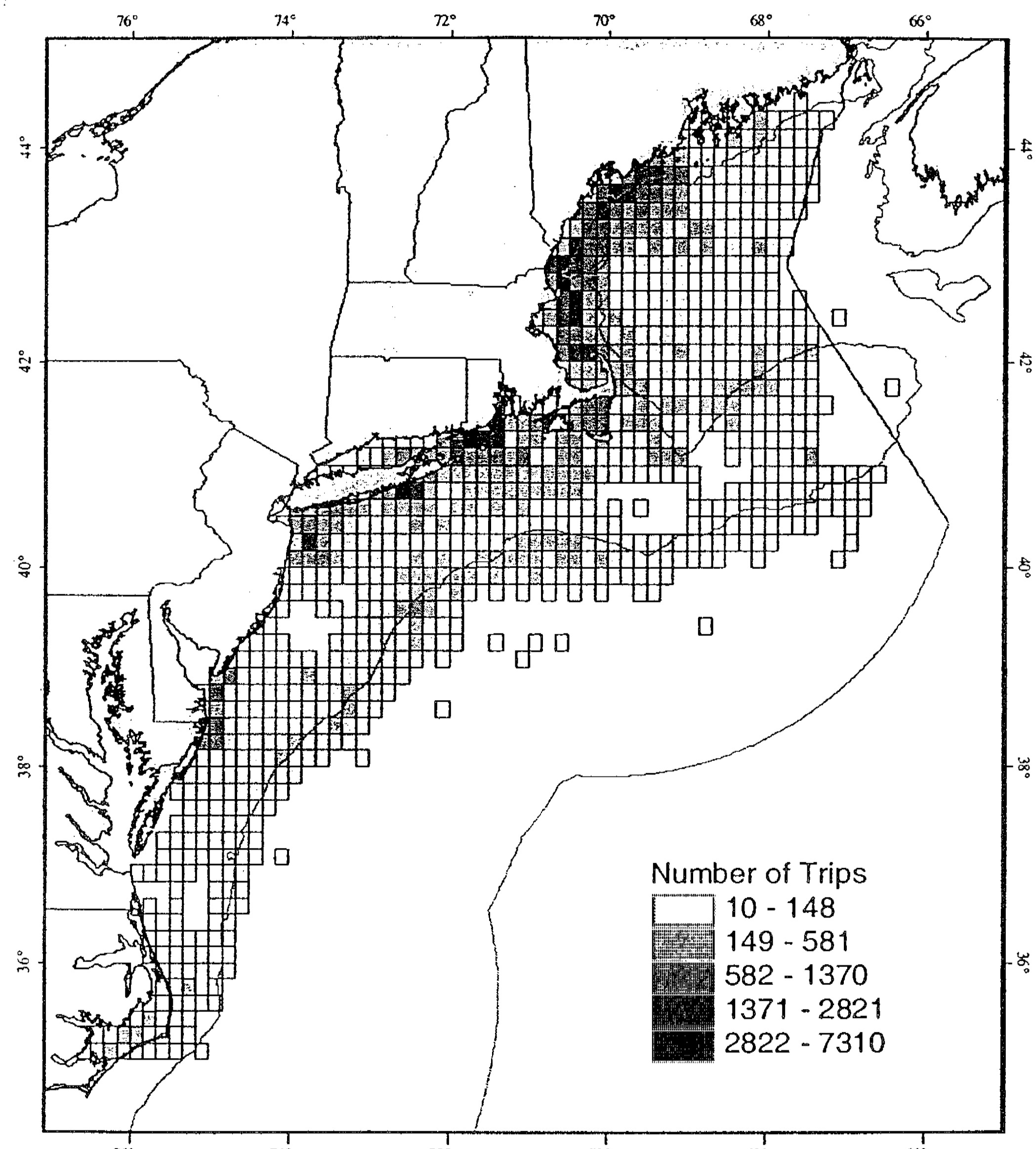


Figure 11

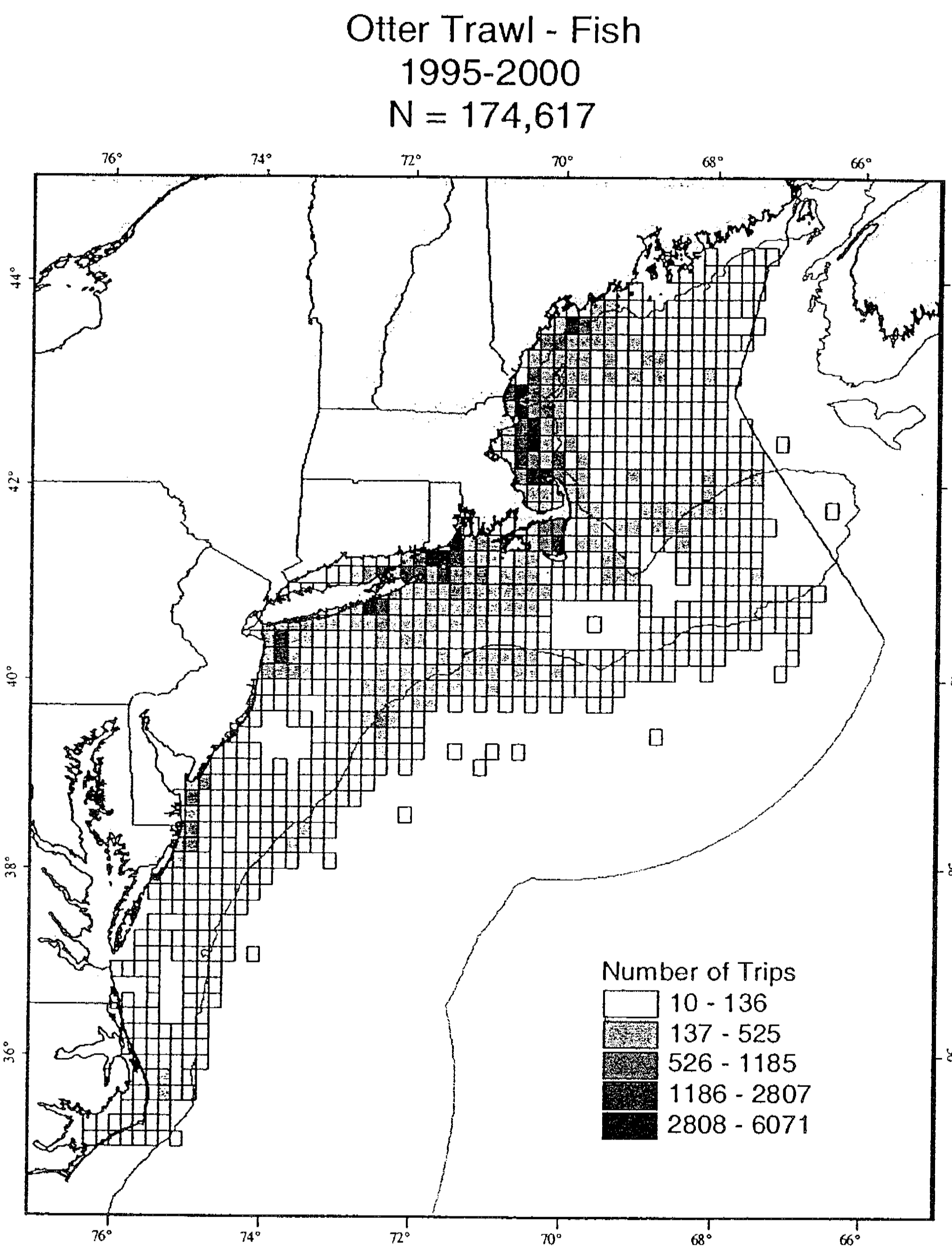

Otter Trawl - Fish
1995-2000
N = 174,617
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
10 - 136
137 - 525
526 - 1185
1186 - 2807
2808 - 6071

Figure 12

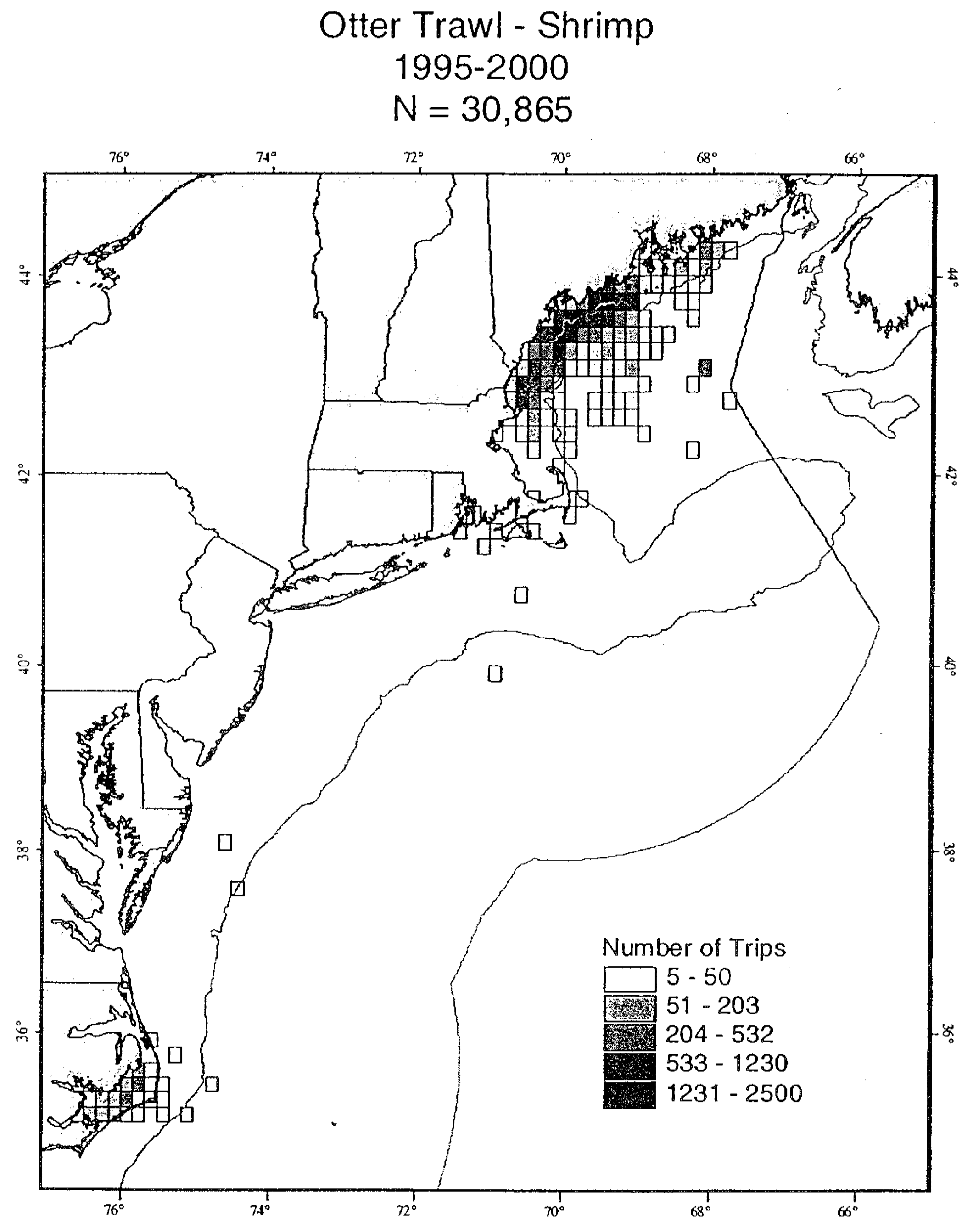

Otter Trawl - Shrimp
1995-2000
N = 30,865
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
5 - 50
51 - 203
204 - 532
533 - 1230
1231 - 2500

Figure 13

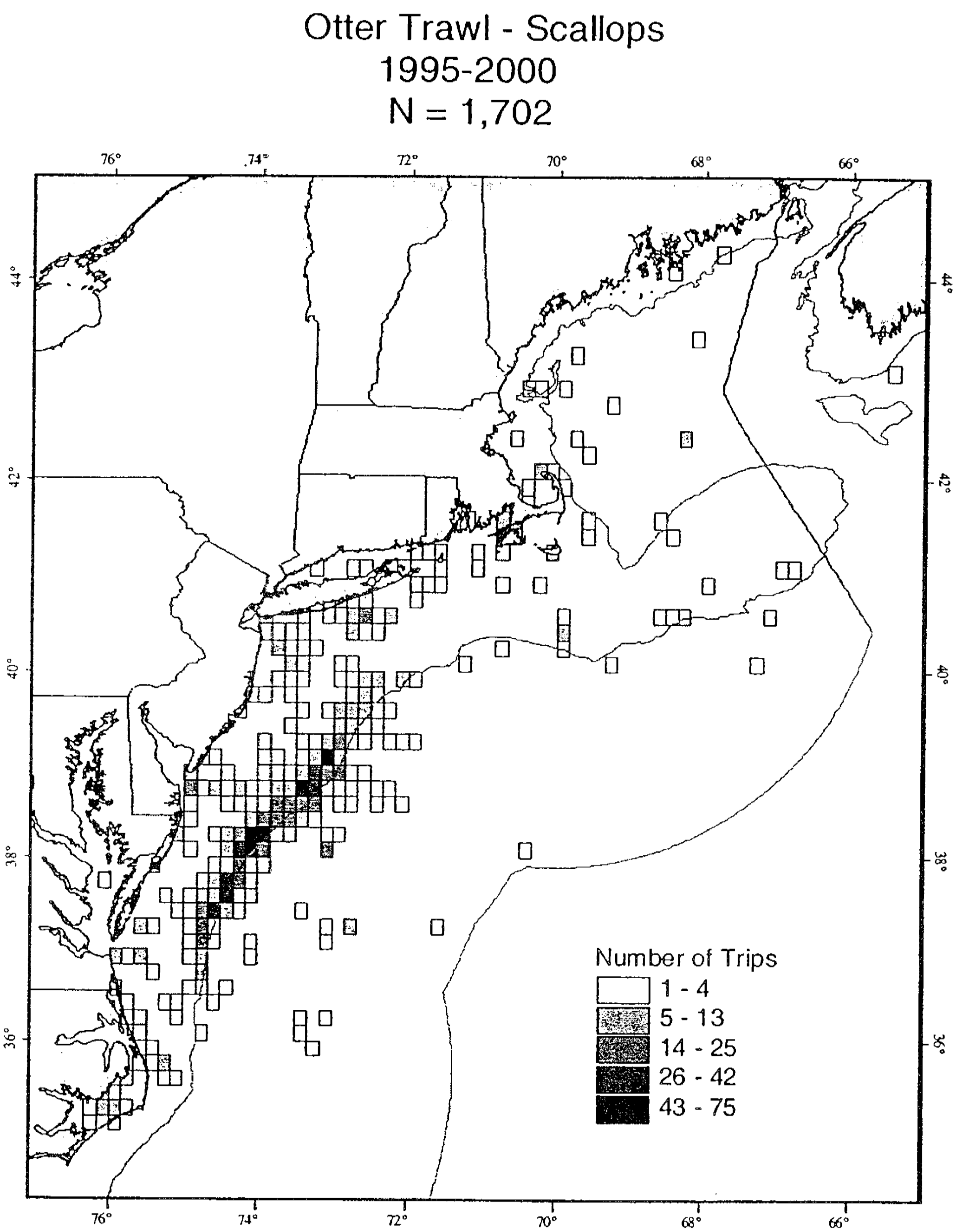

Otter Trawl - Scallops
1995-2000
N = 1,702
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 4
5 - 13
14 - 25
26 - 42
43 - 75

Figure 14

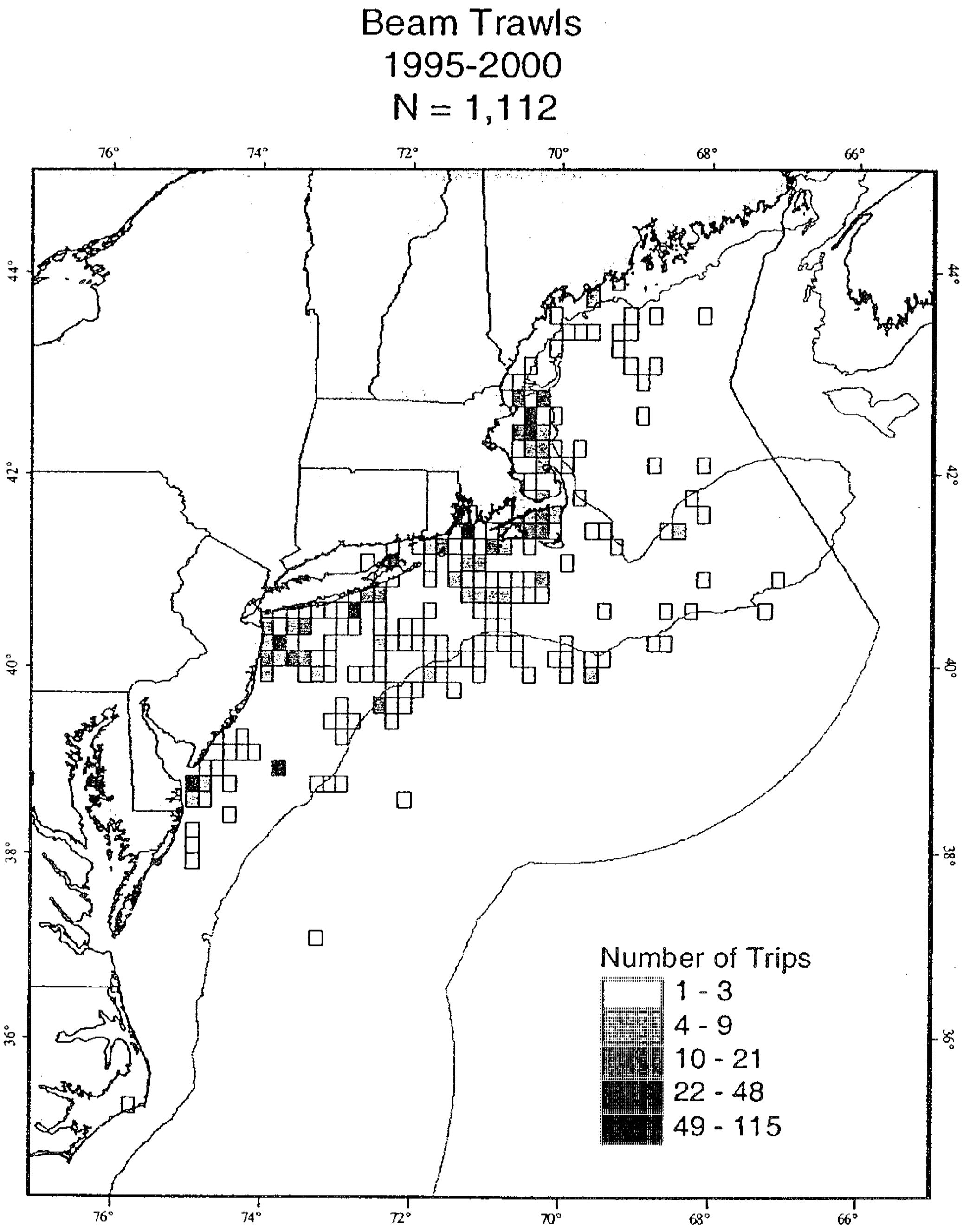

Beam Trawls
1995-2000
N = 1,112
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 3
4 - 9
10 - 21
22 - 48
49 - 115

Figure 15

All Dredges
1995-2000
N = 30,764

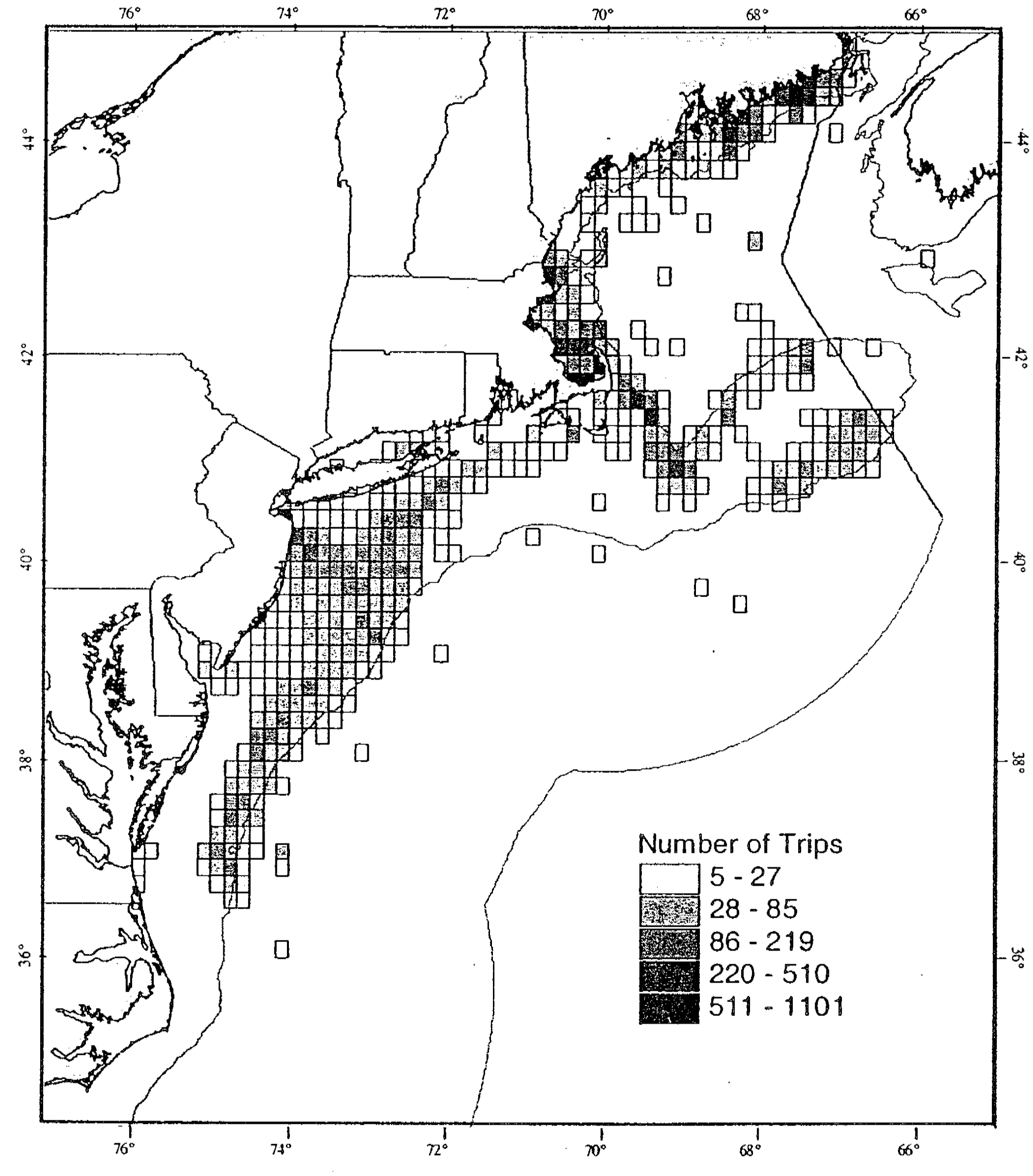


Figure 16

Surfclam and Ocean Quahogs

(not available yet)

Figure 17

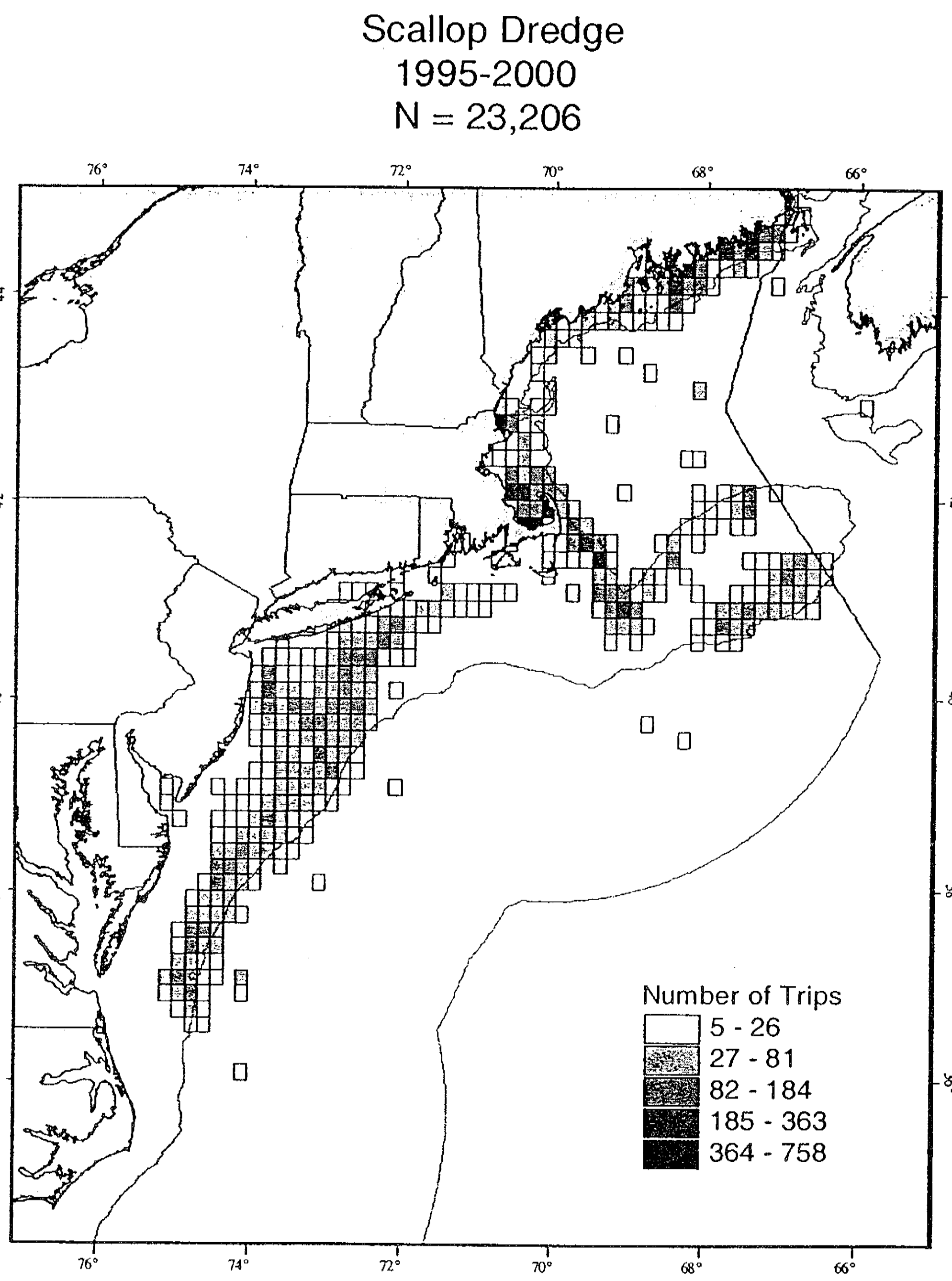

Scallop Dredge
1995-2000
N = 23,206
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
5 - 26
27 - 81
82 - 184
185 - 363
364 - 758

Figure 18

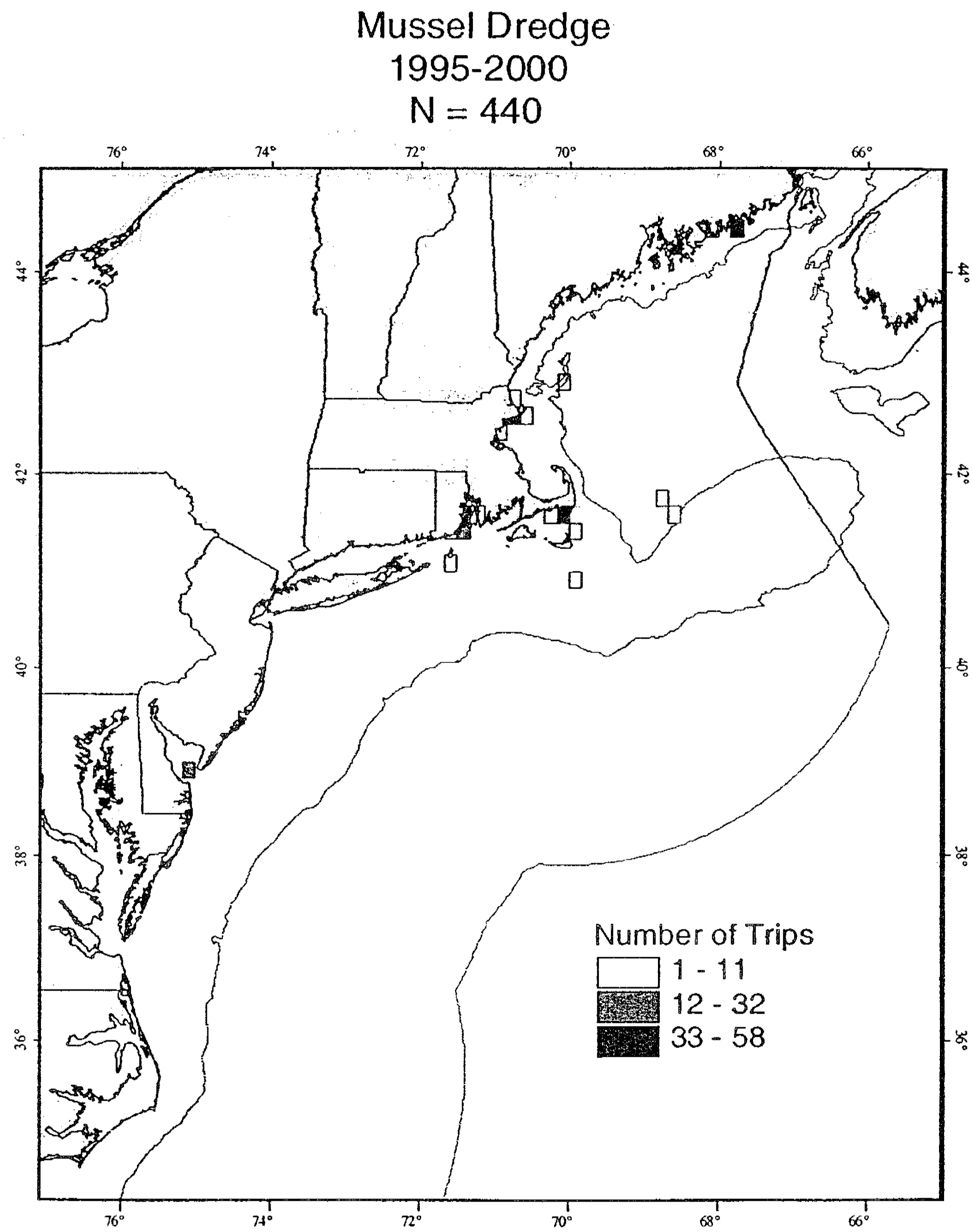

Mussel Dredge
1995-2000
N = 440
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 11
12 - 32
33 - 58

Figure 19

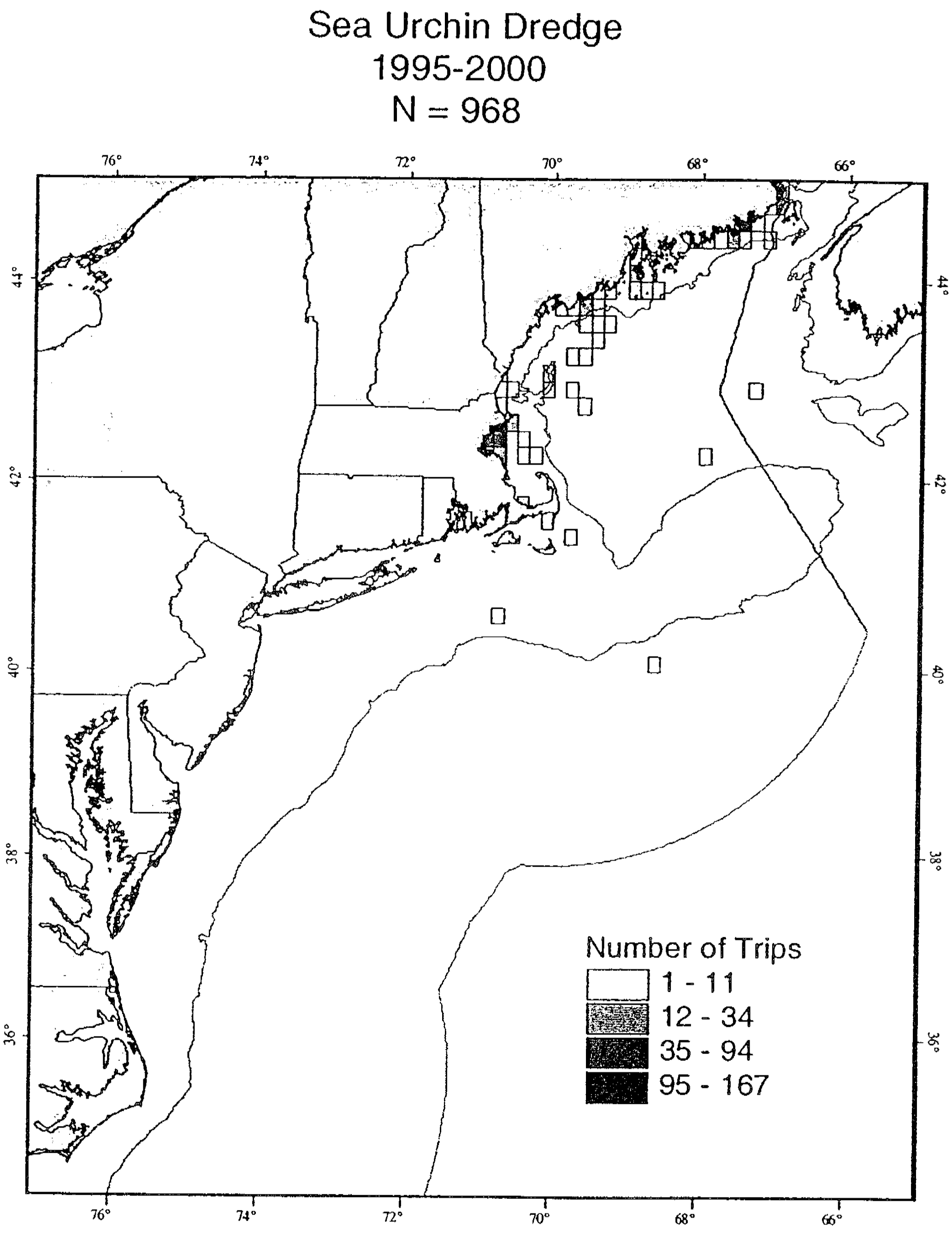

Sea Urchin Dredge
1995-2000
N = 968
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 11
12 - 34
35 - 94
95 - 167

Figure 20

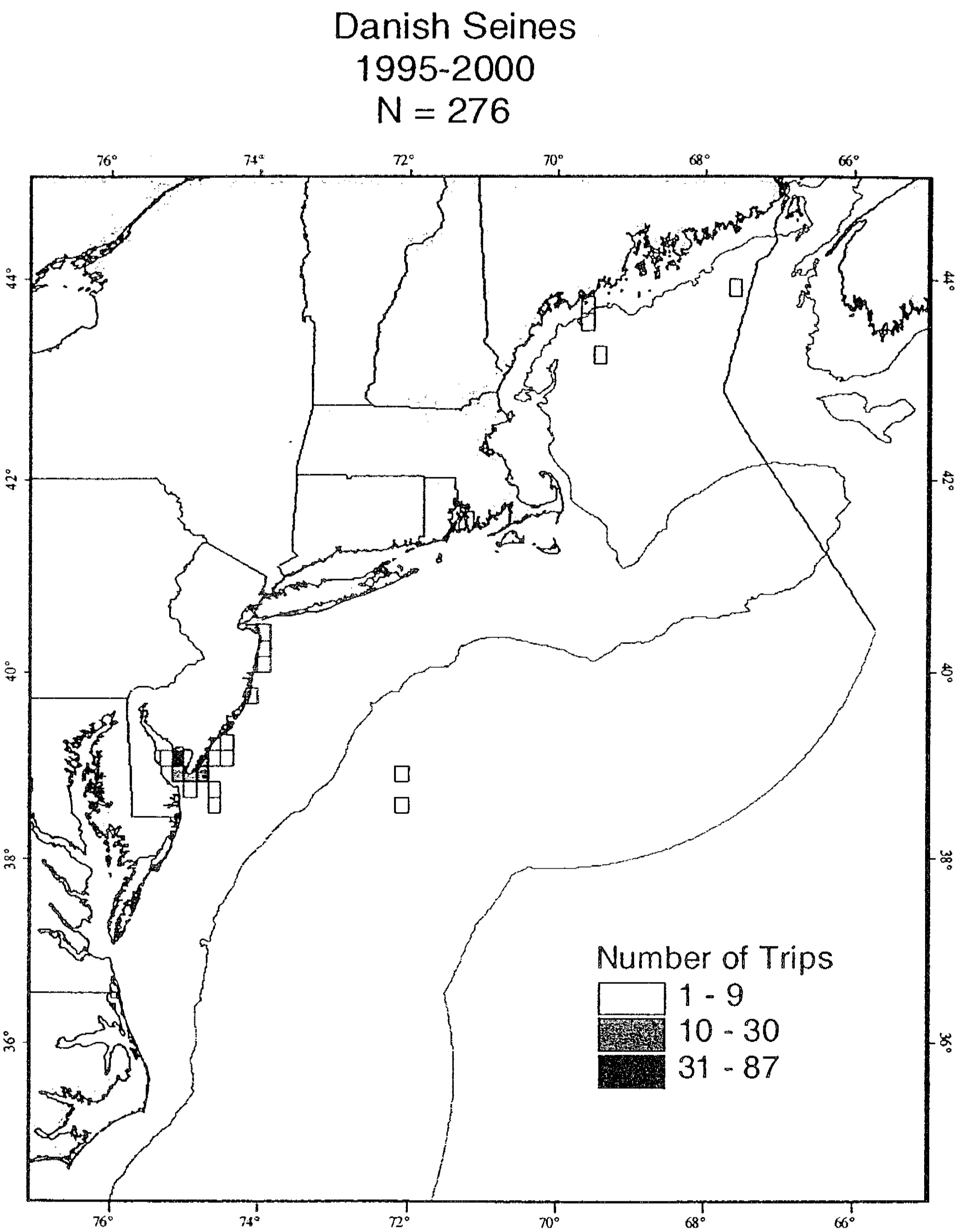

Danish Seines
1995-2000
N = 276
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 9
10 - 30
31 - 87

Figure 21

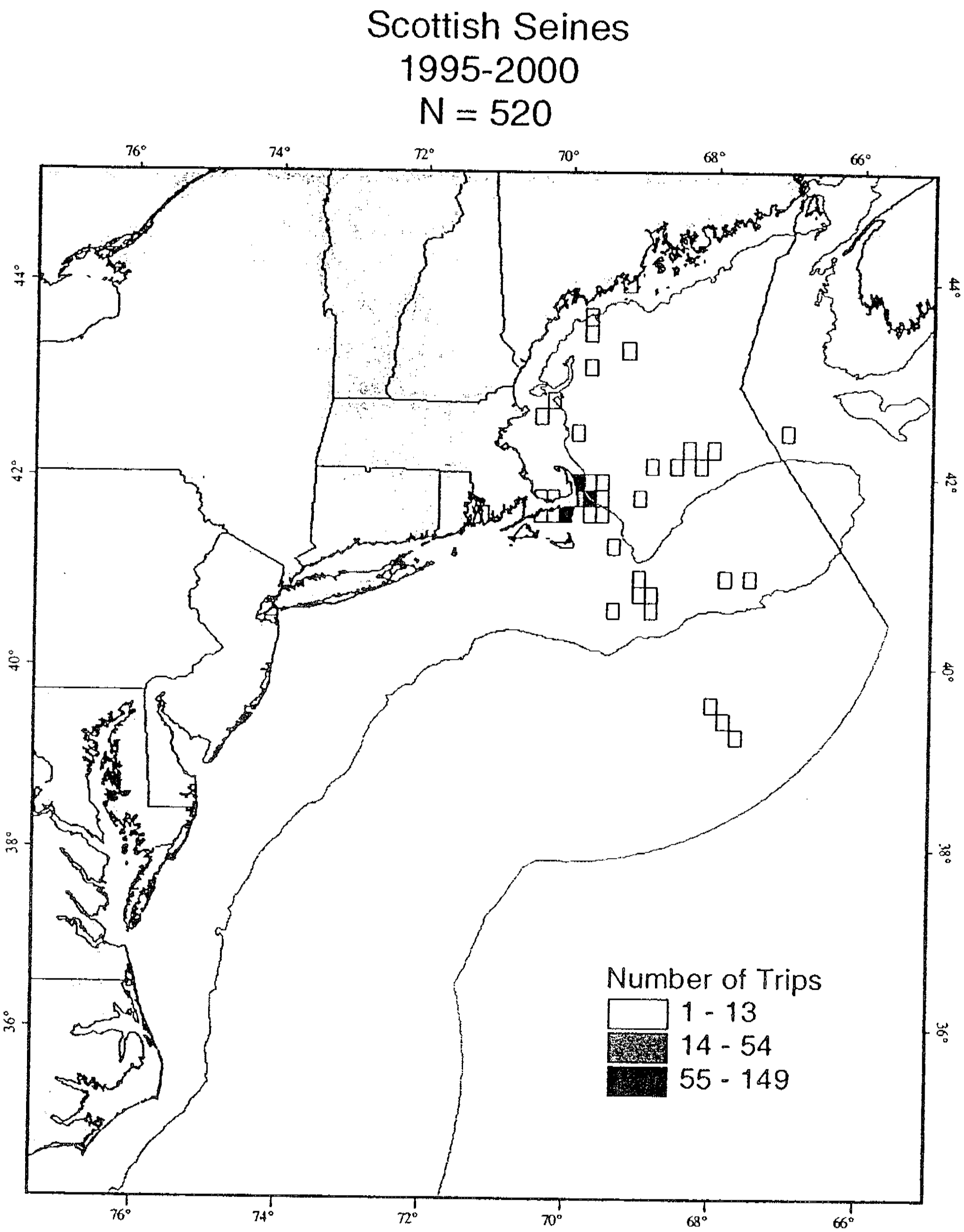

Scottish Seines
1995-2000
N = 520
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 13
14 - 54
55 - 149

Figure 22

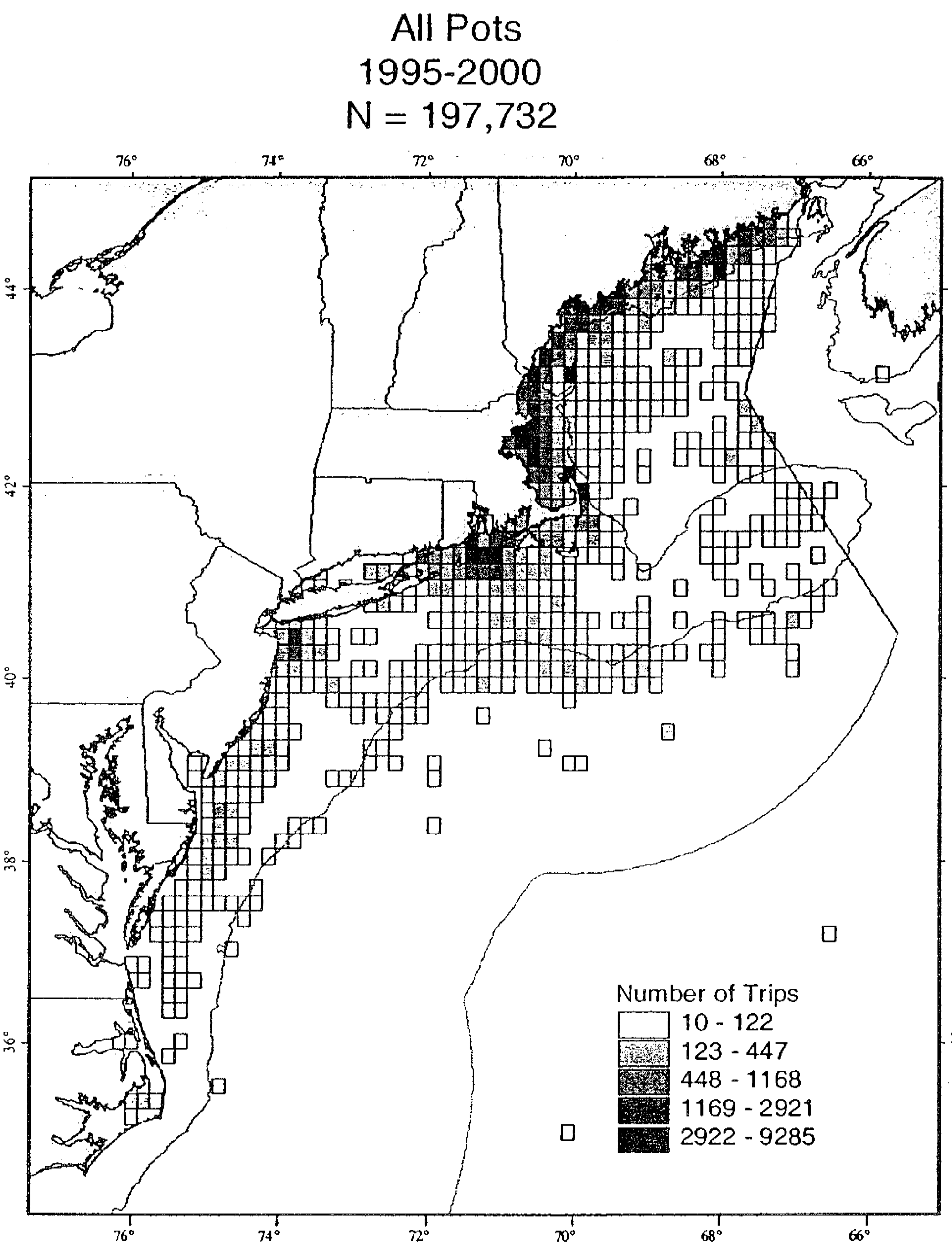
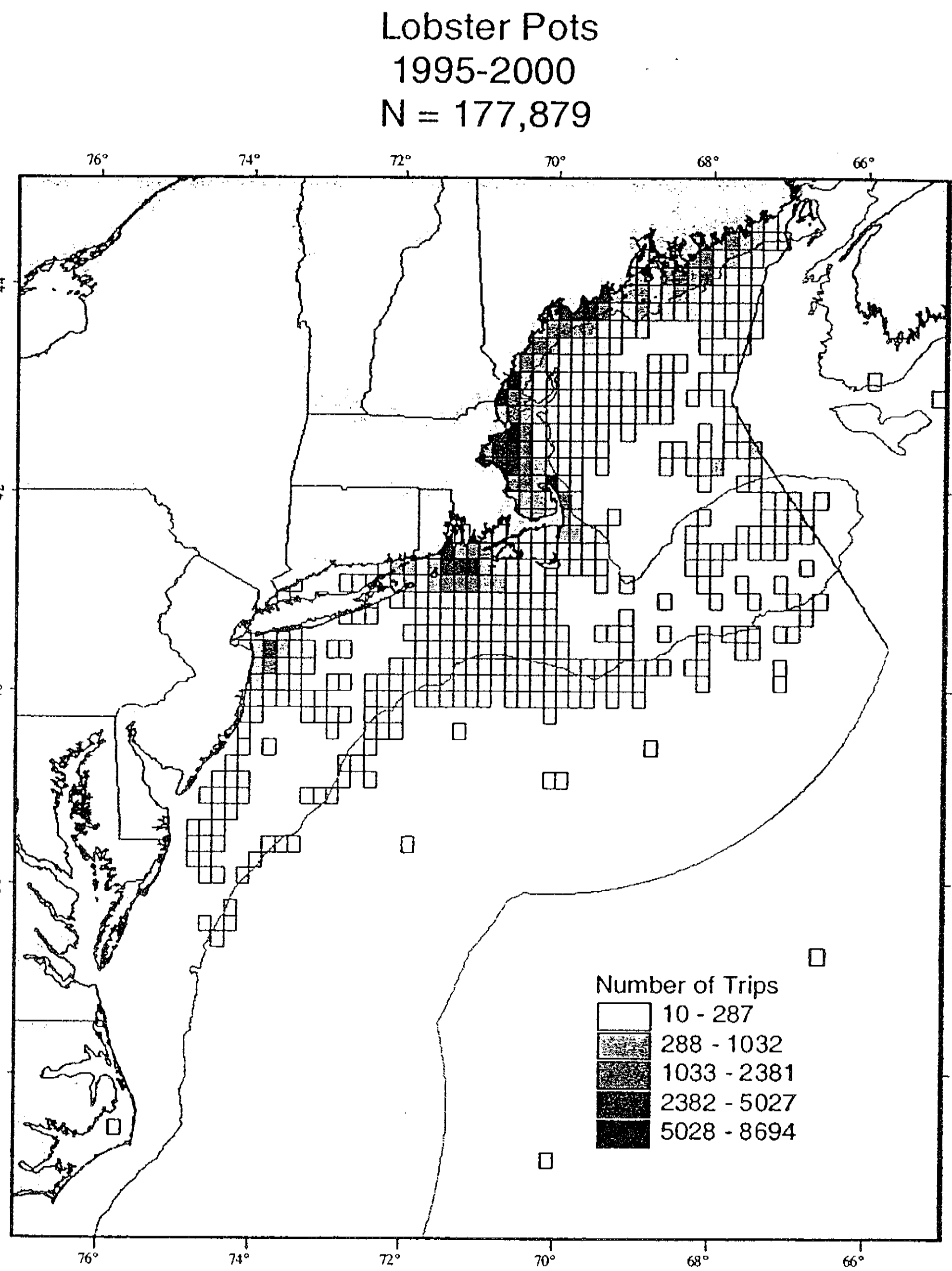

All Pots
1995-2000
N = 197,732
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
10 - 122
123 - 447
448 - 1168
1169 - 2921
2922 - 9285

Figure 23



Lobster Pots
1995-2000
N = 177,879
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
10 - 287
288 - 1032
1033 - 2381
2382 - 5027
5028 - 8694

Figure 24

Fish Pots
1995-2000
N = 7,697

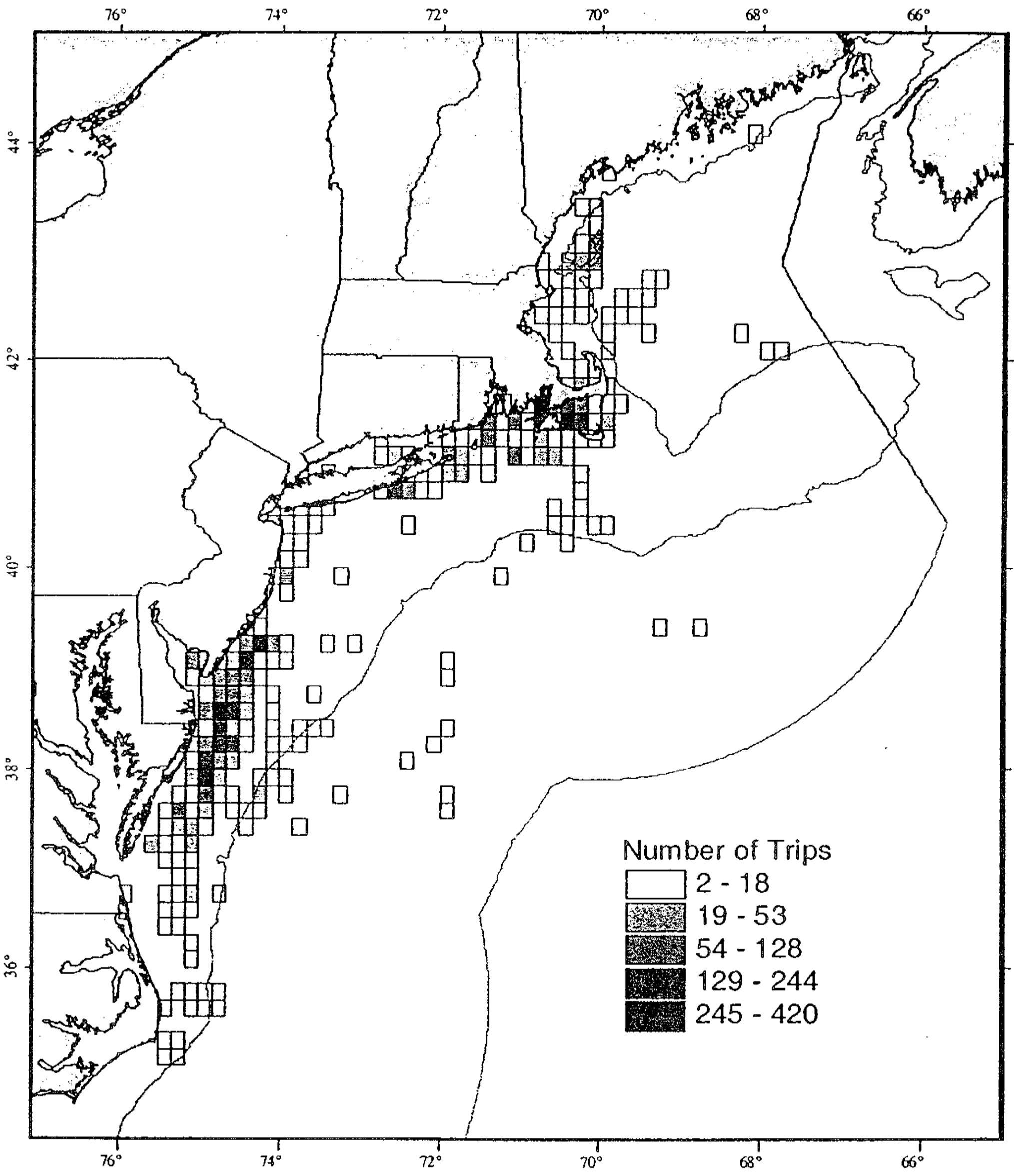


Figure 25

Crab Pots
1995-2000
N = 1,050

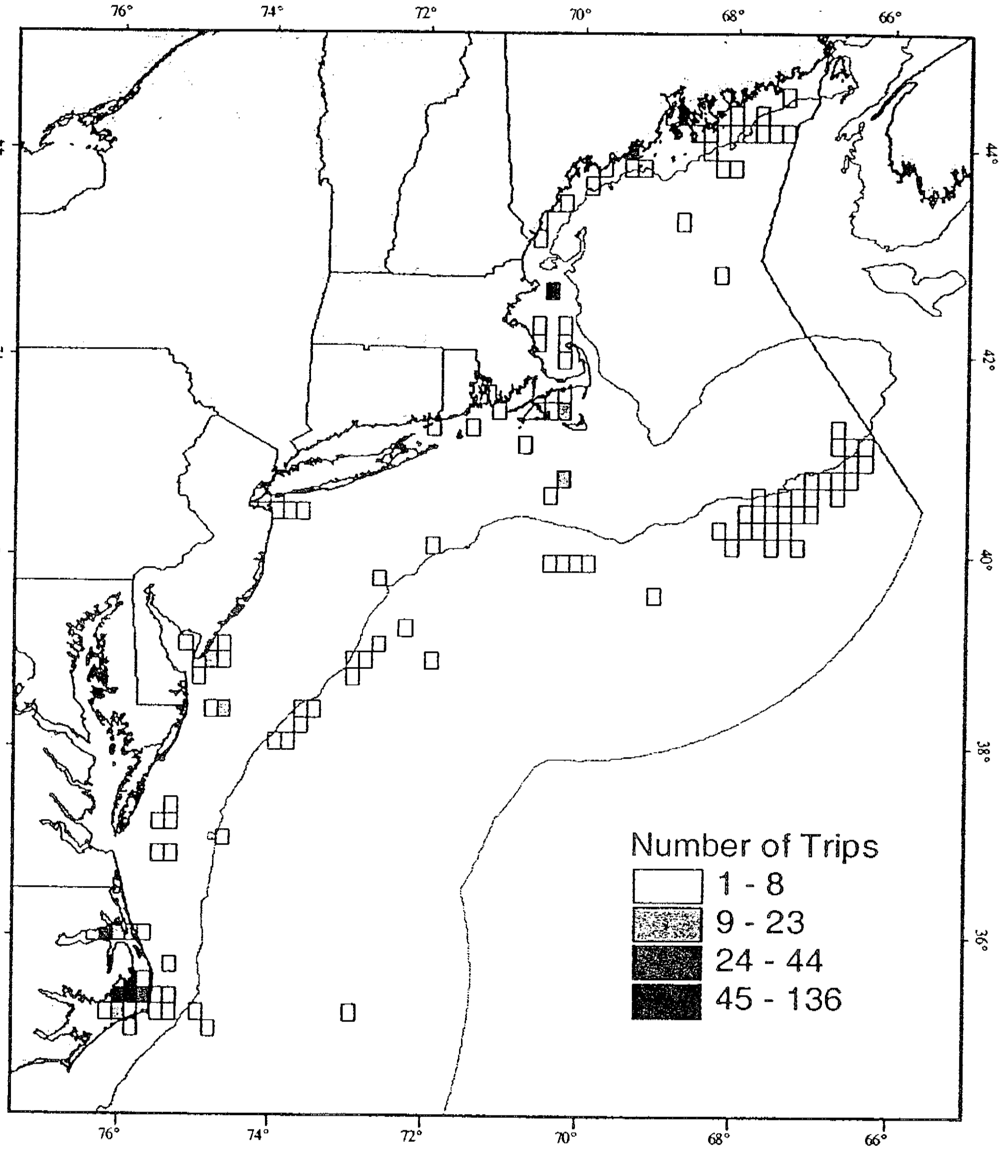
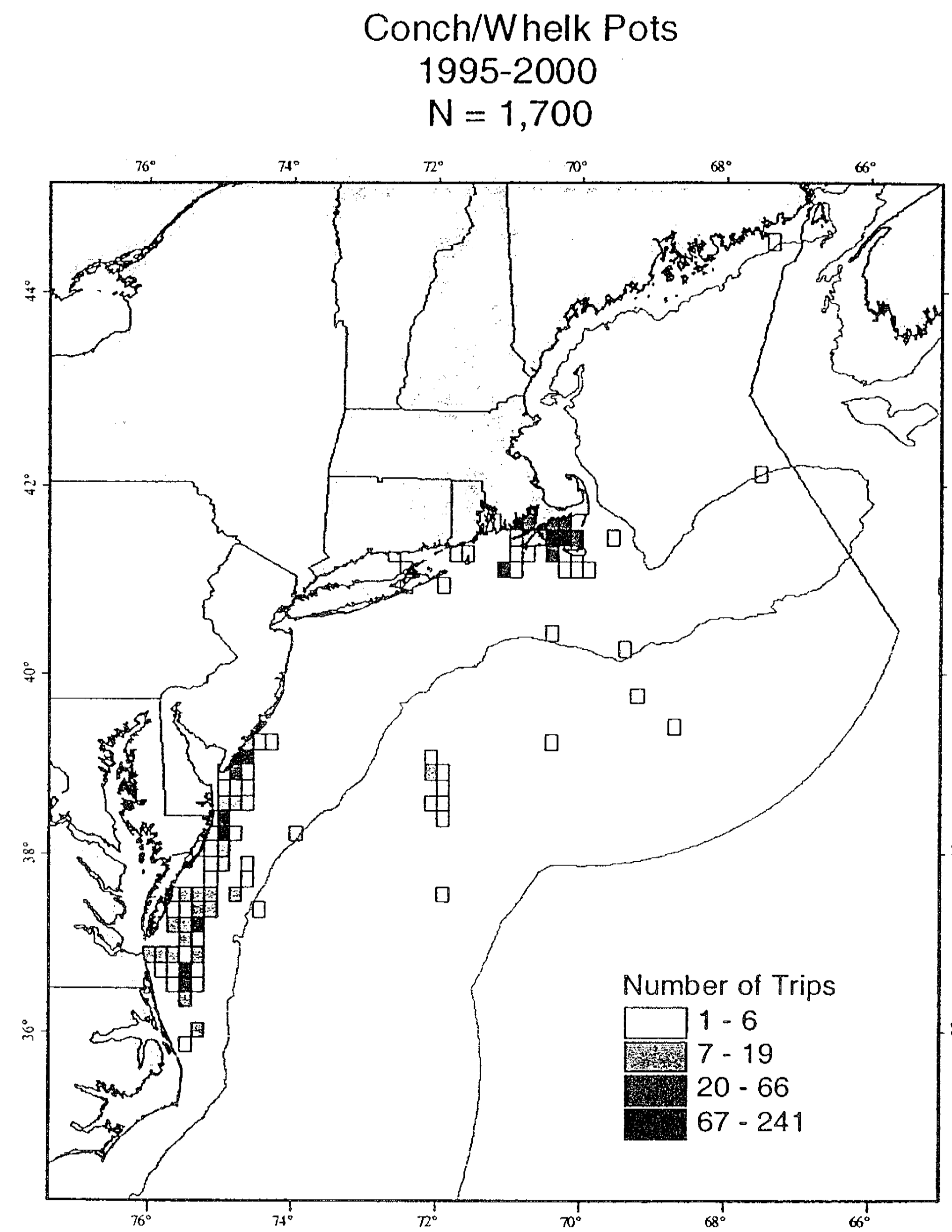


Figure 26



Conch/Whelk Pots
1995-2000
N = 1,700
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
1 - 6
7 - 19
20 - 66
67 - 241

Figure 27

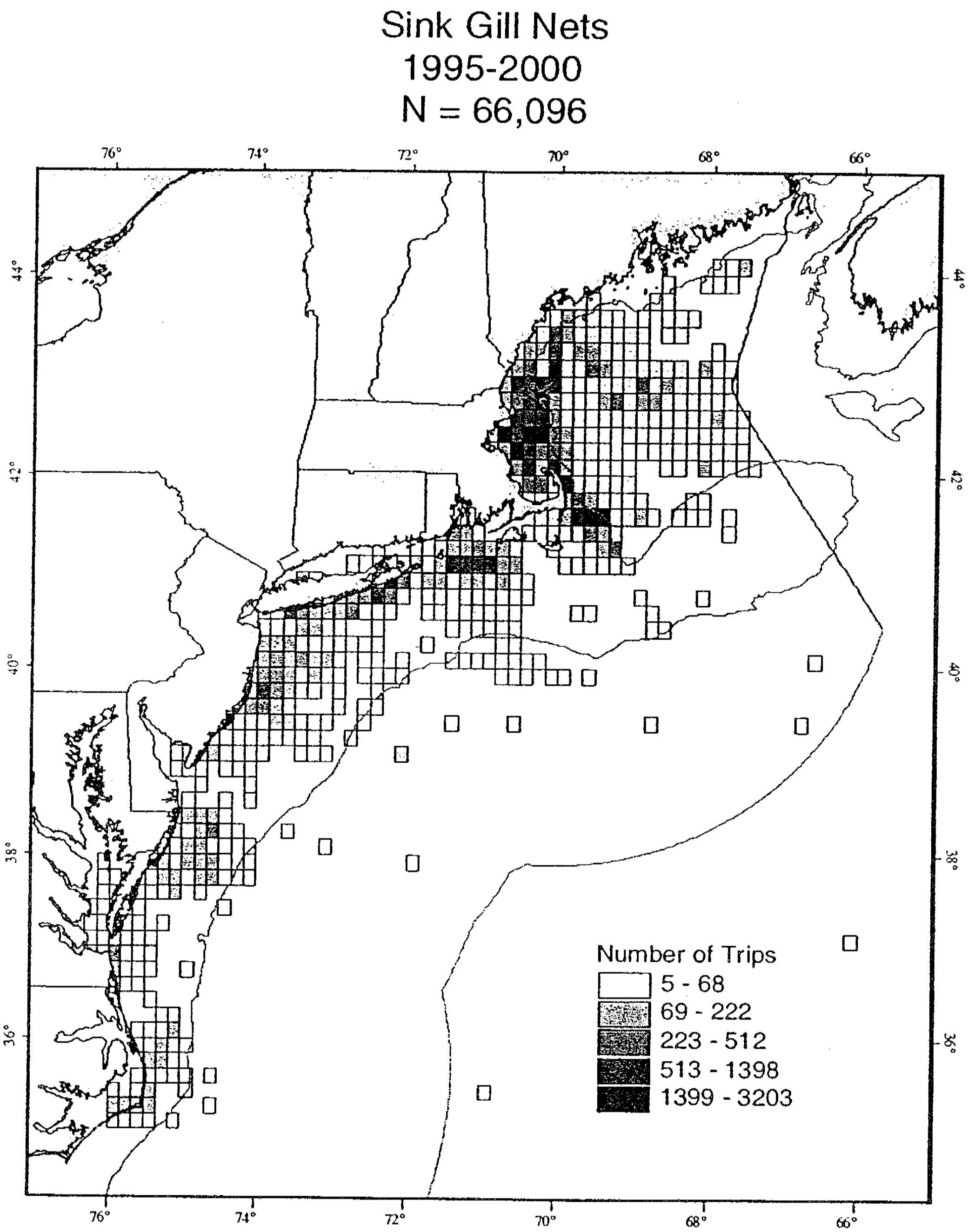

Sink Gill Nets
1995-2000
N = 66,096
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
5 - 68
69 - 222
223 - 512
513 - 1398
1399 - 3203

Figure 28

Hand Lines
1995-2000
N = 163,508

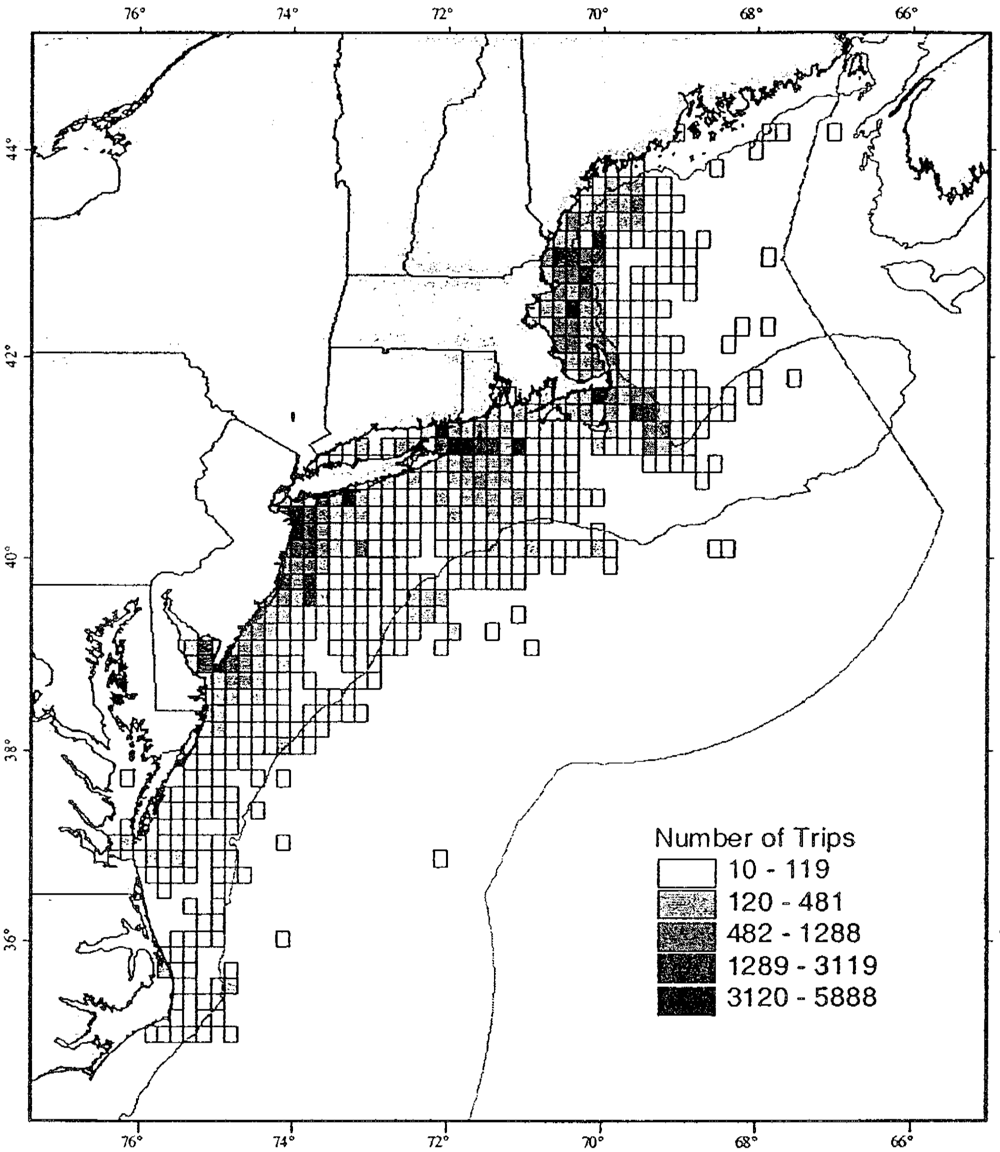
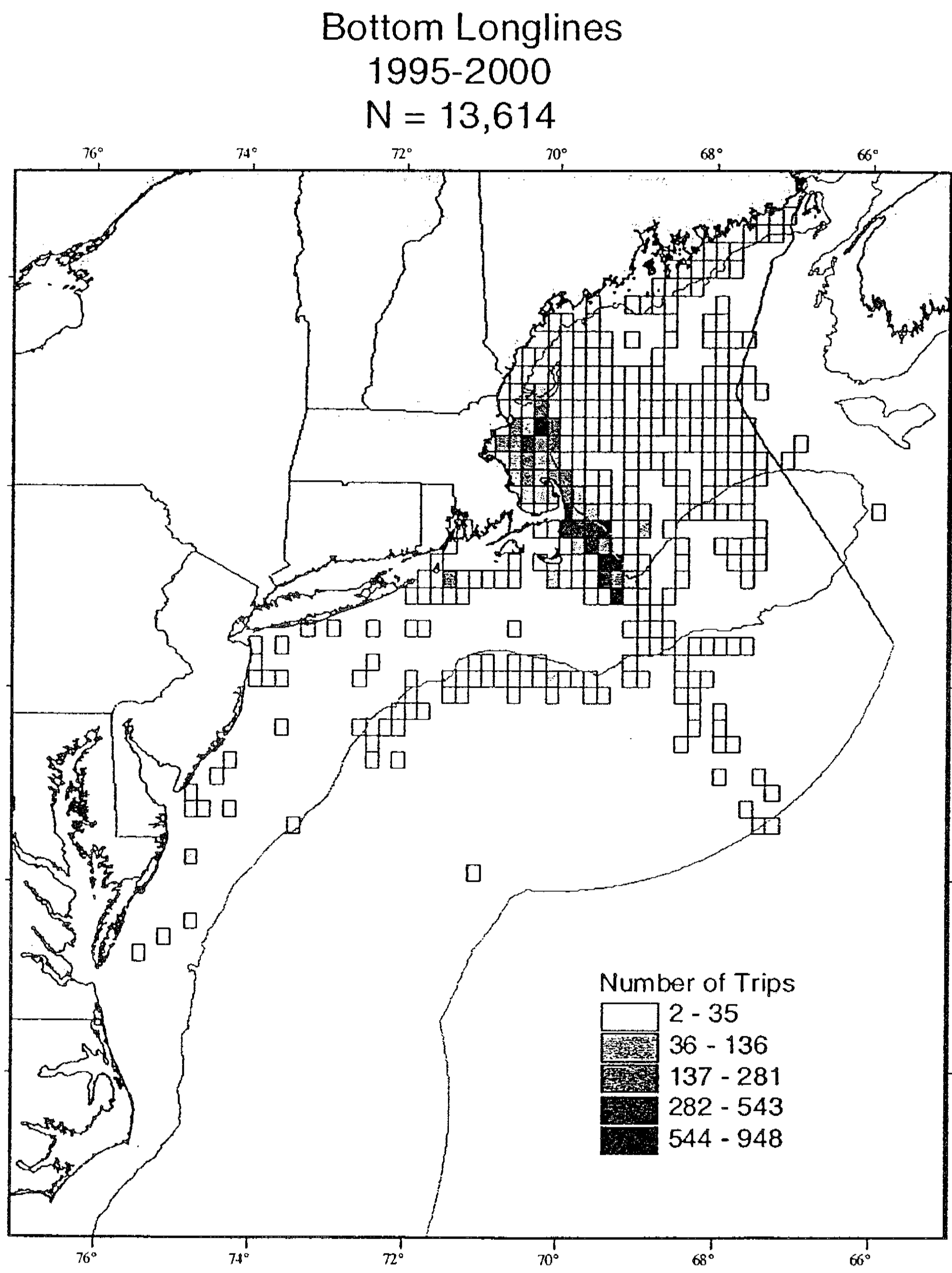


Figure 29



Bottom Longlines
1995-2000
N = 13,614
76°
74°
72°
70°
68°
66°
44°
42°
40°
38°
36°
Number of Trips
2 - 35
36 - 136
137 - 281
282 - 543
544 - 948

APPENDIX D. "WORKSHOP ON THE EFFECTS OF FISHING GEAR ON MARINE HABITATS OFF THE NORTHEASTERN UNITED STATES OCTOBER 23-25, 2001 BOSTON, MASSACHUSETTS" (NER EFH SC 2002)

August 19, 2002

Northeast Fisheries Science Center Reference Document 02-01

Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States October 23-25, 2001 Boston, Massachusetts

by

Northeast Region
Essential Fish Habitat
Steering Committee

February 2002

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01-18 **Report of the 33rd Northeast Regional Stock Assessment Workshop (33rd SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments.** [By Northeast Regional Stock Assessment Workshop No. 33.] December 2001.

01-19 **Report of the 33rd Northeast Regional Stock Assessment Workshop (33rd SAW): Public Review Workshop.** [By the 33rd Northeast Regional Stock Assessment Workshop.] December 2001.

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Northeast Fisheries Science Center Reference Document 02-01

Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States October 23-25, 2001 Boston, Massachusetts

by

Northeast Region Essential Fish Habitat Steering Committee

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The EFH Steering Committee would like the thank the workshop panel (listed in Appendix A) for their hard work and dedication to having a successful workshop. Thanks to Kathie Ciarametaro for her assistance with workshop logistics. Thanks to Jeff Citrin of Resolve, Inc. for providing workshop facilitation services.

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The views expressed herein are those of the workshop panel and do not necessarily reflect the views of the EFH Steering Committee members, the agencies they represent, or the sponsors.

INTRODUCTION

The 1996 Amendment to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) tasked the National Marine Fisheries Service (NMFS) and federal fishery management councils with identifying and describing essential fish habitat (EFH) for all species that are managed under a federal fishery management plan (FMP). Additionally, each FMP is required to identify and assess the impacts of all fishing gears on EFH, and where practicable, minimize any adverse effects caused by fishing.

Assessing gear impacts and implementing management measures that will minimize the effects of fishing requires scientific information documenting the following: the effects of different fishing gears and practices used in the region; the distribution of fishing effort; the distribution of habitats within the region; the recovery rates of the effected habitats; and any reduction of an essential fish habitat's capacity to support exploited marine resources as a result of fishing. Studies have been conducted in the Northeast region and in other geographic areas around the world which address some of these questions, but to date there has been little attempt to evaluate all of the available information in order to identify adverse impacts to the specific habitat types of the Northeast region. For the purposes of the workshop, the Northeast region encompasses the area from Maine through North Carolina. The uncertainty regarding the identification of adverse impacts on the various habitat types found within the Northeast has resulted in reluctance to implement risk-averse habitat protection measures.

The workshop convened a panel of experts in the fields of benthic ecology, fishery ecology, geology, fishing gear technology, and fisheries gear operations (List of Participants in Appendix A). The purpose of the panel was to assist the New England Fishery Management Council (NEFMC), the Mid-Atlantic Fishery Management Council (MAFMC) and NMFS with: 1) evaluating the existing scientific research on the effects of fishing gear on benthic habitats; 2) determining the degree of impact from various gear types on benthic habitats in the Northeast; 3) specifying the type of evidence that is available to support the conclusions made about the degree of impact; 4) ranking the relative importance of gear impacts on various habitat types; and 5) providing recommendations on measures to minimize those adverse impacts. The workshop was held from October 23 - 25, 2001, in Boston, Massachusetts (Workshop Agenda in Appendix B).

Although the workshop was entitled "The Effects of Fishing Gear on Marine Habitats of The Northeastern United States," the workshop focused on benthic habitats. The goal of the workshop was to evaluate the impacts of fishing gear used in federally regulated fisheries on habitats of the Northeast shelf ecosystem, and to recommend management measures that will reduce those impacts (Appendix C). Only impacts to habitat were considered; effects of fishing on exploited species populations were not considered. Definitions of terms, such as "adverse effect", that were used to focus the discussions are provided in Appendix D.

There will be two final products as a result of this workshop. The first is this workshop report which summarizes panel discussions and conclusions relating to the effects of fishing gears on benthic habitats in the Northeast region. The second product will be a peer reviewed document produced by NMFS staff which describes gear types used in federal and state waters in the

Northeast region, the spatial distribution of fishing trips made by each gear type in federal waters, oceanographic regimes and habitat types in the region, and the results of scientific studies of the effects of fishing gear on benthic habitats in the Northeast U.S. and elsewhere. Preliminary Draft copies of this document (White Paper) were distributed to panel members in advance of the meeting to assist them in achieving workshop objectives. These documents will be available for use by the NEFMC and MAFMC to fulfill their MSFCMA requirements to include an assessment of fishing gear impacts on EFH in all of their FMPs.

WORKSHOP FORMAT

Although there are many fishing gear types utilized in the Northeast region, the workshop focused on gear types that are federally managed under the MSFCMA. An exception to this was made for lobster pots due to their widespread use in both state and federal waters. The following gear categories were evaluated:

- Bottom-tending Static Fishing Gear
    - Pots and Traps
    - Sink Gill Nets, Bottom Long Lines
- Bottom-tending Mobile Fishing Gear
    - Clam Dredges (hydraulic and non-hydraulic)
    - Otter Trawls
    - Sea Scallop Dredges
    - Beam Trawls
- Pelagic Fishing Gears (Static and Mobile)

The panel was provided a set of 15 questions, in advance, to guide the workshop discussions (Appendix E). These questions were divided into four categories: gear descriptions, gear effects on habitat, strength of evidence supporting the effects, and management actions. Individual panelists led the discussion for each gear type, guided by the questions. Some discussion leaders provided short presentations on their assigned gears which were then followed by group discussions. During the first two evenings, the discussion leaders held individual sessions with selected experts and workshop staff to further evaluate the available information and to prioritize the effects of each gear type in different habitats. On the third and final day the panel reviewed the results of these sessions.

A gear impact matrix was completed for each gear type which summarized the degree of impact for three substrate types, mud, sand, and gravel (Appendix D for definitions). The panel evaluated the types of impact caused by the gear for each substrate type, the degree of each impact, the duration of the impact, and the type of evidence available to support these conclusions. Four types of impacts were considered for each gear type and habitat: 1) removal of physical features; 2) impacts to biological structure; 3) impacts to physical structure and; 4) changes to benthic prey (Appendix D for definitions). After the matrices for each gear type were completed, the panel ranked the relative significance of each gear and impact type for all three substrate types. Once the types of impacts and habitats of greatest concern were identified, the panel recommended management actions that could be considered by the Councils to reduce the adverse effects of fishing gear on benthic habitats in the Northeast region.

This report clearly identifies when panel consensus was reached, and when points are attributed to individual panelists. The workshop began with introductory remarks by representatives of NMFS, MAFMC and NEFMC. The following sections summarize the introductions, discussions, conclusions and recommendations of the panel.

INTRODUCTORY PRESENTATIONS

NMFS Welcoming Address

Peter D. Colosi, Jr., Assistant Regional Administrator for Habitat Conservation

I am excited to welcome you to this workshop on the effects of fishing gear on fish habitat with such a panel of knowledgeable scientists, gear technologists, and fishermen.

As most of you are aware, with the 1996 Amendment to the Magnuson-Stevens Fishery Conservation and Management Act, the National Marine Fisheries Service and fishery management councils have had the task of identifying and describing essential fish habitat for all federally managed species. Additionally, we have had to identify and assess the relative impacts of all fishing gears on essential fish habitat for all of our fishery management plans, and where practicable, minimize any adverse effects from fishing.

Assessing gear impacts and implementing management measures to minimize impacts has been a very daunting task when faced with limited scientific information related to gear impacts on specific habitats, recovery rates, and the applicability of research conducted in other locations to the Northeast. Additionally, we are currently unable to quantify the intensity of gear interaction on specific habitat types in the Northeast. This has lead to much uncertainty regarding the identification of adverse impacts to the various habitat types found within the Northeast as well as apprehension to implement risk-averse habitat protection measures.

This panel has been convened to assist in interpreting the existing scientific research, determining the applicability of existing studies to the Northeast and evaluating the strength of that evidence. Your deliberations over the next three days, will provide valuable information to the New England and Mid-Atlantic Fishery Management Councils for use in fulfilling the habitat requirements of the Magnuson-Stevens Act.

I would also like to take this time to thank the Northeast Region EFH Steering Committee, which is comprised of staff from the National Marine Fisheries Service's Regional Office and Northeast Fisheries Science Center, the Mid-Atlantic and New England Fishery Management Councils and the Atlantic States Marine Fisheries Commission, for their hard work in organizing this workshop.

Good Luck over the next several days and I look forward to your results.

Mid-Atlantic Fishery Management Council Welcoming Address

Gary Caputi, Vice-Chairman, Ecosystem Planning Committee

On behalf of the Mid-Atlantic Fishery Management Council, its members and staff, I'd like to welcome this distinguished group of scientists, fishery managers and fishermen to this important workshop. It is our hope that the documents and the recommendations for future research produced by this gathering of specialists will help us move forward with the responsibilities placed on our shoulders by the Sustainable Fisheries Act.

With the passage of the Act in 1996, Congress and the Administration charged the eight regional management councils with identifying essential fish habitat and addressing threats to the health and viability of that habitat. One perceived threat was specifically identified in the language of the Act and was, therefore, required to receive a heightened level of investigation and action in FMP amendments. That is the impact of fishing gear on EFH or its subset, habitat areas of particular concern (HAPCs).

In trying to meet this mandate, the Mid-Atlantic Council has run into a problem caused by the lack of targeted scientific data addressing specific gear types used in the wide ranging fisheries we are responsible for managing. This poses a dilemma for managers because we have found ourselves unable to identify whether specific gears pose a threat or have no impact on the wide range of marine habitats exposed to their use. The problem is a double-edged sword. Our inability to justify positions on gear impacts has generated disapprovals of portions of recent plan amendments in which we identified no discernable impacts as well as those in which we identified possible impacts. Without adequate scientific documentation, the decisions we make are unsupported and, therefore, cannot be approved by the Agency and the Secretary. That is why this workshop was developed and why we have asked for this distinguished panel to convene. We desperately need scientific documentation to support the management objectives we assume under the Sustainable Fisheries Act so we can we do our jobs better.

In the past, a lot of scientific investigation was performed and scholarly papers were published on a wide variety of subjects. Many did little to provide fishery managers with the bedrock work they need to make better management decisions. This is not to say that such work was not important, or that it did not serve a purpose in furthering our understanding of the marine environment and its workings. But when it comes to the work the Councils are charged with performing, scientific research and documentation is required that specifically addresses our needs. It is in the management process that the scientific rubber meets the road and that is why the steering committee has worked so diligently to make it clear what we as managers need from you as scientists to make our efforts to rebuild and maintain sustainable fisheries and protect the marine environment more successful.

In the past two years, the Mid-Atlantic Council has seen the "Gear Impacts" sections of four major FMPs disapproved. They include *Summer Flounder, Scup and Black Sea Bass*; *Surfclams and Ocean Quahogs*; *Squid, Mackerel and Butterfish* and the *Bluefish FMP*. The amount of work involved in writing these plan amendments, incorporating entirely new sections detailing EFH and then trying to divine whether there are or are not threats to the identified important habitat from fishing gear, with little or no scientific data to fall back upon, was a frustrating exercise. One that we do not want to see repeated. Our inability to adequately identify gear impacts has lead to the Council and the Agency being criticized by constituencies on all sides of this rather volatile issue.

Not only have we experienced amendment disapprovals in major plans, but we have also been unable to justify the incorporation of "gear restricted areas" in the *Tilefish FMP*. Tilefish represent possibly the most habitat dependent of all the species of finfish the Mid-Atlantic Council is responsible for managing. It is a sedentary species that is believed to spend a major portion of its life cycle in relationship to burrows in the clay bottom located near the major canyon heads and along the edge of the continental shelf. After a great deal of examination of the existing data, it was "divined" that the doors of bottom tending mobile gear presented a potential negative impact to tilefish burrows. Therefore boundaries were developed to identify areas known to have concentrations of burrows and the Council proposed a restriction on the use of bottom tending mobile gear in those areas. Did the Council go too far? By proposing this action, based on impressions gleaned from the limited scientific study available, did the Council overstep its bounds? Apparently so because the gear restricted area concept was found to be unjustifiable after lengthy public hearings.

Without concise documentation, fishery managers are damned if they do and damned if they don't act. Is it possible that there is sufficient published literature to justify some actions or inactions, but it simply has not been compiled into documents that will stand up under Agency and possible judicial review? That is for you to determine.

It is our desire to see this workshop produce a comprehensive compendium of the work already done on identifying gear impacts to marine habitat and also identify areas where additional work is necessary that directly addresses the needs of managers so that we may accomplish our mandates in a more accurate and timely manner. With that, we wish you Godspeed and good luck in your endeavor.

New England Fishery Management Council Welcoming Address

Doug Hopkins, Chairman, Habitat Committee

Good morning and thank you for the invitation to speak to you as you begin these important deliberations on the effects of fishing gear on fish habitat.

My name is Doug Hopkins. I am wearing four hats, those of New England Council member, Chair of the Council's Habitat Committee, Environmental Defense staff member, and lawyer. So the lens through which I view these issues may be a little different from yours.

Yes, you will identify many, many unanswered scientific questions related to the effects of fishing gear on marine habitat and will conclude that much additional research is needed. Nevertheless, you can play a critical role in helping the regional councils, the National Marine Fisheries Service and the scientific community to avoid paralysis, and I urge you to do so.

Let's look closely at the Magnuson-Stevens Act mandate. The law, as amended by the Sustainable Fisheries Act (SFA), allows -- actually it requires -- action by the councils and NMFS to protect habitat from harmful fishing impacts even in the absence of thorough scientific understanding.

Yours is not a forensic undertaking whose aim is to present evidence for a jury to conclude beyond a reasonable doubt what gear should be convicted of assault and battery on Essential Fish Habitat (EFH). Congress has already reached the conclusion that many of today's fishing gears and practices adversely affect EFH.

It is now the managers' job to implement all practicable measures to minimize harm by fishing gear to EFH. This is what the SFA requires. So what do we, as managers, need from you, the scientific experts, so that we can do our jobs effectively? We need a diverse menu of measures that singly or together will reduce the adverse effects of fishing on habitat. We also need good explanations that let us, fishermen and the general public understand how these measures will provide benefits to fish habitat. In addition, and very importantly, we need as much help as possible prioritizing these proposed measures by characterizing the relative expected benefits of each.

Finally, and crucially, since the Magnuson-Stevens Act requires that any fishery management plan must "minimize to the extent practicable adverse effects on . . . [essential fish] habitat caused by fishing," the regional councils and NMFS need your help to systematically evaluate the practicability of each of the measures you propose. To do this you may have to include in your deliberations fishery economists and other experts who are not present today for this workshop.

Addressing a few other points, first I believe the New England Council would welcome suggestions for creating incentives for fishermen to develop and adopt new fishing practices and gear that would reduce harmful habitat impacts, so long as they would in fact benefit habitat. In other words we seek your help identifying ways to harness the enormous, proven ability of fishermen to solve problems and increase their efficiency through innovations in gear and fishing methods.

Next, I wish to highlight an example of a proposed measure that needs additional scientific input to adequately evaluate its potential. The New England Scallop Oversight Committee and the full Council are considering a measure for possible inclusion in Amendment 10 to the Scallop FMP that would bar future scallop fishing from the historically least productive scallop grounds. The pertinent scientific question then is whether data exist to determine whether the historically least productive scallop grounds can be distinguished from the historically most productive? The initial designation of the least productive grounds would not have to be perfect, only scientifically supported and practicable. If subsequent surveys disclosed that a rare but significant set of scallops had occurred in an area initially closed as within the historically least productive grounds, a subsequent framework adjustment to the FMP could always reopen the area.

Touching on research needs, I want to emphasize that the regional councils and NMFS clearly need significant input from the scientific community to identify and prioritize additional research that would help to answer important questions related to minimizing the adverse effects of fishing on EFH. That said, identifying research needs should not become an excuse for management inaction. You can help the Councils and NMFS determine how best to encourage valuable research. For example, we need to know: How can the New England Council and NMFS best utilize the Research Steering Committee? Should we be considering creating Habitat Research Areas where fishing activity would be barred except as specifically allowed for research? If so where should these be sited and how large should they be? How important would it be to have baseline benthic surveys done and how should the survey areas be prioritized, recognizing that funding won't allow them to be completed all at once?

When it comes to research, engendering accurate expectations of the benefits of specific research projects will be critical. The Councils, the fishing communities and the general public need accurate information as to how long any particular research activity will likely take to yield results relevant to management decisions. Is it two years, five years or 20 years? Unrealistic expectations can damage scientific credibility among non-scientists and erode public confidence in fishery management.

In conclusion, Congress has determined that fishing gear and practices can and must evolve to reflect the scientific understanding we have of the high and unnecessary cost of fishing on the marine environment. Fishing yields food for people to eat and money and livelihoods for fishermen and their communities. You can help the fishery managers and fishermen to figure out better ways to provide these yields more sustainably than current fishing practices allow. The technology and practices used to catch fish in New England have not changed significantly for decades, while scientific understanding of the stresses on marine ecosystems caused by fishing has grown dramatically during this time. This imbalance is simply wrong. Your scientific advice will be crucial to helping managers and fishermen change fishing gear and practices to dramatically decrease their ecological and economic costs.

Thank you, and good luck in your deliberations over the next three days.

HABITAT CHARACTERIZATION

Dr. Page Valentine (U.S. Geological Survey) summarized major marine habitat characteristics applicable to the Gulf of Maine, Georges Bank, southern New England and mid-Atlantic Bight and their variability in terms of topography, sediment texture and hardness, substrate roughness and surface area, substrate dynamics, water column characteristics, habitat usage, and fishing impacts (Table 1). This is information that could be considered when evaluating the setting, function, and vulnerability of various habitats. Additional information was presented for eleven different geographical habitat types on Georges Bank and in the Gulf of Maine using these generalized habitat characters (Appendix F). No detailed information was presented for habitat types in southern New England and the mid-Atlantic Bight.

Panel members concluded that this was very useful information and recommended that: 1) detailed habitat types between Cape Cod and Cape Hatteras also be described, and 2) several new characters be added to the habitat type descriptions. It was noted that information is available for certain habitats (e.g., soft corals) south of Cape Hatteras. Additional habitat characters that were suggested by panel members were the principal types of fishing activity, estimates of the area covered by each habitat type, and depth range. Dr. Valentine pointed out that there is some information on the areal extent of some of the offshore habitats he described in the Gulf of Maine – Georges Bank region, particularly for Georges Bank itself, but thorough maps are not available.

Table 1. Habitat Characteristics and Variability

HABITAT CHARACTER	VARIABILITY
TOPOGRAPHY	FEATURELESS -- FEATURES
SEDIMENT TEXTURE [and HARDNESS]	FINE --- COARSE -------------------------- [SOFT] --- [HARD] -------------------------- MUD ---------------------- SAND ------------ GRAVEL; SHELLS; BEDROCK
SUBSTRATE ROUGHNESS [and SURFACE AREA] · PHYSICAL · BIOLOGICAL	SMOOTH -- ROUGH [LOW] -- [HIGH] MUD ---------------------- SAND --------------- SHELLS; GRAVEL; BEDROCK | --BURROWS-- | | --------- BEDFORMS ------ | | --STRUCTURES (TUBES and ATTACHED EPIFAUNA) ------------------
SUBSTRATE DYNAMICS · PHYSICAL mud, sand, shells · BIOLOGICAL -------------------------------------- · PHYSICAL hard bottom · BIOLOGICAL	WEAK CURRENTS --- STRONG CURRENTS ------------------------------- TIDAL; STORM; OTHER ------------------------------- STABLE SUBSTRATE ---------------------------------- UNSTABLE SUBSTRATE MUD ---------------- | SAND --------------------- | ------------------ SAND and SHELL MOVEMENT ---- ADAPTED TO STABLE ---------- and/or ------MOVING SEDIMENT------------- STABLE SUBSTRATE --- GRAVEL MOUNDS, BEDROCK, GRAVEL PAVEMENT ------------------------- ADAPTED TO NON-MOVING SUBSTRATE
WATER COLUMN PRODUCTIVITY WATER DEPTH	STRATIFIED --- MIXED LOW --- HIGH DEEP -- SHALLOW
HABITAT USAGE · by FAUNA · by FISHERS	 SPAWNING, JUVENILE SURVIVAL, ADULT POPULATION ROUNDFISH, FLATFISH, BIVALVES (EPIFAUNAL, INFAUNAL) TARGET SPECIES and/or HABITATS using MOBILE GEAR, STATIONARY GEAR
FISHING IMPACTS · PHYSICAL · BIOLOGICAL	 TOPOGRAPHIC FEATURES, TEXTURE, ROUGHNESS and SURFACE AREA, SUBSTRATE DYNAMICS ROUGHNESS and SURFACE AREA (TUBES and ATTACHED EPIFAUNA), BIODIVERSITY

EFFECTS OF FISHING GEAR

CLAM DREDGES

Gear Description

Mr. Dave Wallace (Wallace and Associates) presented a thorough description of the evolution and current use of the hydraulic clam dredge for the surfclam and ocean quahog fisheries. A brief discussion of "dry dredges" used in the Maine "mahogany" ocean quahog fishery was led by Mr. Wallace with contributions from the workshop panelists. This section of the report summarizes his presentation and the panel discussion.

Hydraulic clam dredges have been used in the surfclam fishery for over five decades and in the ocean quahog fishery since its inception in the early 1970s. These dredges are highly sophisticated and are designed to: 1) be extremely efficient (80 to 95% capture rate); 2) produce a very low bycatch of other species; and 3) retain very few undersized clams.

The typical dredge is 12 feet wide and about 22 feet long and uses pressurized water jets to wash clams out of the seafloor. Towing speed at the start of the tow is 2.5 knots and declines as the dredge accumulates clams. The dredge is retrieved once the vessel speed drops below 1.5 knots, which can be only a few minutes in very dense beds. However, a typical tow lasts about 15 minutes. The water jets penetrate the sediment in front of the dredge to a depth of about 8 - 10 inches, depending on the type of sediment and the water pressure. The water pressure that is required to fluidize the sediment varies from 50 pounds per square inch (psi) in coarse sand to 110 psi in finer sediments. The objective is to use as little water as possible since too much pressure will blow sediment into the clams and reduce product quality. The "knife" (or "cutting bar") on the leading bottom edge of the dredge opening is 5.5 inches deep for surfclams and 3.5 inches for ocean quahogs. The knife "picks up" clams that have been separated from the sediment and guides them into the body of the dredge ("the cage"). If the knife size is not appropriate, clams can be cut and broken, resulting in significant mortality of clams left on the bottom. The downward pressure created by the runners on the dredge is about 1 psi.

It was pointed out by a panel member that the high water pressure associated with the hydraulic dredge can cause damage to the flora and fauna associated with bottom habitats. However, water pressure greater than that required for harvesting will reduce the quality of the clams by loading them with sand and increase the rate of clam breakage. Therefore, water pressure is usually self regulated.

There are currently two types of hydraulic dredges used in the fishery, stern rig dredges and side rig dredges. The chain bag on a side rig dredge drags behind the dredge and helps smooth out the trench created by the dredge. The chain bag results in significantly more damage to small clams and other bycatch than occurs with the stern rig dredge. With the stern rig dredge, which is basically a giant sieve, small clams and bycatch fall through the bottom of the cage into the trench and damage or injury is minimal. Improvements in gear efficiency have reduced bottom time and helped to limit the harvest of surfclams to a relatively small area in the mid-Atlantic Bight.

Prior to 1990, the resource was managed by controlling the number of hours a vessel could fish. Consequently, towing speeds were maximized to catch as many clams as possible regardless of the damage done to the clams or the habitat. Cutting and breakage of discarded clams were estimated to be as high as 90% in some locations and under some conditions decomposition of dead clams caused reduced oxygen concentrations in sediments to the point that clams were killed. Incidental mortality is currently estimated to be well under 10% because quota management has removed the need for vessels to catch as many clams as possible as quickly as possible.

Concurrent with the change in harvesting practices that occurred after 1990, there has also been a significant reduction in fishing effort and a shift to stern rig dredges. About 60 side-rig vessels pulling 80 dredges were taken out of the fishery after 1990. The number of surfclam vessels decreased from 128 in 1990 to 31 in 2000, while the number of vessels that landed ocean quahogs (excluding the Maine fishery) dropped from 56 in 1990 to 29 in 2000. Currently there are only 4 side rig vessels pulling five dredges left in the fleet.

Surfclams live mostly in sand which is disturbed and re-suspended by storms and, in some locations, by strong bottom currents. Ocean quahogs live at greater depths, mostly in finer sand and silt/clay substrates which are less affected by natural physical disturbances. Surfclams and ocean quahogs are not found in commercial quantities in gravel or mud habitats or in depths greater than 300 feet.

Hydraulic clam dredges can be operated in areas of large grain sand, fine sand, sand and small grain gravel, sand and small amounts of mud, and sand and very small amounts of clay. Most tows are made in large grain sand. Dredges are not fished in clay, mud, pebbles, rocks, coral, large gravel greater than one half inch, or seagrass beds. Boat captains will not dredge in areas with very soft or hard substrate where they run the risk of losing or damaging the gear. The fishery is also limited to sandy sediment because the processors do not want mud blown into the clam bodies by the dredge.

The spatial scale of fishing effort varies depending on which species is the target: surfclams are harvested primarily in a small area off the New Jersey coast whereas ocean quahogs are harvested over a larger area that includes offshore waters. Areas with denser concentrations of clams would presumably be dredged more intensively, i.e., a higher percentage of the bottom would be affected. Because surfclams are concentrated in a very defined area off the New Jersey coast where the bottom is so homogeneous, a high proportion of the bottom over this large contiguous area is affected by dredging. Surfclams grow much more rapidly than ocean quahogs and surfclam beds are dredged every few years. Areas dredged for ocean quahogs are left untouched for many years. Ocean quahogs are much more likely to be dredged from a number of more or less discrete patches that are surrounded by undisturbed areas. It was noted, as a general rule, that once 50% of the harvestable clams are removed from an area, the catch rates drop to a point where it is no longer economically feasible for fishing to continue there.

In federal waters, the amount of bottom area directly impacted by the hydraulic clam dredge fleet in 2000 was about 110 square miles (Table 2). An additional 15 square miles were dredged in State waters of New Jersey, New York, and Massachusetts. The predominant substrate on the southern New England/Mid-Atlantic Bight shelf is sand. Thus, during any given year, this fishery is conducted in a very small proportion of a habitat type that characterizes most of the 40,000 square miles of continental shelf between the Virginia/North Carolina border and Nantucket Island (69° W longitude). The Georges Bank region has been closed to clam harvesting since 1990 because of the potential of paralytic shellfish poisoning.

Table 2. Estimated area in federal waters towed by hydraulic clam dredges in 2000 (Source: Dave Wallace).

	Quahogs	Surfclams
Hours at sea per year	28,440[a]	19,907[a]
Setting & hauling gear (25%)	7,110	4,977
Hours fished per year	21,330	14,930
Average speed/tow (nmi/hr)	2	2
Total distance towed (nmi)	42,660	29,860
Ft per nmi	6076	6076
Total distance towed (ft)	2.385×10^9	1.814×10^9
Average dredge width (ft)	9.2	9.2
Area towed per year (ft^2)	2.385×10^{10}	1.669×10^{10}
Square ft per n mile	3.69×10^7	3.69×10^7
Area towed per year (nmi^2)	64.6	45.2
a = From clam vessel logbook data, excludes Maine quahog fishery		

The dry dredge used in the Maine fishery is a cage with wide skis and a series of teeth about 6 inches long in the front. These dredges are used on smaller boats (about 30 to 40 feet long) and are pulled through the seabed using the boat's engine. The cutter bar is limited to a width of 36 inches by State law. This fishery takes place in small areas of sand and sandy mud found among bedrock outcroppings in depths of 30 to > 250 ft in state and federal coastal waters north of 43° 20' N latitude. The dredges scoop up clams and sediment, and the vessel's propeller wash is used to clean out the sand and mud.

Effects and Evidence

Dr. James Weinberg (Northeast Fisheries Science Center - NEFSC) led the discussion of the direct physical and biological effects of hydraulic clam dredging, and Dr. Roger Mann (Virginia Institute of Marine Science - VIMS) led the discussion on the available evidence. Most of the evidence for dredging impacts that was considered by the panel was from the Northeast U.S., but there are studies from other areas that show the same effects. It was noted that early studies done in the Northeast region were conducted during development of the fishery, when clam dredging was more damaging to the habitat than it is now.

According to these studies, the direct physical effects of hydraulic clam dredging are basically two-fold. First, a trench about 8 inches deep is left behind the dredge and windrows of sediment and organisms are formed on either side of the trench. The second direct physical effect is the resuspension of sediment. If a dredge goes through silt or loose sediment, it produces a sediment cloud. In the panel's judgement, fine sediment may take as long as 24 hours to resettle and would end up outside the trench, while heavier particles would settle much more rapidly, primarily back into the trench. The evidence for physical effects (trench, windrows, and sediment re-suspension) is strong because these effects are so obvious.

Physical impacts to bottom habitat last longer (months) in low energy environments than in high energy environments (hours). In sand, the sides of the trench start to erode as soon as it is cut; this happens more rapidly when bottom currents are strong. The rate at which it fills in depends on the grain size of the sediment, water depth, and the strength and frequency of storms and bottom currents. It was noted that there are permanent, longshelf, sand ridges with low elevation off the New Jersey coast, but there is no evidence to indicate that clam dredges remove them, even though they may be towed through them.

The direct biological effects of hydraulic dredges vary, depending on whether organisms are hard-bodied like clams or soft-bodied like amphipods or polychaetes. What happens when a clam dredge goes through an area is not fully known and more study is needed. It was noted that structure-forming epifauna such as anemones and sponges would clearly be removed. Emergent epifauna growing on shell beds in the mid-Atlantic Bight is known to provide cover for juvenile fish species like black sea bass. Removal of these organisms, or their burial by re-suspended sediments, could therefore cause the loss of habitat for some species of juvenile fish.

It is not clear what happens to soft-bodied organisms that are moved by the dredge or pass through the trench and are deposited back on the seafloor. Often, after an area is dredged, scavengers move in rapidly and eat broken clams and soft-bodied organisms that are removed from the substrate. However, the panel considered that evidence for effects on infaunal prey organisms was weak because there aren't many studies that link changes in benthic community structure in dredged areas to the food supply for fish, and those that do exist do not show definitive results. The panel concluded that infaunal communities would be likely to recover more quickly than emergent epifauna, and therefore removal of structure-forming organisms was judged to be more of a concern. However, one panelist noted that the potential loss of secondary production of benthic invertebrates which are prey for bottom-feeding fish is the effect that is least understood, and that any reduction in prey abundance – if it occurs – would not necessarily be limited to the dredge tracks themselves, but would affect the entire dredged area. Moreover, the effects of fluidizing the sediment on benthic infauna are unknown and may be important.

The panel noted that there may be cumulative physical and biological effects in areas that are dredged several times annually. As previously stated, surfclams grow much more rapidly than ocean quahogs and surfclam beds are dredged every few years, whereas areas dredged for ocean quahogs are left untouched for many years. It was also noted that benthic organisms that occupy muddy bottom in deep water are less adapted to physical disturbance and therefore would presumably take longer to recover from dredging than organisms in sandy bottom areas in shallower water.

Conclusion

The panel concluded that the habitat effects of hydraulic dredging were limited to sandy substrates, since the gear is not used in gravel and mud habitats (Table 3). Two effects -changes in physical and biological structure – were determined to occur at high levels. The evidence cited for these two effects was a combination of peer-reviewed scientific literature, gray literature, and professional judgement. There are no effects of hydraulic dredges on major physical features in sandy habitat because, in the panel's view, there are no such features on sandy bottom. Panel members evaluated changes to benthic prey as unknown.

The temporal scale of the effects varies depending on the background energy of the environment. Recovery of physical structure can range from days in high energy environments to months in low energy environments, whereas biological structure can take months to years to recover from dredging, depending on what species are affected.

Table 3. Impacts of Clam Dredges on Benthic Habitat

TYPE OF IMPACT	DEGREE OF IMPACT	DURATION	TYPE OF EVIDENCE	COMMENTS
MUD				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	N/A			
Impacts to Physical Structure	N/A			
Changes in Benthic Prey	N/A			
SAND				
Removal of Major Physical Features	Unknown			
Impacts to Biological Structure	XXX	Months - Years1	PR, GL, PJ	1 Dependent upon species composition (eg. Amphipod tubes < 1 yr recovery)
Impacts to Physical Structure	XXX2	Days - Months	PR, GL, PJ	2 Represents major alteration to regime for soft bodied organisms
Changes in benthic prey	Unknown			
GRAVEL				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	N/A			
Impacts to Physical Structure	N/A			
Changes in benthic prey	N/A			

KEY: X = Effect can be present, but is rarely large; XX = Effect is present and moderate; XXX = Effect is often present and can be large; N/A = Effect is not present or not applicable; Unknown = effects are not currently known; (H) = High energy environment; (L) = Low energy environment; PR = Peer reviewed literature; GL = Grey literature; PJ = Professional judgement. For definitions of Substrate Type and Type of Impact see Appendix D.
NOTE: Ongoing Canadian studies for clam dredges are near completion and will contribute substantially to this discussion.

The panel agreed that hydraulic dredges have important habitat effects, but even in a worse case scenario, where there were known to be severe biological impacts, only a small area is affected and therefore this gear type is less important than other gear types like bottom trawls and scallop dredges which affect much larger areas. It was also pointed out, however, that even though the effects of dredging (at least for surfclams) are limited to a relatively small area, localized effects of dredging on EFH could be very significant if the dredged area is a productive habitat for one or more managed fish resource. The same would be true if dredging in a particular area coincided with a strong settlement of larval fish. A major question for this gear is "what are its long-term biological impacts" *i.e.*, how, and to what extent, are benthic communities altered in heavily dredged areas, particularly the prey organisms, and how long does it take for them to recover once dredging ceases?

Management

Dr. William DuPaul (VIMS) led the discussion on the types of management actions that could be taken to minimize adverse impacts of hydraulic dredging to benthic habitat.

The effectiveness of the Individual Transferable Quota (ITQ) management program since 1990 and the opinion that the two resources are underfished, led the panel to conclude that reductions in effort are probably not practicable. Nor is it likely that gear substitutions or modifications are practical since the current gear is highly efficient at harvesting clams. Therefore spatial area management seems to be the only practicable approach to minimizing gear impacts, if necessary.

It was emphasized that hydraulic dredges are designed to operate in sandy substrate. This gear could be very destructive if fished in the wrong sediment type or in structured environments like gravel beds or tilefish pueblo villages. The panel emphasized the gear should not be used in sediment types where it would cause more damage. Areas of known structure-forming biota should be mapped and set aside as a priority. It was emphasized that since we really do not know what the effect of this gear is to soft-bodied benthic organisms, a possible precautionary measure would be to restrict the fishery to areas of high clam productivity. Seasonal closures were mentioned if times and areas of high recruitment could be detected.

SCALLOP DREDGES

Gear Description

Dr. DuPaul led the discussion on scallop dredges. The New Bedford scallop dredge was described during a general review of scallop dredges and their use. This dredge is the primary gear used in the Georges Bank and mid-Atlantic sea scallop (*Placopecten magellanicus*) fishery. The scallop dredge used in coastal waters of the Gulf of Maine was also described briefly. The European scallop dredge was briefly discussed.

The forward edge of the dredge includes the cutting bar, which rides above the surface of the substrate, creating turbulence that stirs up the substrate and kicks objects up from the surface of the substrate (including scallops) into the bag. Shoes on the cutting bar are in contact with and ride along the substrate surface. The bag is made up of metal rings with chafing gear on the bottom and twine mesh on the top, and drags on the substrate when fished. New Bedford dredges are typically 14 feet wide; two of them are towed by a single vessel at speeds of 4 to 5 knots. Dredges used along the Maine coast are smaller (5.5 to 8.5 ft). Towing times are highly variable, depending on how many marketable sized scallops are on the bottom and the location. Scallops are shucked at sea, but small amounts (< 50 baskets) are returned to shore whole for specialty markets.

In the Northeast region, scallop dredges are used in high and low energy sand environments, and high energy gravel environments. Although gravel exists in low energy environments of deepwater banks and ridges in the Gulf of Maine, the fishery is not prosecuted there.

Effects and Evidence

Dr. Valentine led the discussion on the effects of scallop dredging and Dr. Weinberg led the discussion on the available evidence. The panel noted that much of the scientific literature is based on the European dredge, which differs in structure and use from the New Bedford dredge. The leading edge of the European dredge contains teeth which dig into the substrate. This type of gear is used by smaller vessels that are not able to tow a non-toothed dredge fast enough (4-5 knots is necessary) to fish effectively. The panel noted that because of these differences, research using the European dredge was not completely relevant to North American scallop fisheries or the habitats in which they are found, and should only be applied in a limited fashion.

An analysis of vessel monitoring system (VMS) data for vessels in the scallop fishery provided to panel members at this workshop revealed that the scallop fishery is highly concentrated. Total fishing activity (dredges and trawls) in year 2000 was dispersed throughout 12,800 one square nautical mile sub-areas, but 81% of the total catch was harvested in only 2,946 of these sub-areas. A full description if this information that includes plots of fishing activity in 1998 and 1999 is in Appendix G. One panelist noted that based on his analysis of logbook data from the mid 1980s to the mid 1990s, the distribution of fishing effort for scallop dredges in the Northeast U.S. was patchy, with areas that were fished intensively and other areas that were fished very lightly, and generally did not overlap with areas that were fished heavily with bottom trawls.

The findings of the studies summarized in the white paper which took place in the Northeast region were discussed and considered to be applicable to other areas of similar habitat type within the region. These findings included:

- disruption of amphipod tube mats and decline in dominant megafaunal species in gravelly sand in the Gulf of Maine from fishing (Langton and Robinson 1990);
- increased epifauna (hydroids, bryozoans, sponges, serpulid worms and sea cucumbers) on a cobble/shell bottom in an area on the Maine coast closed to dredging and trawling in 1983 (Auster et al. 1996);
- disturbance of storm-created coarse sand ripples (10-20 cm high) by scallop dredges on Stellwagen Bank, in the southwestern Gulf of Maine (Auster et al. 1996);
- increased abundance of emergent sponges inside a sandy area closed to dredging and trawling for 4.5 years (Almeida et al. 2000);
- redistributed gravel, pebbles, and boulders, flattened sand and mud bedforms, and resuspended fine sediments caused by mussel and scallop dredging in lower Narragansett Bay, Rhode Island (DeAlteris et al. 1999);

- reduced epifaunal community, smoother bottom, and disturbed and overturned boulders in gravel areas on Georges Bank affected by dredges and trawls compared to unfished areas (Valentine and Lough 1991);
- reduced densities, biomass, and species diversity of megabenthic organisms in disturbed gravel habitat on Georges Bank (Collie et al. 1997);
- higher percent cover of emergent colonial epifauna in undisturbed gravel habitat sites on Georges Bank (Collie et al. 2000).

A number of international studies were also discussed. Although the gear differed in some of these studies as described above, findings in these studies were considered to be relevant. The findings were as follows:

- long-term shifts in benthic community composition in the Wadden and Irish Seas following the introduction of scallop dredging (Reise and Schubert 1987, Hill et al. 1999);
- increased abundance of some epifaunal species (sea urchins and some crustaceans) in gravel areas closed to dredging in the Irish Sea (Bradshaw et al. 2000);
- mortality of large epifauna and sand lance (*Ammodytes*) in the path of the trawl in high energy sand in Scotland, with no significant effects on abundance of mollusc or crustacean infauna (Eleftheriou and Robertson 1992);
- loss of emergent tubes and sediment ripples and decreased density of common macrofauna from dredging in sub-tidal sand flats in New Zealand, with complete faunal recovery within a few months (Thrush et al. 1995);
- reduced abundance of 6 of the 10 most common benthic infaunal species from dredging, with recovery within 6 months for most, but greater than 14 months for a few, in mud and sand habitat in Australia (Currie and Parry 1996).

The panelists agreed that effects and their significance vary by habitat type, and that research results could not be applied widely across habitat type. The panelists also agreed that the first pass of a dredge over an undisturbed area is expected to have more significant effects than subsequent passes and that the return of cut shell-stock to the environment could enhance sea floor structure and provide substrate for settling scallop larvae. There was some discussion about the discarding of viscera from shucked scallops and its value to EFH, but no consensus was reached.

Several studies conducted on Georges Bank were discussed in detail. Valentine and Lough (1991) compared trawled and dredged gravel areas with undisturbed gravel areas and noted that the epifaunal community was more diverse with abundant attached organisms at the undisturbed sites. Subsequent research by Collie et al. (2000) in gravel pavement habitat showed that *Filograna implexa*, a colonial, rock-encrusting polychaete, and bushy colonial epifauna such as bryozoans and hydroids, were more abundant in the undisturbed areas. The study by Almeida et al. (2000) showed an increased abundance of emergent sponges (*Suberites ficus* and *Polymastia* sp.) on sandy bottom at stations inside Groundfish Closed Area II four and a half years after it was closed, compared to stations just outside the area that have remained open to bottom fishing.

The panel clarified that the results of the studies done on gravel bottom on Georges Bank could be applied to dredged areas in the Gulf of Maine where the same taxa are present in hard bottom habitats, but not to sandy scallop fishing grounds in southern New England and the mid-Atlantic Bight where different emergent epifaunal species are present and where there are fewer epifaunal organisms growing on the bottom. Panel members agreed that structure-forming biota that are present in sandy habitats are just as vulnerable to scallop dredging as in gravel habitats, but that the biological impacts of dredging on emergent epifauna are less significant in high energy sand environments because the organisms are better adapted to sediment disturbances caused by storms and strong bottom currents and therefore recover more quickly from dredging. It was noted that hard bottom benthic habitats in the Gulf of Maine and in deeper water on Georges Bank are more vulnerable to bottom mobile gear than sand bottom habitats south of Cape Cod because they support more diverse and prolific epifaunal communities and because recovery times are slower. It was also noted that long-term effects are more significant than short-term effects and are harder to differentiate from effects caused by environmental changes.

There was some discussion about the indirect biogeochemical effects of sediment resuspension caused by dredging and trawling. It was noted that the re-suspension of fine sediments (clay, silt and fine-grained sand) could have important effects on habitat quality by releasing nutrients, metals and contaminants that are "trapped" in anaerobic bottom sediments. These effects would be negligible in shallow water, coarse sand habitats. The release of nutrients could be beneficial, but the release of metals and other contaminants could have adverse effects on pelagic and benthic habitats. Most of the research that has been done on this subject is in inshore coastal and estuarine waters, not in deeper, offshore waters.

There was also some discussion about the effects of scallop dredging on the functional value of benthic habitats for exploited marine resource populations. Two habitat functions mentioned were: 1) cover from predators provided for juvenile fish and prey species by emergent epifauna; and 2) the bio-energetic benefits of sand ripples and waves for bottom fish (e.g., flounders) that seek refuge from bottom currents. The panel noted that some studies have been conducted in these two subject areas and others are in progress.

Conclusion

The panel determined that the effects of scallop dredging were of greatest concern in the following three habitat types: high and low energy sand and high energy gravel. Scallop fishing does not generally occur in deep water, low energy gravel habitats. The basis for all the panel's conclusions regarding the degree of impact and recovery time estimates were a combination of peer reviewed literature, gray literature, and the panelists' professional judgement.

Low energy sand habitat occurs in deeper water, where the bottom is unaffected by tidal currents and where the only natural disturbance is caused by occasional storm currents. In this habitat type, the primary physical bottom features are shallow depressions created by scallops and other benthic organisms. Reduction of biological structure and changes in physical structure were both considered to occur at a high level as a result of scallop dredging (Table 4). Recovery of physical structure was expected to vary from days to months depending on how long it takes different species of animals to create new depressions in the seafloor. The degree of impact to biological structure in low energy sand habitats was judged to be high because emergent epifauna is more abundant in this more stable environment. Recovery from reduction in structural biota was expected to take from months to years.

Table 4. Impacts of Scallop Dredges on Benthic Habitat

TYPE OF IMPACT	DEGREE OF IMPACT	DURATION	TYPE OF EVIDENCE	COMMENTS
MUD				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	N/A			
Impacts to Physical Structure	N/A			
Changes in Benthic Prey	N/A			
SAND				
Removal of Major Physical Features	Unknown			
Impacts to Biological Structure	XXX (L) X (H)	Months - Yrs	PR, GL, PJ	
Impacts to Physical Structure	XXX (H, L)	Days - Months	PR, GL, PJ	Cut (shucked) shell provides additional structure.
Changes in Benthic Prey	Unknown			Disposal of shucked scallop viscera may alter local food sources - impacts unknown.
GRAVEL				
Removal of Major Physical Features	Unknown			
Impacts to Biological Structure	XXX (H) N/A (L)	Several Years (H)	PR, GL, PJ	(L)=deepwater banks, gravel ridges in GOM; fishery is not prosecuted here
Impacts to Physical Structure	XXX (H) N/A (L)	Months - Years (H)	PR, GL, PJ	(L)=deepwater banks, gravel ridges in GOM; fishery is not prosecuted here. Cut shell provides additional structure.
Changes in Benthic Prey	XXX (H) N/A (L)	Months - Years (H)	PR, GL, PJ	(L)=deepwater banks, gravel ridges in GOM; fishery is not prosecuted here

KEY: X = Effect can be present, but is rarely large; XX = Effect is present and moderate; XXX = Effect is often present and can be large; N/A = Effect is not present or not applicable; Unknown = effects are not currently known; (H) = High energy environment; (L) = Low energy environment; PR = Peer reviewed literature; GL = Grey literature; PJ = Professional judgement. For definitions of Substrate Type and Type of Impact see Appendix D.
NOTE: Ongoing Canadian experiments will be able to provide additional information in the near future.

In high energy sand habitats, effects on biological structure were considered to be low, since organisms in this environment would be adapted to a high degree of natural disturbance. Changes to physical structure such as smoothing out of sand ripples, sand waves, and sand ridges were rated as high. The range of recovery times for physical structure in high energy sand habitat was based on the rapid recovery time for sand ripples that are produced by bottom currents (days) and a longer time (months) for storm-created sand waves and ridges. Similar to low energy sand, recovery time for biological structure was expected to range from months to years. The range in recovery time was based on how long it would take for amphipod tubes to re-form compared to the growth rates of sponges and other longer-lived species. The panel did not have enough information to evaluate the effects of scallop dredging on benthic prey in sandy bottom and therefore concluded that the degree of this effect was unknown in both low and high energy habitats.

In high energy gravel habitat, the panel concluded that the degree to which biological structure was reduced by scallop dredging was high, as were changes in physical structure, and changes in benthic prey. Dredging disturbs gravel and pebbles, breaches gravel "pavement," and redistributes cobbles and small boulders. Recovery of physical structure in this habitat type was estimated to take anywhere from months to a year. Once gravel pavement is breached, it re-forms fairly quickly as the underlying exposed sand is removed by bottom currents leaving gravel behind as the predominant substrate. Attached epifauna known to be removed by scallop dredges in high energy gravel habitats include sponges, bryozoans, hydrozoans, and colonial polychaetes. Recovery times for biological structure were estimated as years (but fewer than ten years).

Since many of the structure-forming organisms that are removed from high energy gravel habitat by scallop dredges are either preyed upon by bottom-feeding fish or provide cover for invertebrates and small fish that are consumed by bottom-feeding fish, habitat impacts caused by changes in prey species composition and abundance were rated as high in this habitat type, with recovery times of months to several years, depending on which taxa are affected. Panel members noted that it was difficult to evaluate impacts to benthic prey in the absence of information linking known alterations in the species composition and abundance of benthic organisms to changes in the food supply for fish.

The panel acknowledged that impacts of scallop dredging to sand and gravel habitats represent two extremes in a continuum of effects (gravel being more vulnerable) and that what happens to mixed sediment habitat types that fall in between these two extremes is harder to evaluate. It was also pointed out that the more important question may not be what happens in the dredge path itself and how quickly the seafloor and the benthic community in the dredge path recovers, but instead what is the net impact of dredging on the affected environment and its value to marine resources?

Management

Dr. Michael Fogarty (NEFSC) led the discussion on the management of scallop dredge impacts. Three main approaches to minimizing habitat impacts were discussed: effort reduction, gear modification, and area management. Panelists noted that maintaining a high biomass of scallops would reduce harvesting time and therefore reduce the amount of bottom time devoted to dredging. Panelists also noted, however, that the high initial impact of the gear on habitat (from the first tow) could confound attempts to minimize impacts by reducing effort.

Suggestions for gear modifications included innovations to "float" the ring bag so it does not drag along the bottom. Use of a "hard dredge" which only has two skids in contact with the bottom was also discussed; however, panelists did not agree that this would be feasible since rigid frame dredges are reportedly difficult to use and cause a higher non-harvest mortality of scallops. Other gear modifications discussed included development of a foil that uses a vacuum to harvest scallops.

Many panelists spoke favorably about the use of area based management. Based on the distribution of scallop dredge fishing trips (Appendix G), the panel noted that there are many locations where scallop dredging does not occur. The panel discussed focusing fishing effort in productive areas and areas without sensitive habitats. Since scallop recruitment is episodic, some panelists felt that it was important that all areas be available for fishing. In a rotational area management system, the panel discussed keeping sensitive areas closed for a longer period of time. Panelists also noted that a comprehensive approach to area management that included consideration of the habitat impacts of gears used in other fisheries (e.g., bottom trawls) should be considered.

OTTER TRAWLS

Gear Description

Mr. Frank Mirarchi (Boat Kathleen A. Mirarchi, Inc.) and Mr. James Lovgren (F/V Sea Dragon) identified the types of otter trawl gear used in the northeast. They stressed the diversity of otter trawl types used in this region, explaining that the diversity of gear types was a result of the diversity of fisheries prosecuted and bottom types in the region. The specific gear design used is often a result of the target species (whether they are found on or off the bottom) and the composition of the bottom (smooth versus rough and soft versus hard). The presenters described the various components of otter trawls, including the sweeps, the net body, bycatch reduction devices, bridles or ground cables, and the doors. The sweeps can be chain-wrapped wire, rubber cookies, rockhoppers, rollers, street-sweepers, or tickler chains. The net body depends upon the head rope height, the amount of overhang, and the mesh sizes of the various net panels. Bycatch reduction devices include the Nordmore grate and mesh panels. Types of bridles include chain, bare wire, covered wire, or seine rope. Trawl doors can be polyvalent, flat, or vee type.

Small mesh nets are used to target whiting and squid, and these configurations usually employ a light chain sweep. Flatfish are primarily targeted with a mid-range mesh flat net that has more ground rigging and is designed to get the fish up off the bottom. A high rise or fly net is also used with larger mesh. There are three components of the otter trawl that come in contact with the bottom: the doors; the ground rigging behind the doors; and the sweep.

The panel members discussed these descriptions, noting that otter trawls are actually very complex systems designed to target specific types of fish rather than simple sieves used to collect everything in their path. Fish herding is an important aspect of trawl design and depends upon the hydrodynamic forces of the doors and the sediment clouds generated by the ground rigging and sweep. Panel members reported that roller gear is obsolete in the Northeast, having been replaced by rockhopper gear. Rockhopper gear is no longer used only on hard bottom habitats, but is actually quite versatile for use on a variety of habitat types.

The panel considered the weight in water of the different otter trawl configurations, relative to their weight on land. Contrary to some assumptions, rockhopper gear is not the heaviest type of otter trawl in use in this region as it loses 80% of its weight in water (i.e., a rockhopper rig that weighs 1000 pounds on land may only weigh 200 pounds in water). Streetsweeper gear is much heavier due to the use of steel cores in the brush components. Cookie gear can be heavier as it retains 80-85% of its weight in water. Plastic-based gear has the smallest weight in water to weight on land ratio, at approximately 5%. The panel agreed that the weight of the gear in water is a very important consideration in understanding the relative effects of different otter trawl configurations.

Effects and Evidence

The discussion leaders for the effects of otter trawling were Dr. Robert Van Dolah (South Carolina Department of Natural Resources) and Dr. Ellen Kenchington (Department of Fisheries and Oceans, Canada). At the outset of the discussion, the panel agreed to two general points: first, otter trawls are one of the most studied fishing gear types; and second, otter trawls are one of the most widely used fishing gears. The effects of otter trawls are believed to vary by the specific configuration used, by the intensity of the trawling activity, and by the type of habitat in which the gear is used. Some of the panel members were of the opinion that benthic habitats are dynamic systems, and the changes that result from otter trawling may not necessarily be detrimental.

The panel members discussed a variety of direct effects of the gear operating on the bottom. These effects included: 1) the scraping or plowing of the doors on the bottom, sometimes creating furrows along their path; 2) sediment resuspension resulting from the turbulence caused by the doors and the ground gear on the bottom; 3) the removal or damage to non-target species such as benthic or demersal predators; and 4) the removal or damage to structure-forming biota. The relative significance and/or duration of these effects often depends upon whether the gear is used on low versus high energy environments (these environments could also be thought of as stable versus unstable). It was mentioned during discussion that with the exception of the doors, the trawl gear has to be relatively light on the bottom to maintain its shape and effectiveness. If it rides too heavily on the bottom the gear would collapse in on itself.

Some panel members stated that even relatively light trawl gear will still have an impact on structure forming taxa. Discussion included the opinion that static weight of the gear alone is not the only factor to consider, but that the horizontal and vertical forces on the gear (i.e., the speed of the vessel) are also important considerations. It was agreed that more research is needed to better understand the relationships of gear weight and the forces on the bottom and the differences between gear types.

The panel members also discussed some potential indirect effects of the gear operating on the bottom. The indirect effects included: 1) altered trophic function of benthic communities, primarily caused by a reduction or change in large biota, a reduction or change in predators, or a reduction or change in epiphytes; and 2) altered demersal communities, primarily caused by a loss of structure-forming biota and an alteration of physical features.

The most significant potential effects of otter trawls identified by the panel included long-term changes in bottom structure and long-term changes in benthic trophic function or ecosystem function. The panel suggested that these changes may result either from a reduction of organisms or the replacement of organisms. The potential replacement of some organisms with other organisms is significant because this may prevent the ecosystem from being able to return to its original state, even in the complete absence of fishing activity.

The panel discussed a proposed model for determining the degree of effect on various habitats. The model ranked habitat types along a continuum from mud/sand with no major epifauna or structure-forming biota in a high energy environment to gravel/hard bottom with abundant epifauna and/or structure-forming biota, and suggested that the degree and duration of the effects on these habitat types ranged from lowest for the mud/sand with no major epifauna or structure-forming biota in a high energy environment to highest for the gravel/hard bottom with abundant epifauna and/or structure-forming biota. This model utilized a variation of the major categories of effects previously described: 1) removal of physical features, 2) reduction of structural biota (impacts to biological structure), and 3) reduction of habitat complexity and sea floor structure (impacts to physical structure). Generally, there was a low level of concern for the effects of trawling in mud and sand habitats without major epifauna or structure-forming biota, but a high level of concern for gravel and hard bottom habitats with epifauna and/or structure-forming biota. There was some discussion among the panel members as to whether mud deserved its own category, based on the deep-water basins in the Gulf of Maine that contain long-lived epifauna, but there was no consensus on this issue. The degree and duration of a fourth category of effect, changes in benthic prey, was suggested as being case specific. This conceptual model is discussed in more detail in a subsequent section.

The panel discussion identified several indirect effects of otter trawls on different habitat types, including the attraction/movement of scavengers into the area behind the trawl and changes in diatoms and other primary producers. It was suggested that although scavengers are attracted to areas recently trawled, they do not move in from great distances. Rather, the scavengers that are already in the general vicinity do well, but there are not significant increases in the numbers of these scavengers. It was also suggested that there may be important cascading effects of the changes in diatoms and other primary producers.

The panel discussed the changes in habitat complexity resulting from the tracks made by the doors in further detail. The door tracks themselves create an increase in complexity at the scale for small organisms, but there is a net loss in complexity due to the reduction of biogenic structure. The panel also discussed the duration of effects and agreed to define "long-term" as whenever the recovery period is longer than the natural period of disturbance. The panel agreed that the duration of effect would be greater in habitats toward the gravel/hard bottom with epifauna and/or structure-forming biota end of the continuum identified above.

Following the discussion on the types and relative importance of the different effects of otter trawling on benthic habitats, the panel discussed the strength of the scientific evidence for these effects. This discussion was led by Dr. James Lindholm (Stellwagen Bank National Marine Sanctuary). The panel agreed that there is a great deal of literature to apply to otter trawl fishing activities in the northeast. Most of the available information can be applied to otter trawls in general and deals with chronic effects rather than acute effects. The most difficult issue remains establishing the link between the alteration of the habitat and the effects on biological communities.

It was suggested that ultimately, to make real progress on these issues, we need to be able to look at the differential effects of fishing gear on different types of habitats, and be able to do this by the type of otter trawl rather than only considering otter trawls in general. The current situation is limited to the generalized effects of otter trawls, without the ability to tease out the good and bad elements of these fishing activities. This situation also creates a problem for conservation engineering because there are no specific objectives or problems to solve, only generalities.

In spite of this problem, there was agreement that the general principles and results of the worldwide body of literature on the effects of otter trawling on benthic habitats were applicable to the northeast, even though the gear used might be slightly different. Of all the gears the panel has been charged with considering, otter trawls represent the type where the results of studies from other areas are the most applicable. The panel generally agreed that there was strong evidence in the scientific literature for each of the four primary types of effects as identified earlier.

Conclusion

The panel concluded that the greatest impacts from otter trawls occur in low and high energy gravel habitats and in hard clay outcroppings (Table 5). In gravel, the greatest effects were determined to be on major physical features, and physical and biological structure of the habitat. The panel found it was unable to reach consensus on the degree of impact for sand and low energy mud habitats, but a majority of panel members agreed upon the final conclusions in Table 5.

In gravel and other hard bottom habitats, the degree of impact of otter trawls on major physical features, physical structure, and biological structure were all considered to be high in both low and high energy environments. Major physical features in this habitat type are boulder mounds, which can be knocked down by trawls. Once this happens, the mounds can never be re-formed, and the resulting changes are permanent. Trawls also cause alterations to physical structure by redistributing cobbles and boulders and breaching gravel pavement. Impacts to biological structure in gravel were of greater concern to the panel than impacts to biological structure in other habitats because structural biota is more abundant on gravel bottom. Effects to physical and biological structure of these habitats were judged to last from months to years. The basis for all the panel's conclusions were professional judgement, peer-reviewed literature, and gray literature. Changes to benthic prey caused by trawling were considered to be unknown. In mud habitats, the panel distinguished between hard clay outcroppings that occur in deep water on the outer continental shelf and soft mud (silt and clay) sediments found in deep water basins in the Gulf of Maine and many shallower locations on the shelf. Bottom trawling takes place in both of these habitat types.

Clay outcroppings are found on the slopes of submarine canyons that intersect the shelf on the southern edge of Georges Bank and the New York Bight. These outcroppings provide important habitat for tilefish (*Lopholatilus chamaelonticeps*) and other benthic organisms which burrow into the clay. Based on the panel's professional judgement, removal of this material by trawls was considered to be a permanent change to a major physical feature, and was rated as a high degree of impact. The panel determined that trawls could also cause a high degree of impact to the physical structure of hard clay habitat that could last from months to years. This determination was based on peer reviewed and gray literature, and the panel's professional judgement. Due to a lack of information, the panel was not able to rate impacts to biological structure or benthic prey in this habitat type.

The panel did not reach consensus on the degree to which otter trawls affect physical and biological structure in soft mud habitats. However, most panelists agreed that impacts to biological structure (including worm tubes and burrows) and physical structure were moderate. Panelists agreed that these impacts would be expected to last from months to years. Peer reviewed and gray literature and professional judgement were relied on to make determinations about impacts to physical structure, while professional judgement was the only basis for determination of impacts to biological structure. A lack of information prevented the panel from drawing conclusions about impacts to benthic prey. Panelists determined that removal of major physical features was not a concern in this relatively featureless habitat.

Determining the impacts from trawling on sand habitat was particularly difficult for the panel. There was no consensus on the degree of impact to biological or physical structure, or to benthic prey, in high and low energy environments. However, with one exception, the panelists agreed that these impacts were moderate. Trawl induced changes to physical structure in high energy sand were rated as low. Recovery times for biological structure and prey were considered to range from months to years, and for physical structure from days to months. The basis for all determinations was peer reviewed and gray literature, and professional judgement. The panel determined that removal of major physical features was not an impact that applied in what is a relatively featureless environment.

There was a general consensus that the acute impacts of bottom trawls (i.e., impacts caused by a single tow) on physical and biological structure are less severe than for a scallop dredge, but the chronic impacts resulting from repeated tows are more severe for trawls because a greater bottom area is affected by trawling than is affected by scallop dredging. Additionally, otter trawls are towed repeatedly in the same locations, much more so than scallop dredges and clam dredges. One panel member pointed out that the only part of a trawl that disturbs the bottom in the same manner as a scallop dredge is the door - the rest of the trawl behaves very differently. Another panel member reiterated that there are a large variety of trawls in use in the Northeast U.S. Some (squid nets, high rises) are very light trawls that barely contact the bottom at all, whereas others (flatfish nets) "hit hard" which makes it difficult to generalize the impacts associated with this gear. It is important to recognize that the greatest challenge the panel faced in drawing their conclusions is the fact that there is such a wide variety of otter trawl gear in use over a very wide range of habitat types and known impacts from trawl gear is aggregated and not typically attributed to a specific gear configuration.

Table 5. Impacts of Otter Trawls on Benthic Habitat

TYPE OF IMPACT	DEGREE OF IMPACT	DURATION	TYPE OF EVIDENCE	COMMENTS
MUD				
Removal of Major Physical Features	XXX (H) N/A (L)	Permanent	PJ	(H) in Mud referrs to clay (i.e., tilefish burrows) in all cases
Impacts to Biological Structure	Unknown (H) XX* (L)	Months - Yrs	PJ	(L) opinions ranged from X-XXX
Impacts to Physical Structure	XXX* (H) XX* (L)	Months - Yrs	PR, GL, PJ	(L) opinions ranged from XX-XXX and unknown
Changes in Benthic Prey	Unknown			
SAND				
Removal of Major Physical Features	N/A	N/A	N/A	
Impacts to Biological Structure	XX* (H, L)	Months - Years	PR, GL, PJ	(H) opinion ranged from X-XXX (L) opinion ranged from XX-XXX
Impacts to Physical Structure	X* (H) XX* (L)	Days - Months	PR, GL, PJ	(H, L) opinion ranged from X-XXX
Changes in Benthic Prey	XX* (H, L)	Months - Years	PR, PJ, GL	(H) opinions were XX or unknown (L) ranged from X-XXX and unknown
GRAVEL				
Removal of Major Physical Features	XXX (H, L)	Permanent	PR, GL,PJ	
Impacts to Biological Structure	XXX (H, L)	Months - Years	PR, GL, PJ	
Impacts to Physical Structure	XXX (H, L)	Months - Years	PR, GL, PJ	Rocks altered or relocated
Changes in Benthic Prey	Unknown			

KEY: X = Effect can be present, but is rarely large; XX = Effect is present and moderate; XXX = Effect is often present and can be large; N/A = Effect is not present or not applicable; Unknown = effects are not currently known; (H) = High energy environment; (L) = Low energy environment; PR = Peer reviewed literature; GL = Grey literature; PJ = Professional judgement. For definitions of Substrate Type and Type of Impact see Appendix D.

NOTE: Ongoing Canadian experiments will be able to provide additional information in the near future.

* This does not represent a consensus among the panel

Management

Dr. Joseph DeAlteris, (University of Rhode Island) was the discussion leader for the management section and offered a framework of management approaches that could be considered for reducing the impacts associated with otter trawls on benthic habitats. The approaches included effort reductions, area restrictions, and gear improvements. He acknowledged that fishing effort by bottom-tending mobile gear has been reduced approximately 50% in the Northeast over the last ten years. He also acknowledged that the existing year-round closed areas (Georges Bank Closed Areas I and II, the Nantucket Lightship Closed Area, and the Western Gulf of Maine Closed Area) have been effective at reducing fishing-related impacts within the areas. He suggested that there are ways to make fishing gear more "habitat-friendly" by lowering the associated turbulence and making the gear lighter on the bottom, but stressed that these efforts would require cooperative work with the fishing industry and specific goals and objectives. Overall, the panel agreed with the discussion leader on these points as general principles.

The panel discussed these management approaches. Panel members suggested that reductions in effort do not necessarily translate into similar reductions in impacts, while area closures guarantee protection to the areas closed that effort reductions cannot. Panel members also suggested that what is really needed is an adjustment to fishing capacity, and that over-capacity in the fleet is forcing people to fish in ways and in areas that they otherwise would not. Excess fishing power results in people fishing very inefficiently at lower catch-per-unit-effort (CPUE) than would otherwise occur and this results in increased fishing time. The panel members suggested that conservation engineering is a key management factor to develop fishing gears that have less impact on benthic habitats. It was also suggested that the concept of closed areas should be revisited to target specific habitats and bycatch concerns, and that the areas closed could be more discrete.

The panel also identified the link between effort reduction and specific closed areas as an important consideration in evaluating the effectiveness of management measures. By itself, effort reduction may not accomplish the objective of reducing impacts to habitat. Ideally, the three components identified by the discussion leader (effort reduction, closed areas, gear improvement) would be used together to manage fishing activities. The panel was cautioned that the concept of effort reduction is not necessarily as simple as it sounds. Managers must be able to deal with latent effort and changes in fishing behavior, the differences between nominal effort and effective effort, and issues related to effort displacement. For example, in response to a reduction in the allowable fishing effort, vessels may move inshore, but this could increase the impacts to inshore habitats.

The panel agreed that another management challenge will be the need to consider how to protect habitat from adverse impacts from otter trawls and other fishing gears in the context of a rebuilt fishery when fishing effort would likely increase.

POTS AND TRAPS

Gear Description

Pots and traps were described by Mr. Arnold Carr (Massachusetts Division of Marine Fisheries). Mr. Carr's descriptions focused on lobster, seabass, scup, red crab and hagfish pots. Even though the intent of the workshop was to focus only on gears used in federally-managed fisheries, lobster pots were included because they are by far the most commonly used gear in this category and because they could potentially affect habitats that support federally-managed resources.

<u>Lobster Pots</u>: Mr. Carr pointed out that these are fished as either 1) a single pot per buoy (although two pots per buoy are used in Cape Cod Bay, and three pots per buoy in Maine waters), or 2) a "trawl" or line with up to 100 pots. It was also pointed out that habitat impacts

are probably due mostly to the pots and the mainline between pots, not the buoy line. Other important features of lobster pots and their use were the following:

- About 95% of lobster pots are made of plastic-coated wire.
- Floating mainlines may be up to 25 feet off bottom.
- Sinklines are sometimes used where marine mammals are a concern - neutrally buoyant lines may soon be required in Cape Cod Bay.
- Soak time depends on season and location - usually 1-3 days in inshore waters in warm weather, to weeks in colder waters.
- Offshore pots are larger (more than 4 ft long) and heavier (~ 100 lb.), with an average of ~ 40 pots/trawl and 44 trawls/vessel; they usually have a one-week soak and a floating mainline.
- There has been a three-fold increase in lobster pots fished since the 1960s, with more than four million pots now in use.

Other Pots: Seabass/scup and red crab pots are similar in design to lobster pots. Seabass/scup pots are usually fished singly or in trawls of up to 25 pots, in shallower waters than the offshore lobster pots and red crab pots. Pots may be set and retrieved 3-4 times/day when fishing for scup. The red crab fishery uses 400-600 pots/vessel, hauled on a daily basis, and operates on the continental slope and canyons. Hagfish pots (40 plastic gallon barrels) are fished in deep waters, on mud bottoms.

Effects and Evidence

Mr. Carr led the discussion on the habitat effects that can be attributed to pots. Most of the discussion focused on lobster pots. The primary direct impacts of any kind of pot are the scouring of the bottom and injury or death to benthic organisms that occur directly under the pot or in its path when it is retrieved. The total impact is thus the aggregate effect of the pot's "footprint," the area through which it is dragged when it is hauled (which may be 2-3 times larger than its footprint), any damage caused by the mainline in a trawl of pots, the number of pots that are in use in any period of time, and the number of times each pot is hauled. Although panel members agreed that the habitat impacts caused by individual lobster pots were minimal, they believed that the cumulative effects of so many pots could be significant, especially in sensitive habitat areas of high structural complexity. Panel members also mentioned that lobster pots normally remain on the same place on the bottom for days at a time and that they are set repeatedly in certain heavily-fished areas; both of these factors further magnify their site-specific impacts on benthic habitats.

Lobsters concentrate in coastal, hard substrate areas, offshore canyons, and in mud substrate with a high clay content where they produce burrows. The types of habitat that the panel considered most vulnerable to alteration by pot fishing were complex hard bottom habitats with abundant structural biota. The panel did not consider high-energy sand habitats to be vulnerable, and pointed out that lobster pots are usually not fished there except during times of the year when lobsters move across open areas of bottom.

Other observations made by panel members included the following:

- Sinking mainlines can turn over rocks and shear off epifauna when pots are hauled.
- Lobstermen tend to avoid using sinklines in rocks.
- Attached epifauna in low energy mud and sand habitats are susceptible to damage from sinklines, which are used in relatively flat, featureless bottoms.
- Baits used in pots enrich benthic ecosystems and may increase the abundance of infaunal benthic organisms in heavily-fished locations.
- Pots may also act as reef habitat, though this effect is reduced by their frequent retrieval.
- At certain times of year, pots indirectly provide some habitat protection by making areas inaccessible to mobile gear.

Dr. Doug Rader (Environmental Defense) led the discussion of the evidence and pointed out that there is some published evidence from Florida and the Caribbean of damage to hard substrates, benthic epifauna, and submerged aquatic vegetation. He also mentioned an evaluation of the habitat impacts of fish pots in the Gulf of Mexico as ranging from "an impact" to "a significant impact" (as opposed to "no impact" or an "extreme impact). The panel agreed that there is a paucity of information for the Northeast U.S., but studies from other regions are applicable if they address impacts to analogous species of emergent epifauna or types of biogenic structure.

Conclusion

The panel concluded (Table 6) that the degree of impact caused by pots and traps to biological and physical structure and to benthic prey in mud, sand and gravel habitats was low. In both mud and sand, the duration of impacts to biological structure could last for months to years, whereas physical structure and benthic prey should recover in days to months. Professional judgement was used to make the evaluations for benthic prey, while the panel relied on grey literature for the other types of impacts. In gravel, reduction of structural biota and changes in seafloor structure and benthic prey could all persist for months to years. Again, the panel relied on professional judgement to assess changes to benthic prey, while grey literature was also considered for the other impacts. In all three habitats, changes in benthic prey could be negative, due to damage by the gear, and may be positive or negative due to nutrient enrichment or food availability from bait.

Table 6. Impacts of Pots and Traps on Benthic Habitat

TYPE OF IMPACT	DEGREE OF IMPACT	DURATION	TYPE OF EVIDENCE	COMMENTS
MUD				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	X	Months - Years	GL, PJ	
Impacts to Physical Structure	X	Days - Months	GL, PJ	
Changes in Benthic Prey	X	Days - Months	PJ	Enrichment mediated effects, damage mediated effects due to baited gear
SAND				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	X	Months - Years	GL, PJ	
Impacts to Physical Structure	X	Days - Months	GL, JP	
Changes in Benthic Prey	X	Days - Months	PJ	Enrichment mediated effects, damage mediated effects due to baited gear
GRAVEL				
Removal of major physical features	N/A			
Impacts to Biological Structure	X	Months - Years	GL, PJ	
Impacts to Physical Structure	X	Months - Years	GL, PJ	
Changes in benthic prey	X	Months - Years	PJ	Enrichment mediated effects, damage mediated effects due to baited gear
KEY: X = Effect can be present, but is rarely large; XX = Effect is present and moderate; XXX = Effect is often present and can be large; N/A = Effect is not present or not applicable; Unknown = effects are not currently known; (H) = High energy environment; (L) = Low energy environment; PR = Peer reviewed literature; GL = Grey literature; PJ = Professional judgement. For definitions of Substrate Type and Type of Impact see Appendix D.				

Management

The strongest recommendation made by the panel to minimize adverse effects of pots and traps was a reduction of effort, although it was recognized that reducing the total number of pots in use is not a complete solution since the remaining pots could be set more often or left for longer set times. Other suggestions made by panel members were:

- "Zoning" habitats (i.e., identifying zones within each habitat type for various uses, including habitat protection) and protecting sensitive areas (e.g., clay pipes).
- If pots can be made lighter without lifting off the bottom, impacts could be reduced.
- Minimizing the amount of line on the bottom would also be helpful.
- Fewer pots per string would reduce impacts of dragging the gear across the bottom.

These observations focused on lobster pots, but some apply to other types of pots as well. Pot fisheries for black sea bass and conch in certain locations are also characterized by a high density of pots which maximizes the likelihood of site-specific habitat impacts.

SINK GILL NETS AND BOTTOM LONGLINES

Gear Description

These two gears were described by Mr. Carr. Other types of bottom static gear (e.g., stake gill nets, handlines, electric or hydraulic reels) were not covered because they are not used extensively in federal waters.

Sink/Anchor Gill Nets: Individual gill nets are typically 300 feet long, and are usually fished as a series of 5-15 nets attached end-to-end. Gill nets have three components: leadline, webline and floatline. Fishermen are now experimenting with two leadlines. Leadlines used in New England are ~65 lb/net; in the Middle Atlantic leadlines may be heavier. Weblines are monofilament, with the mesh size depending on the target species. Nets are anchored at each end, using materials such as pieces of railroad track, sash weights, or Danforth anchors, depending on currents. Anchors and leadlines have the most contact with the bottom. Some nets may be tended several times/day, e.g., when fishing for bluefish in the Middle Atlantic; for New England groundfish, frequency of tending ranges from daily to biweekly.

Bottom Longlines: Mr. Carr was most familiar with longlines fished off Chatham, MA, where about six vessels use them. Up to six individual longlines are strung together, for a total length of about 1500 ft, and are deployed with 20-24 lb anchors. The mainline is parachute cord or sometimes stainless steel wire. Gangions (lines from mainline to hooks) are 15 inches long and 3-6 ft apart. The mainline, hooks, and gangions all come in contact with the bottom. Circle hooks are potentially less damaging to habitat features than other hook shapes. These longlines are usually set for only a few hours at a time. Other panelists noted that: 1) the soak time is regulated, such that the longlines cannot remain in the water for very extended periods; 2) longlines for tilefish in deep water may be up to 25 miles long, are stainless steel or galvanized wire, and are deployed in a zig-zag fashion; and 3) in the Southeast, longlines are prohibited in waters less than 300 ft deep (except for sharks), and are also prohibited in the wreckfish fishery (which is generally prosecuted in depths from about 1200-2000 ft). The prohibition is due to evidence of damage to corals, lost gear, and conflicts with other gears.

Effects and Evidence

Discussions of effects and strength of evidence were led by Dr. Robert Diaz (VIMS) and Dr. DeAlteris. It was noted that both gears are dragged over the bottom when they are retrieved. In addition, gill nets move around to some extent while they are on the bottom and longlines can be moved back and forth across the bottom if there is enough current or when hooked fish pull on the mainline. Dr. Diaz noted that direct effects could include alteration of physical structure and injury or death of emergent epifauna, while indirect effects could include alterations of benthic assemblages toward species that provide less cover or prey for demersal fish. He also pointed out that the amount of damage will depend on the frequency and duration of sets, and the amount and type of structure present. Mr. Carr, who has done research on lost or abandoned gill nets in New England, observed damage to bottom habitats caused by trapped schools of dogfish dragging the nets across the bottom.

Dr. DeAlteris noted that observations in an area off Alaska indicated that the effects of bottom longlines could be of the same type and magnitude as those caused by mobile gear, if longlines are used intensively in areas with abundant biological structure. However, these gears cause relatively little harm when used in non-sensitive habitats that have little or no vertical physical or biological structure. Vulnerable areas are those with 1-3 ft tall structure. Dr. DeAlteris also noted that in order to fully evaluate the significance of the habitat impacts of these two gear types in the Northeast region, the types of gear used and how they are used need to be matched up with the types of habitat where they are used. Two other factors to consider are the amount of gear used and the total area affected.

Except for observations of "ghost" gill nets, there are no studies of the habitat impacts of either of these gear types in the Northeast region. However, in the opinion of Dr. DeAlteris, studies from other areas could be applied to the Northeast, as long as the gear was used in the same type of habitat.

Several panel members noted that tilefish are unusually important in structuring the bottom in offshore canyon head areas. These areas then become important habitat for lobsters, crabs and other species, and that removal of these fish (with longlines) should perhaps be considered a habitat effect, as it may lead to reduced burrow-forming and maintenance. It was noted that part of the continental shelf break habitat for golden tilefish in the Southeast U.S. is now protected, and research is being done on the value of this habitat.

Conclusion

The panel concluded that sink gill nets and longlines cause some low degree impacts in mud, sand and gravel habitats (Table 7). In mud the impacts to biological structure could last for months to years. Duration of impacts to physical structure could be days to months on soft muds, and permanent if impacts were on hard bottom clay structures found in deep water on the continental slope. Impacts to physical structure in mud would be caused by lead lines and anchors used with sink gill nets, not by longlines. In the panel's judgement, impacts in sand would be limited to biological structure and would last days to months. The panel's evaluations of impacts in mud and sand habitats were based on professional judgement alone. Impacts in gravel would also be to biological structure, and the duration could be months to permanent (the latter if the damage involved corals), as indicated by peer review and gray literature, as well as professional judgement.

Table 7. Impacts of Sink Gill Nets and Bottom Longlines

TYPE OF IMPACT	DEGREE OF IMPACT	DURATION	TYPE OF EVIDENCE	COMMENTS
MUD				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	X	Months - Years	PJ	
Impacts to Physical Structure	X	Permanent[1] Days - Months[2]	PJ	[1] Refers to clays [2] Soft bottom muds
Changes in Benthic Prey	N/A			
SAND				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	X	Days - Months	PJ	
Impacts to Physical Structure	N/A			
Changes in Benthic Prey	N/A			
GRAVEL				
Removal of Major Physical Features	N/A			
Impacts to Biological Structure	X	Months - Permanent[1]	PR, GL, PJ	[1] corals
Impacts to Physical Structure	N/A			
Changes in Benthic Prey	N/A			

KEY: X = Effect can be present, but is rarely large; XX = Effect is present and moderate; XXX = Effect is often present and can be large; N/A = Effect is not present or not applicable; Unknown = effects are not currently known; (H) = High energy environment; (L) = Low energy environment; PR = Peer reviewed literature; GL = Grey literature; PJ = Professional judgement. For definitions of Sediment Type and Type of Impact see Appendix D.

Management

The panel agreed that better information is needed on the distribution of habitats that are sensitive to alteration from sink gill nets or bottom longlines, and recommended that sensitive habitats be protected through closures. It was also pointed out that there are areas where emergent epifauna would naturally grow, but has been removed by mobile bottom gear. The panel also suggested that gill net and longline vessels should have observers to record bycatch of benthic structural material.

BEAM TRAWLS

Description

Dr. Chris Glass (Manomet Center for Conservation Sciences) and Mr. Mirarchi led the panel discussion on beam trawls. The panel was unaware of any beam trawls being used in the Northeast U.S. at this time. A few beam trawls were used in the 1970s to catch monkfish, but the fishery was unsuccessful. In the mid 1990s, a number of boats off New Bedford used what were referred to as beam trawls, but the gear more closely resembled a scallop dredge rather than the traditional, European beam trawls. There are a few boats that are currently coded as beam trawls in the fishery landings database, but the panel felt that these were most likely miscoded and were otter trawls being deployed from the side of the vessels.

The panel also felt that it is unlikely that fishermen would begin using beam trawls in the Northeast U.S. Beam trawls are prevalent in the North Sea where the water is dark and murky and the fisheries target flatfishes, which sit slightly under the sediments. In these fisheries, the beam trawl acts to sieve the fish up off the seafloor. The lack of conventional herding effect and small mouth opening of the beam trawl would not be effective for harvesting U.S. target species. Furthermore, most vessels being used in the Northeastern U.S. do not have the size or power required to handle a beam trawl.

Effects and Evidence

There has been long standing concern (dating back to the 14th century) about the adverse effects resulting from the use of beam trawls. Therefore, there exists a large body of good information on the effects of this gear on different habitats.

Management

No management measures are necessary at this time. This issue should be revisited if beam trawls start being used in the Northeast in the future.

PELAGIC GEAR

Description

Dr. DeAlteris discussed a number of pelagic gear types used in the Northeast, including pelagic trawls, drift gill nets, purse seines and longlines. The discussion focused on the fact that, if operated correctly, pelagic fishing gear should only incidentally come into contact with the seafloor. Pelagic trawls, for example, are not designed to touch the seafloor and would be damaged by such contact. Furthermore, the trawl doors would be unstable and would not fish correctly. Purse seines are fished primarily in offshore areas to target tunas. Only a small number of vessels (5 or 6) use purse seines to fish for tunas in coastal waters. Drift (i.e., floating) gill nets and longlines (which are fished in deep waters) only inadvertnetly contact the seafloor. Paired midwater trawls have been banned except for herring, and drift gill nets, once employed for swordfish, are no longer in use.

Effects and Evidence

Dr. DeAlteris and Dr. Fogarty led the discussions on effects and evidence. It was stated that if pelagic gear were to incidentally contact the seafloor, the trawl doors, footropes, leadlines of stationary or floating nets, the nets themselves, or components of longlines could drag across benthic habitats or become entangled on benthic structures. Occasionally boats fishing with purse seines follow fish into shallow water depths where the height of the net (the only one the boat is equipped with) could cause dragging along the seafloor. In the Northeast, purse seines were permitted into Groundfish Closed Area II in 2000 and 2001 with observers. No benthic materials came up in the nets during those observed trips. A few boats observed in 1996 captured benthic materials in the net when it was fished in the shallow waters of Massachusetts Bay. This contact with the bottom is accidental and normally is avoided to prevent damage to the nets.

The opinion of the panel was that pelagic gear has a lower priority than gear that is intentionally dragged across the seafloor. There would be more concern over the potential effects of pelagic fishing gears if seafloor contact was other than incidental, or if there was evidence that contact occurred frequently. Therefore, the panel concluded that we need a better understanding of how often contact occurs. For example, West Coast fisheries that use purse seines such that they frequently contact bottom habitats are monitored with 100% observer coverage.

The panel also discussed ecosystem implications of pelagic gear due to removal of pelagic prey items. It was determined, however, that this issue would be more appropriately addressed through the population management provisions of the Magnuson-Stevens Act, rather than the EFH provisions of the Act.

Management

No management measures are necessary at this time, however, Councils and NMFS should consider increasing observer coverage to track, to the extent possible, the frequency that pelagic gear comes into contact with the seafloor.

CONCEPTUAL HABITAT IMPACT MODEL

Dr Fogarty and Dr. DeAlteris presented a conceptual habitat impact model which was partially described in the previous Otter Trawl section. Although this model has not been extensively reviewed and discussed by the panel, the panel agreed that the model did relate habitat impacts, structural complexity of habitats and recovery time rather well. Based upon the panel's agreement as to the merits of this conceptual model it is presented here in greater detail.

Habitat Classification and Assessment

The potential impacts of fishing gear on a habitat type are a function of the structural complexity of the habitat, the expected recovery time following a disturbance, and characteristics of the gear itself. Habitats characterized by high structural complexity (including emergent biological structures (EBS) such as attached macroalgae, epibenthic organisms etc.) are expected to exhibit higher levels of vulnerability to disturbance. The expected recovery time for a habitat is a function of its physical and biological characteristics and geological structure. For habitats with high complexity attributable to biological structure, the life history and generation times of the emergent or attached organisms will critically determine recovery times. Disturbance to geological structures such as cobble/boulder mounds may effectively be permanent. The expected recovery times for certain organisms that contribute to structural complexity of the environment (e.g. hard and soft corals) may be measured on decadal time scales. Conversely, disturbance to sand/mud substrates without emergent biological structure is expected principally to involve short term impacts and rapid recovery times.

Although a number of habitat classification schemes are possible (e.g. Auster 1998), most involve consideration of grain size characteristics and the presence or absence of biogenic structure. For the purposes of assessing priority for protection, we propose a simple classification scheme with the following categories:

- mud/sand without emergent biological structure
- mud/sand with emergent biological structure
- small gravel (< 2cm) without emergent/attached biological structure
- small gravel (< 2cm) with emergent/attached biological structure
- shell aggregations and/or reefs without emergent/attached biological structure
- shell aggregations and/or reefs with emergent/attached biological structure
- cobble/boulder without emergent/attached biological structure
- cobble/boulder with emergent/attached biological structure

We expect a general relationship between the structural complexity of these habitat types and recovery time from a disturbance. The specific geological and biogenic structures impacted by particular fishing gears will of course determine if recovery is possible and, if so, the expected time scales. Highest vulnerability to fishing gear occurs in habitat types with high structural complexity and long recovery times. Although the specific biological and geological characteristics of particular habitats must be assessed to determine vulnerability to fishing gear, we propose a general conceptual model for the purpose of defining areas of potential high vulnerability (Figure 1).

Consideration of the physical oceanographic characteristics in the habitats will also be critical. In high energy environments, we anticipate coarser grain size and biological communities adapted to disturbance. The expected impact of additional anthropogenic disturbance due to fishing activities must be assessed with respect to rates and magnitude of natural disturbance. In low energy environments, we anticipate biological communities that are not adapted to natural disturbance regimes and these communities may be particularly vulnerable to fishing gear impacts.

Consideration of priorities for protection must also consider the relative availability of particular habitat types. Rarer habitat types should be accorded high priority for protection with the highest priority assigned to those habitats with low availability and high expected recovery times (Figure 2). In the Northeast region, habitat with low structural complexity and short recovery times are relatively abundant. Conversely, habitats with high structural complexity and long recovery times are comparatively less abundant. These characteristics lead to the shape of the curve depicted in Figure 2. Types of protection can range from constraints on particular gear types in specific habitats to the establishment of marine protected areas in which all extractive activities are prohibited.

Figure 1. Conceptual model of the relationship between vulnerability to fishing gear (structural complexity and recovery time) and habitat availability for the Northeast region.

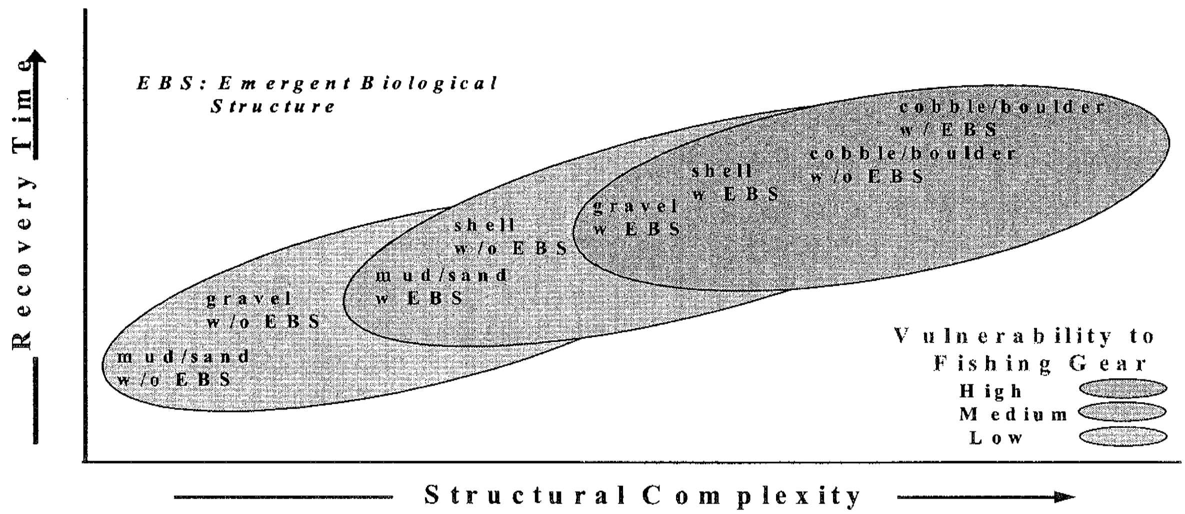
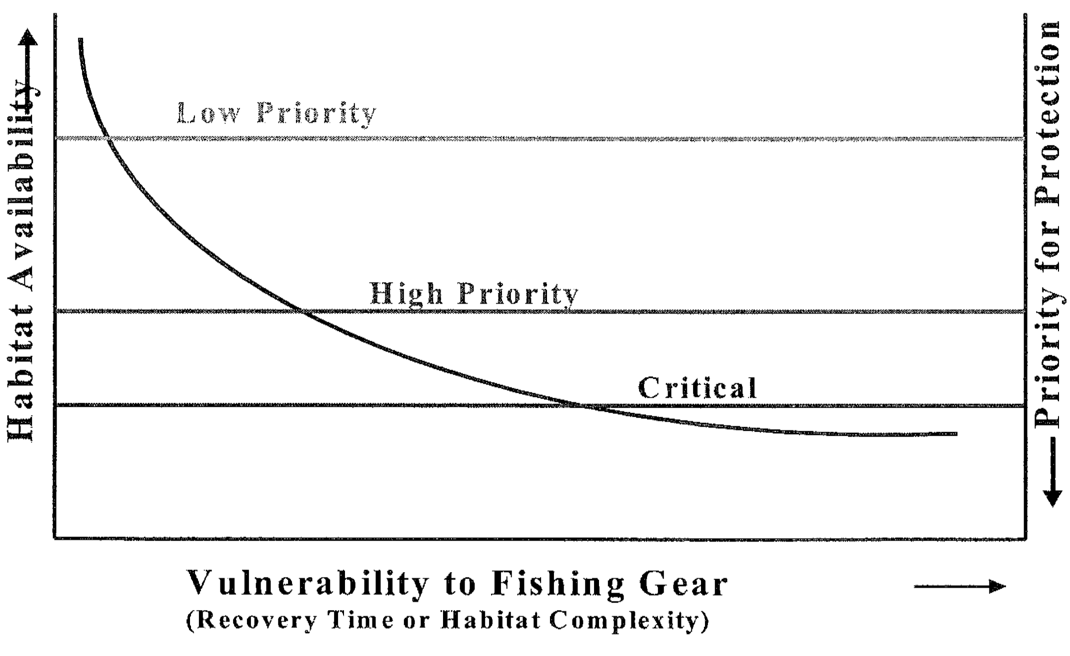


Figure 2. Conceptual model of the relationship between vulnerability to fishing gear (structural complexity and recovery time), habitat availability, and priority for protection.



PRIORITIZATION OF IMPACTS

The workshop participants were asked to participate in an exercise to rank the relative importance of various gear impacts on habitat. The panelists considered the three general habitat types of mud, sand and gravel, and within those habitat types four impacts 1) Removal of major physical features, 2) Impacts to biological structure, 3) Impacts to physical structure, and 4) Changes in benthic prey.

All of these impacts and habitat types were tabulated on a large chart. The panelists were allowed seven votes each. They voted by placing stickers on the chart next to the combinations of impacts and habitats that they felt were the most critical. They could allocate their votes as they saw fit based on any criteria they chose. Some panelists did not specify the type of impact and simply voted by gear type and habitat type. The results from this exercise are found in Tables 8 and 9.

Table 8. Prioritization of Habitat Impacts: Votes Cast by Panel

HABITAT	TYPE OF IMPACT	PANEL RANKING (number of votes, N = 84)					
		Scallop Dredge	Otter Trawl	Nets & Lines	Pots & Traps	Clam Dredges	Total
MUD	Any Impacts	.	5	.	1	.	6
	Removal of major physical features	.	3	.	.	.	3
	Impacts to biological structure	.	1	.	.	.	1
	Impacts to physical structure	.	2	.	.	.	2
	Changes in benthic prey	.	.	.	.	.	.
SAND	Any Impacts	.	.	.	.	1	1
	Removal of major physical features	.	.	.	.	.	.
	Impacts to biological structure	7	4	.	.	2	13
	Impacts to physical structure	2	1	.	.	4	7
	Changes in benthic prey	.	.	.	.	.	.
GRAVEL	Any Impacts	8	11	.	.	.	19
	Removal of major physical features	.	1	.	.	.	1
	Impacts to biological structure	9	10	5	.	.	24
	Impacts to physical structure	4	3	.	.	.	7
	Changes in benthic prey	.	.	.	.	.	.
TOTAL		30	41	5	1	7	84

Table 9. Priority Ranking of the Level of Concern Over Potential Adverse Impacts to Benthic Habitats

Concern by Sediment Type

Rank	Sediment Type	Percentage	Votes
1	Gravel	61%	51/84
2	Sand	25%	21/84
3	Mud	14%	12/84

Concern by Type of Effect

Rank	Type of Effect	Percentage	Votes
1	Impacts to biological structure	65%	38/58
2	Impacts to physical structure	28%	16/58
3	Reduction of physical features	7%	4/58

Concern by Type of Gear

Rank	Type of Gear	Percentage	Votes
1	Otter trawls	49%	41/84
2	Scallop dredges	36%	30/84
3	Clam dredges	8%	7/84
4	Nets and Lines	6%	5/84
5	Pots and Traps	1%	1/84

Concern by Sediment Type and Effect Combination

Rank	Sediment Type - Effect	Percentage	Votes
1	Gravel - Impacts to biological structure	41%	24/58
2	Sand - Impacts to biological structure	22%	13/58
3	Sand - Impacts to physical structure	12%	7/58
3	Gravel - Impacts to physical structure	12%	7/58
5	Mud - Reduction of physical features	5%	3/58
6	Mud - Impacts to physical structure	3%	2/58
7	Mud - Impacts to biological structure	2%	1/58
7	Gravel - Reduction of physical features	2%	1/58

Concern by Sediment Type and Gear Type Combination

Rank	Sediment Type - Gear Type	Percentage	Votes
1	Gravel - Otter trawls	30%	25/84
2	Gravel - Scallop dredges	25%	21/84
3	Mud - Otter trawls	13%	11/84
4	Sand - Scallop dredges	11%	9/84
5	Sand - Clam dredges	8%	7/84
6	Sand - Otter trawls	6%	5/84
6	Gravel - Nets and Lines	6%	5/84
8	Mud - Pots and Traps	1%	1/84

Several conclusions can be drawn from this evaluation. First of all, gravel habitat was clearly considered to be most at risk, followed by sand and mud (Figure 3). Secondly, impacts to biological structure were of greatest concern, particularly in gravel habitat, followed by any impacts to gravel habitat (Figure 4). Impacts to physical structure ranked third and removal of major physical features ranked fourth. Thirdly, otter trawls and scallop dredges were of much greater concern than clam dredges, gill nets and longlines, and pots and traps (Figures 5). Otter trawls and scallop dredges were judged to have the greatest impacts on gravel habitat (Figure 6). Additionally, otter trawl effects were of concern in all three habitat types, whereas scallop dredge effects are limited to gravel and sand, and clam dredging impacts are limited to sandy bottom. Sink gill nets and bottom longlines were only of concern in gravel. Changes in benthic prey received no votes at all and only one vote was cast for pots and traps. Overall, the panelists stated that this was a valuable exercise and that the results were consistent with their discussions throughout the workshop.

Figure 3. Priorities by Habitat Type

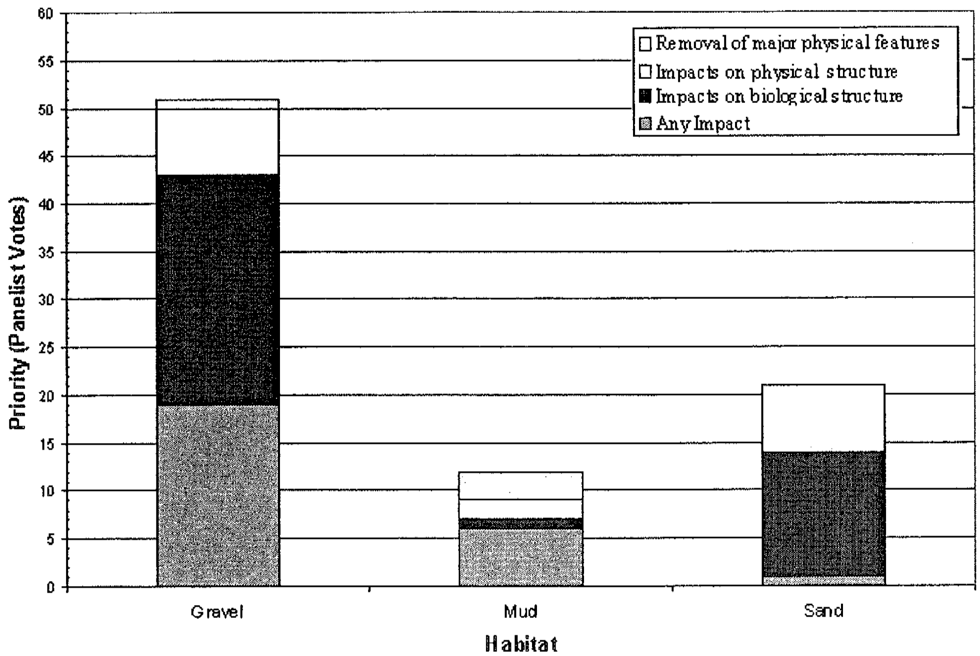


Figure 4. Priorities by Impact Type

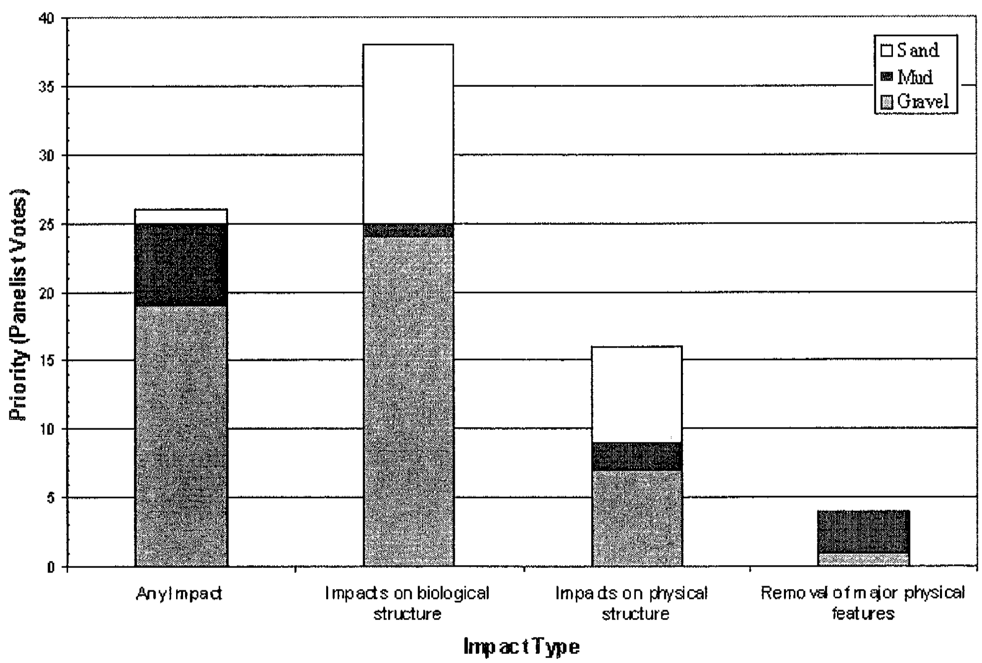


Figure 5. Priorities by Gear

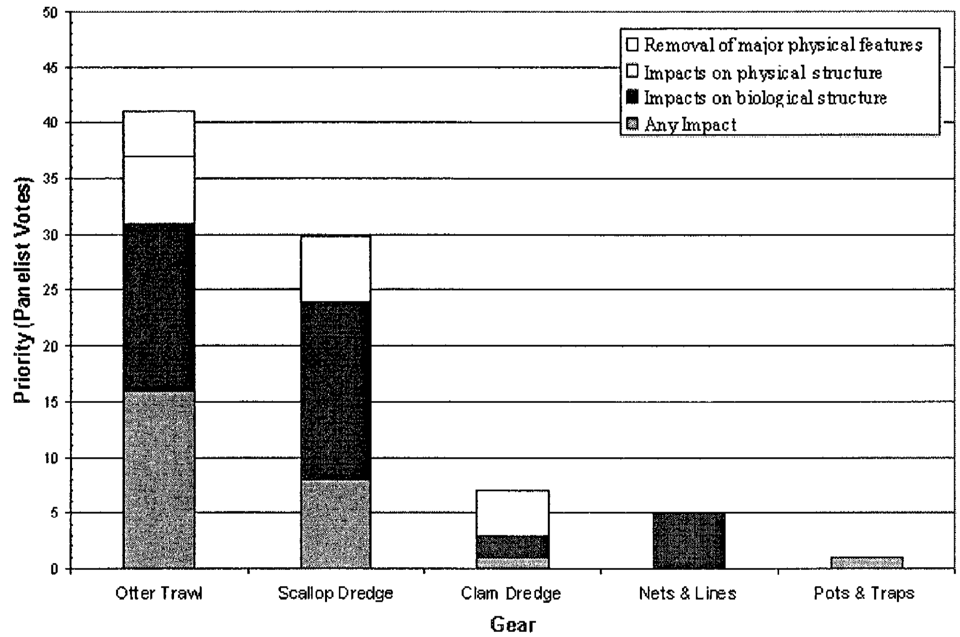
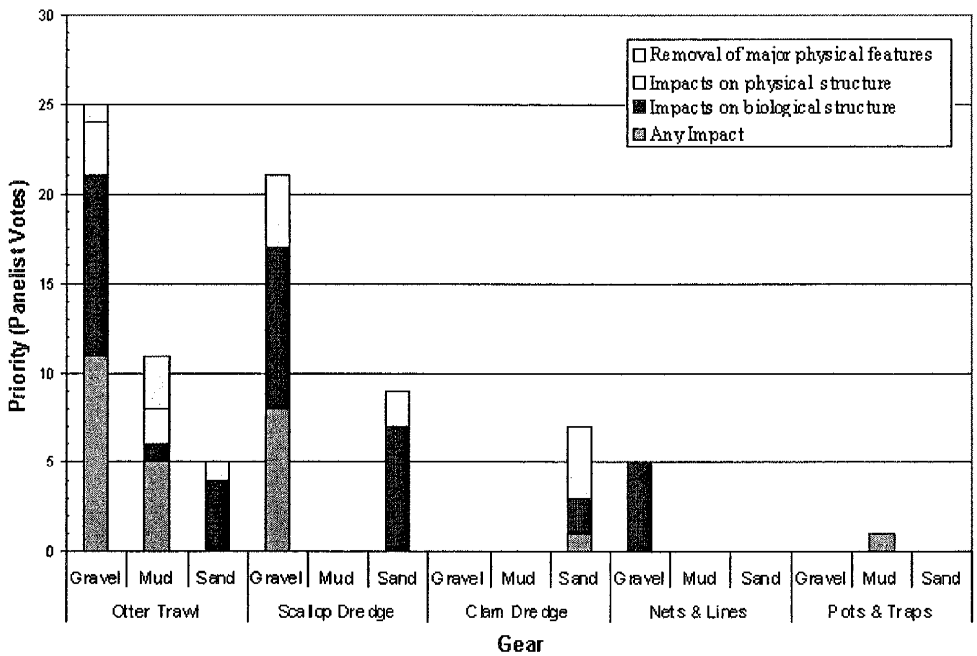


Figure 6. Priorities by Gear and Habitat



RECOMMENDATIONS FOR ACTION

Overall the panel stressed a theme throughout the workshop that in order to protect habitat from gear impacts three management measures deserve consideration: 1) effort reduction, 2) spatial closures, and 3) gear modification. During this specific session of the workshop these themes were raised again and the panel also made several other and more specific suggestions related to gear impacts and habitat. The panel members were free to suggest anything they thought appropriate but were asked to consider both research and management recommendations. For the most part the panel reached consensus on each of these recommendations. When they did not reach consensus, it is noted and the reasons for differing opinions are explained. Many of the recommendations focused in three areas, spatial closures, increased mapping, and effort data. The discussions supporting these three types of recommendations along with the other recommendations offered by the panel are included below. The panel recommended:

Spatial Closures: To protect critical and/or vulnerable habitat areas as an important tool to minimize gear impacts on habitat. The panel indicated that some closed areas need to be closed to all gear types in order to protect critical habitat while other areas only need to be closed to gear types that significantly impact the bottom. Some panel members argued that long term and even permanent closed areas were needed for habitat protection as well as for research. Other panel members thought that short term or more temporary closed areas, which adapted to changing conditions in the habitat or fishery, were sufficient. While all panel members agreed that areas should be closed to protect critical or vulnerable habitat , some panel members emphasized the need to protect portions of representative habitat types in the Northeast region; such closures would include habitats that may not be as vulnerable to alteration from fishing. All panel members agreed that the selection of closed areas should be based on scientific information. Some panel members felt it was important to extend the duration of the current closed areas on Georges Bank and the western Gulf of Maine in order to continue habitat protection which is already in place and to allow established research programs to continue. Other panel members indicated that these areas were chosen for fishery resource management rather than habitat protection purposes and therefore new areas should be considered.

Mapping: The habitats in the Northeast region should be mapped. This mapping effort should begin with the most critical habitats but then should eventually encompass the entire region.

Effort Data: Effort data for the various fishing fleets, especially otter trawls and clam dredges, should be gathered and mapped as has been done in the scallop fishery. While systems such as VMS are currently installed on some vessels for enforcement purposes, the panel agreed that collection of real time trip data was not necessary; instead, any mechanism to gather information that could be mapped at a later date would be sufficient.

Effort Reduction: The panel noted that for many overexploited species, resource management measures which require reductions in fishing effort to maximize yield will have the added benefit of protecting habitat.

Gear Modification: Continued gear research and modification. Throughout the workshop, gear modification was mentioned as a possible way to reduce the impact of certain gears on critical or vulnerable habitats.

Enforcement: Law enforcement for current and any future closed areas should be improved.

Reduce damage to habitat in low yield areas: Identifying areas of low yield of bottom dwelling resources and prohibiting fishing with bottom-tending gear in those areas. This would reduce habitat damage while at the same time minimizing socioeconomic impacts to fishing communities. Some panel members disagreed with this recommendation, indicating that if an area is not productive for fishery resources than it is most likely not productive habitat.

Research: Funding should be provided to support additional research that would address information deficiencies identified in this workshop. Some panel members recommended that greater use be made of observers to collect detailed information on bycatch and the distribution of fishing effort. Additionally it was noted that deep water corals, the continental shelf break, and the heads of submarine canyons are also very important habitats that require more research to understand their importance and provide appropriate protection measures.

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APPENDICES

APPENDIX A

WORKSHOP PARTICIPANTS

Mr. H. Arnold Carr
Massachusetts Division of Marine Fisheries
Pocasset, MA

Dr. Joseph DeAlteris
Department of Fisheries and Aquaculture
University of Rhode Island
Kingston, RI

Dr. Robert Diaz
Virginia Institute of Marine Science
Gloucester Point, VA

Dr. William DuPaul
Virginia Institute of Marine Science
Gloucester Point, VA

Dr. Michael Fogarty
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

Dr. Chris Glass
Manomet Center for Conservation Sciences
Manomet, MA

Dr. Ellen Kenchington
Department of Fisheries and Oceans
Marine Environmental Sciences Division
Dartmouth, Nova Scotia, Canada

Dr. James Lindholm
National Ocean Service
Stellwagon Bank National Marine Sanctuary
Scituate, MA

Mr. James Lovgren
Captain, F/V Sea Dragon
Brick, NJ

Dr. Roger Mann
Virginia Institute of Marine Sciences
Gloucester Point, VA

Mr. Frank Mirarchi
Boat Kathleen A. Mirarchi, Inc.
Scituate, MA

Dr. Doug Rader
Environmental Defense
Raleigh, NC

Dr. Page Valentine
U.S. Geological Service
Woods Hole, MA

Dr. Robert Van Dolah
South Carolina Dept. of Natural Resources
Division of Marine Resources
Charleston, SC

Mr. Dave Wallace
Wallace and Associates
Cambridge, MD

Dr. James Weinberg
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

Dr. Robert Whitlatch
Department of Marine Sciences
University of Connecticut
Groton, CT

WORKSHOP STEERING COMMITTEE

Louis Chiarella
NMFS, Northeast Regional Office
Habitat Conservation Division
1 Blackburn Drive
Gloucester, MA 01930

Robert Reid
NMFS, Northeast Fisheries Science Center
Ecosystems Processes Division
James J. Howard Laboratory
74 Magruder Rd.
Highlands, NJ 07732

Dianne Stephan
NMFS, Northeast Regional Office
Habitat Conservation Division
1 Blackburn Drive
Gloucester, MA 01930

Michael Pentony
New England Fishery Management Council
50 Water Street
Newburyport, MA 01950

Dr. Thomas Hoff
Mid-Atlantic Fishery Management Council
Room 2115 Federal Building
300 South New Street
Dover, DE 19904-6790

Carrie Selberg
Atlantic States Marine Fisheries Commission
1444 Eye Street, N.W., Sixth Floor
Washington, D.C. 20005

Korie Johnson
NMFS, Office of Habitat Conservation
1315 East-West Highway
Silver Spring, MD 20910

Dr. David Stevenson
NMFS, Northeast Regional Office
Habitat Conservation Division
1 Blackburn Drive
Gloucester, MA 01930

John McCarthy
NMFS, Northeast Fisheries Science Center
Ecosystems Processes Division
James J. Howard Laboratory
74 Magruder Rd.
Highlands, NJ 07732

APPENDIX B.

FINAL AGENDA
Effects of Fishing Gear on Fish Habitat in the Northeastern U.S.
October 23 -25, 2001
Boston, MA
Hilton Boston Logan Airport (617) 568 -6700

Tuesday 10/23

9:30-10:00	*COFFEE*
10:00 - 10:30	Welcome and Introductions (Colosi, Hopkins, Caputi)
10:30 - 11:15	Overview of Meeting Format and Products (Chiarella, Citrin)
11:15 - 11:45	Habitat Description and Overview (Valentine Lead)
11:45 - 12:45	Effects of Fishing Gear: Bottom Static, Pots and Traps (Panel)
12:45 - 2:00	LUNCH
2:00 - 4:15	Effects of Fishing Gear: Clam Dredges (Panel)
3:30 - 3:45	*Coffee Break*
4:15 - 5:15	Effects of Fishing Gear: Pelagic Gear (Panel)

Wednesday 10/24

8:00 - 9:00	Effects of Fishing Gear: Bottom Static, Nets and Hook Gear (Panel)
9:00 - 12:15	Effects of Fishing Gear: Scallop Dredges (Panel)
10:20 - 10:35	*Coffee Break*
12:15 - 1:30	LUNCH
1:30 - 4:45	Effects of Fishing Gear: Otter Trawls (Panel)
2:50 - 3:05	*Coffee Break*
4:45 - 5:45	Effects of Fishing Gear: Beam Trawls (Panel)

Thursday 10/25

8:00 - 8:45	Peer Review of White Paper (Panel and Staff)
8:45 - 11:30	Conclusions of Last Two Days (Panel and Staff)
9:45 - 10:00	*Coffee Break*
11:45 - 1:00	Relative Importance of Impacts (Panel)
1:00 - 2:00	LUNCH
2:00 - 3:30	Recommendations for Action (Panel)
3:30 - 4:00	Wrap-Up, Adjourn

APPENDIX C.

Workshop Goals and Objectives

Goal: Evaluate the impact of fishing gear used in federally regulated fisheries on habitats of the Northeast shelf ecosystem, and ways to reduce impacts.

Objective 1: Peer review background document prepared by the Workshop Steering Committee.

Objective 2: Evaluate the applicability of national and international fishing gear effects research to the Northeast.

Objective 3: Evaluate the strength of evidence regarding the effects of different types of gear and fishing practices on marine habitats in the Northeast.

Objective 4: Identify and evaluate types of management measures that could reduce the impacts of fishing gear on marine habitats in the Northeast.

Objective 5: Provide advice and recommendations to the New England and Mid-Atlantic Fishery Management Councils for minimizing adverse effects of fishing gear on marine habitats in the Northeast.

APPENDIX D.

DEFINITIONS

Essential Fish Habitat *(Magnuson-Stevens Act , MSA)*

"EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

Adverse Effect *(EFH Interim Final Rule, IFR)*

"Adverse effect means any impact which reduces quality and/or quantity of EFH. Adverse effects may include direct (e.g. contamination or physical disruption), indirect, (e.g. loss of prey, or reduction of species' fecundity), site-specific or habitat-wide impacts including individual, cumulative, or synergistic consequences of actions."

"Adverse effects from fishing may include physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other components of the ecosystem."

"Identifiable" Adverse Effect *(IFR)*

1. "Impacts from fishing practices that justify the implementation of management measures should be identifiable"
2. "Identifiable means both more than minimal and not temporary in nature..."
3. "Intent is to regulate fishing gears that reduce an essential habitat's capacity to support marine resources, not practices that produce inconsequential changes in the habitat."

Substrate Types

1. **Mud** - For purposes of the workshop this category consisting of clays and silts. Particle sizes range from 0.001 - 0.004 mm for clay and 0.004 mm - 0.062 mm for silt. *(USGS 2001)*

2. **Sand** - Sediment particles ranging from 0.062 mm - 2.00 mm *(USGS 2001)*

3. **Gravel** - For purposes of the workshop this category includes pebbles, cobbles, boulders, as well as hard bottom (ledge) and hard corals. Pebbles are the smallest particles in this category and range from 2.0 mm - 64.0 mm. Cobbles range from 64.0 mm - 256.0 mm. Boulders are > 256.0 mm *(USGS 2001)*

Type of Impact Used in Gear Impact Tables *(Modified from ICES, 2001):*

1. **Removal of Major Physical Features** - Fishing gear may cause the loss or dispersal of physical features in the environment such as peat banks or boulder reefs. These changes are always permanent, and lead to an overall reduction in habitat diversity. This, in turn, can lead to the local loss of species and species assemblages dependant upon such features, for example, attached bryozoan/hydroid turf and important fish habitat. Even when substantial quantities of the habitat feature remain, if the habitat has become highly fragmented, this may compromise the viability of populations dependent upon it. *(ICES 2001)*

2. **Impacts to Biological Structure** - Fishing gear can cause the loss of structure-forming organisms such as colonial bryozoans, *Sabellaria,* hydroids, seapens, sponges, mussel beds, and oyster beds. These changes may be permanent, and can lead to an overall loss of habitat diversity. This in turn, can lead to the local loss of species and species assemblages dependent upon such biogenic structure, for example, important fish habitat for juvenile gadoids. The viability of populations dependent on biogenic features may be compromised even if the feature remains but has become highly fragmented. *(ICES, 2001)*

3. **Impacts to Physical Structure** - Fishing gear can cause a reshaping of seabed features such as sand ripples, and damage to burrows and associated structures (e.g. mounds and casts, microhabitats, and shell windrows). These features provide important habitats for smaller animals (meiofauna) and can

be used by fish to reduce their energy requirements. These changes are not likely to be permanent. Fishing gear can cause the redistribution and mixing of surface sediments which can lead to a decrease in the physical patchiness of the sea floor (i.e., decreased heterogeneity) within the fishing grounds. These changes are not likely to be permanent. *(ICES 2001)*

4. Changes in Benthic Prey - Fishing gear can cause reductions in the abundance and/or species composition of benthic invertebrate populations that are consumed by bottom feeding fish. These changes have the potential to affect habitat suitability for growth, survival, and reproductive capacity of predatory fish.

APPENDIX E.

Questions for the Workshop Panel:

I. Introductory Questions. (Habitat Overview)

1. What types of habitat are found in the Northeast region?
2. What are the characteristics of the habitats in the Northeast region and how do these differ in the Gulf of Maine, Georges Bank, Southern New England shelf, and Mid-Atlantic Bight?

II. Questions on Fishing Gear Types.

The categories of fishing gears used for the workshop include the following:

Bottom-Tending Static Fishing Gears -- Pots and Traps

Bottom-Tending Mobile Fishing Gears -- Clam Dredges (hydraulic and non-hydraulic)

Bottom-Tending Static Fishing Gears – Gill Nets, Long Lines, Hooks

Bottom-Tending Mobile Fishing Gears -- Sea Scallop Dredges

Bottom-Tending Mobile Fishing Gears -- Otter Trawls

Bottom-Tending Mobile Fishing Gears -- Beam Trawls

Pelagic Fishing Gears (Static and Mobile)

The Workshop Panel is asked to answer specific questions about the effects of different fishing gears and the applicability of available information to the Northeast Region. The following set of questions apply to each of the above categories of fishing gear used in the Northeast Region.

1. What fishing gears in this category are used in the Northeast?
2. How are fishing gears in this category used in the Northeast?
3. What, if any, components or elements of fishing gears in this category come in contact or interact with the sea floor?
4. What are the direct effects of fishing gears in this category on different habitats?
5. What are the principal indirect biological effects of gear induced habitat alterations on exploited resource populations?
6. What effects of fishing gears in this category are most significant?
7. Which habitats are most or least vulnerable to effects of fishing with fishing gears in this category?
8. How do we judge the temporal scale of the effects of fishing gears in this category on different habitats?
9. What studies or elements of studies of the effects of fishing gears in this category are applicable to the Northeast? Why?
10. What studies or elements of studies of the effects of fishing gears in this category are <u>not</u> applicable to the Northeast? Why not?
11. How strong is the evidence for the potential effects of fishing gears in this category on different habitats in the Northeast?

12. What are the most important overall potential effects of fishing gears in this category in the Northeast?

13. What types of management actions would be most effective to mitigate the potential adverse effects of fishing gears in this category in the Northeast?

14. Would any changes to fishing practices with fishing gears in this category reduce their interaction with or contact with the bottom, or in some other way reduce the impacts to habitat associated with fishing gears in this category?

15. Are there any design modifications that could be made to fishing gears in this category that would reduce their interaction with or contact with the bottom, or in some other way reduce the impacts to habitat associated with fishing gears in this category?

In addition, the following questions apply to the pelagic categories of fishing gear:

16. Relative to impacts from other gear types on sea floor habitats, how important are potential impacts from pelagic gears to the water column?

17. Would there be more or less concern over the potential effects of pelagic fishing gears if they were used in contact with the bottom, either intentionally or accidentally?

APPENDIX F.

Descriptions of some representative habitats as presented by Dr. Page Valentine, USGS.
Note: This is not a complete listing of habitats of the Northeastern United States

A. GEORGES BANK – Northeastern Edge

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless gravel except for few large sand ridges
B. Sediment texture and hardness	Gravel pavement (hard bottom); small areas of gravel with sand veneer; sand
C. Substrate roughness and surface area (undisturbed)	
• Physical	Gravel pavement: pebbles, scattered cobbles and boulders; little rippled sand Sand ridges with ripples
• Biological	Gravel pavement: calcareous worm tubes, bryozoa/hydrozoa, sponges, and anemones attached to gravel Sand:
D. Substrate dynamics	Strong tidal and storm currents winnow sand from gravel pavement, move shells, and move surfaces of sand deposits;
E. Water column	Generally mixed; high productivity; shallow
F. Possible fishing impacts	Disturb gravel pavement, reduce hard bottom and expose sand for movement; move cobbles and boulders; disturb epifauna; alter biodiversity

B. GEORGES BANK – Central Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Sand bedforms ranging from small ripples to very large sand ridges
B. Sediment texture and hardness	Sand; shell beds; small areas of gravel between sand ridges
C. Substrate roughness and surface area (undisturbed)	
• Physical	Sand bedforms of varying sizes; associated shell beds Gravel: pebbles, cobbles, boulders
• Biological	Sand bedforms: amphipod tubes, sand dollar concentrations and burrowing anemones Gravel: minimal epifauna due to sand movement
D. Substrate dynamics	Strong tidal and storm currents build bedforms and shell beds; daily sand transport; large stable sand ridges are oriented parallel to direction of current flow; bi-directional sand movement
E. Water column	Mixed; high productivity; shallow
F. Possible fishing impacts	Disturb sand bedforms and shell beds; disturb amphipod tubes and burrowing anemones and expose sand for movement

C. GEORGES BANK – Southern Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless sand except for patches of ripples from intermittent storms
B. Sediment texture and hardness	Sand
C. Substrate roughness and surface area (undisturbed)	
• Physical	Depressions in sand formed by benthic fauna; scattered shells
• Biological	Erect yellow sponges attached to shell fragments; amphipod tubes
D. Substrate dynamics	Weak tidal currents do not move sediment; intermittent strong storm currents form sand ripples
E. Water column	Mixed or seasonally stratified; high productivity; shallow
F. Possible fishing impacts	Disturb sand depressions, erect sponges, and amphipod tubesl break shells

D: GEORGES BANK – Large Submarine Canyons on Southern Margin

HABITAT CHARACTER	DESCRIPTION
A. Topography	Deep incision into continental shelf edge; gentle to steeply sloping canyon walls; sand bedforms in canyon axis
B. Sediment texture and hardness	Sand and gravel on canyon rims and in axis; gravel pavement common on eastern rims; clay layer and rock outcrops on canyon walls
C. Substrate roughness (undisturbed)	
• Physical	On canyon rims: depressions in sand formed by benthic fauna; scattered shells; sand bedforms; gravel pavement of pebbles and scattered cobbles and boulders In canyon: sand bedforms; scattered pebbles, cobbles, and boulders; clay burrows (formed by crustaceans, fish, worms ...); irregular rock outcrops
• Biological	Sponges, bryozoa/hydrozoa, soft corals attached to gravel and rock outcrops; burrowing anemones; ...
D. Substrate dynamics	Moderate currents move sand from shelf onto canyon walls; strong tidal currents form sand bedforms in canyon axis
E. Water column	Stratified; low productivity; shallow to deep
F. Possible fishing impacts	Disturb gravel pavement, reduce hard bottom and expose sand for movement; move cobbles and boulders; disturb hardbottom epifauna; disturb clay burrows; disturb burrowing anemones

E. GULF OF MAINE – Central Deep Water Banks

HABITAT CHARACTER	DESCRIPTION
A. Topography	Banks, ridges, hills, mounds
B. Sediment texture and hardness	Gravel and bedrock with intermittent thin veneer of mud; patches of mud; hard and soft bottom
C. Substrate roughness and surface area (undisturbed)	
• Physical	Gravel: pebbles, cobbles, boulders, and bedrock outcrops; scour depressions around cobbles and boulders Mud: mud burrows (crustaceans, fish, worms, ...)
• Biological	Gravel: sponges, brachiopods, and anemones attached to gravel Mud: burrowing anemones, sea pens
D. Substrate dynamics	Very weak currents; little or no sediment transport
E. Water column	Stratified; low productivity; deep
F. Possible fishing impacts	Flatten small gravel mounds; move cobbles and boulders; re-suspend fine sediment and increase turbidity; disturb epifauna; disturb mud burrows; disturb burrowing anemones and sea pens

F. GULF OF MAINE – Central Deep Water Basins

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless mud except for small mounds
B. Sediment texture and hardness	Mud; soft bottom
C. Substrate roughness and surface area (undisturbed)	
• Physical	Mud: mud burrows (crustaceans, fish, worms, ...)
•	
• Biological	Mud: burrowing anemones; sea pens, "amphipod" tubes
D. Substrate dynamics	Very weak currents; little or no sediment transport
E. Water column	Stratified; low productivity; deep
F. Possible fishing impacts	Disturb burrows; re-suspend fine sediment and increase turbidity; disturb burrowing anemones and sea pens

G: GREAT SOUTH CHANNEL REGION – Central Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless gravel; gravel mounds; bedforms ranging from small ripples to very large sand ridges
B. Sediment texture and hardness	Gravel pavement; gravel between large sand ridges; gravel with thin veneer of sand; sand
C. Substrate roughness and surface area (undisturbed)	
• Physical	Gravel pavement and mounds: pebbles, scattered cobbles and boulders; shell beds Sand bedforms of varying sizes
• Biological	Gravel: bryozoa/hydrozoa, sponges, attached anemones Sand:
D. Substrate dynamics	Strong tidal and storm currents; daily sand transport; sand ridges relatively stable and oriented normal to direction of current flow; bi-directional sand movement
E. Water column	Mixed; high productivity; shallow
F. Possible fishing impacts	Disturb gravel pavement, expose sand for movement; flatten small gravel mounds; move cobbles and boulders; disturb gravel epifauna; disturb small bedforms and shell beds

H. GREAT SOUTH CHANNEL REGION – Northern Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless gravel with veneer of rippled sand
B. Sediment texture and hardness	Gravel with mobile patchy sand veneer
C. Substrate roughness and surface area (undisturbed)	
• Physical	Gravel: Pebbles, cobbles, and boulders; current scours around boulders Sand: rippled sand patches; rippled sand deposits streaming downcurrent from boulders
• Biological	Gravel: little attached epifauna due to sand movment Sand:
D. Substrate dynamics	Strong tidal and storm currents; sand moving through gravel
E. Water column	Generally mixed; high productivity; shallow
F. Possible fishing impacts	Move cobbles and boulders; disturb attached epifauna; disturb sand ripples

I. GREAT SOUTH CHANNEL REGION – Northeastern Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless except for storm sand ripples
B. Sediment texture and hardness	Coarse sand and gravel
C. Substrate roughness and surface area (undisturbed)	
• Physical	Sand: storm-generated ripples Gravel: pebble gravel pavement in ripple troughs; scattered cobbles and boulders
• Biological	Gravel: sponges and bryozoa/hydrozoa attached to gravel Sand:
D. Substrate dynamics	Moderate tidal currents; strong storm currents transport sand and form ripples
E. Water column	Mixed or seasonally stratified; high productivity; shallow
F. Fishing impacts possible	Disturb sand ripples and gravel pavement; move cobbles and boulders; disturb gravel epifauna

J. GREAT SOUTH CHANNEL REGION – Southwestern Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless gravelly sand except for widely spaced very large sand ridges
B. Sediment texture and hardness	Gravelly coarse sand between sand ridges; sand on ridges
C. Substrate roughness and surface area (undisturbed)	
• Physical	Gravelly coarse sand: depressions in sand formed by benthic fauna; scattered shells Sand ridges with ripples
• Biological	Gravelly coarse sand: erect yellow sponges, attached anemones, amphipod tubes Sand:
D. Substrate dynamics	Moderate tidal currents; strong storm currents transport surfaces of relatively stable sand ridges; bi-directional sand movement
E. Water column	Generally mixed; high productivity; shallow
F. Fishing impacts possible	Disturb depressions in gravelly coarse sand, erect sponges, attached anemones, and amphipod tubes

K. GREAT SOUTH CHANNEL REGION – Western Part

HABITAT CHARACTER	DESCRIPTION
A. Topography	Featureless
B. Sediment texture and hardness	Mussel bed; hard bottom
C. Substrate roughness and surface area (undisturbed)	
• Physical	Mussel shells
• Biological	Mussel bed with attached epifauna
D. Substrate dynamics	Strong tidal and storm currents
E. Water column	Mixed; high productivity; shallow
F. Possible fishing impacts	Disturb living mussels, shells, and attached epifauna; expose underlying sediment to strong currents

APPENDIX G.

Spatial Distribution of Fishing Effort for Sea Scallops: 1998-2000

Prepared for

Effects of Fishing Gear on Fish Habitat in the Northeastern U.S.
October 23 - 25, 2001
Boston, MA

Paul Rago[1] and Michael McSherry[2]

Northeast Fisheries Science Center, National Marine Fisheries Service, Woods Hole, MA, 02540, USA and [2]Northeast Regional Office, National Marine Fisheries Service, Gloucester, MA, 01930

Introduction

Precise information on the spatial pattern of fishing by commercial vessels is available for few fisheries. Such information is critical for assessment of potential impacts of fishing gear on target and non-target species. The short report summarizes recent information on the spatial distribution of the US sea scallop fishery and estimates the area-specific landings and revenue. Additional information related to this report may be found in Rago et al. (2000).

Methods

Each vessel that participates in the limited access fishery for Atlantic sea scallops is required to use a vessel monitoring device. This device identifies the position of each vessel at intervals of one hour or less. Positions are tracked by a geosynchronous satellite and the information is relayed to ground-based stations. Vessel speed can be computed as the distance between successive position divided by the duration between position reports. The combination of vessel tracking devices, satellite and ground-based monitoring, and associated databases and software define the vessel monitoring system (VMS) for sea scallops. The VMS database was originally designed as an enforcement tool to track time at sea accurately, and to identify possible violations of closed areas. The potential uses of such data for assessment and management, however, are far-reaching. We present a few examples related to development of a synoptic map of fishing activity.

Estimates of area-specific fishing activity by calendar year were derived by overlaying a grid of 1 nm^2 squares over a region extending from Georges Bank to Virginia. Total fishing time in each cell was estimated as the sum of vessel-hours where speed is less than 5 knots (scallop vessel typically fish at 4-5 knots). Speed is estimated as the Euclidian distance between successive position reports divided by the time between observations. This estimate of fishing activity includes haul back time as well as any other time spent processing catch or cessation of fishing during bad weather or mechanical breakdowns. Fishing activity is assigned to the 1 nm^2 cell in which the report is received. In theory however, the fishing activity could have occurred within a five nautical mile radius of the recorded position. In practice, vessels tend to concentrate fishing activity around locations were capture rates are high. The effects of uncertainty in specification of fishing activity time could be examined via various smoothing procedures and through more detailed analysis of individual vessel tracks. For the purposes of this summary, we felt that the overall pattern of vessel activity was sufficiently characterized.

Total fishing activity hours by cell were estimated by quartiles (Table 1) and coded by color (red >75%-ile, 50%-ile<yellow <75%-ile, 25%-ile < green < 50%-ile, blue < 25%-ile. An upper bound on area swept can be obtained as the product of fishing time (hr), an estimated average speed of 4.5 knots while towing, and an industry norm of two 15 ft wide dredges. This product provides a measure of potential bottom contact area, but the actual area covered is determined by the number of times that the bottom is repeatedly towed. The VMS data alone are insufficient to estimate this quantity.

The spatial distribution of landings and revenue was approximated by linking vessel monitoring data with dealer records of landings and total value. Landings associated with each trip were distributed in proportion to time fished over set of 1 nm^2 cells that comprise the area fished. The sum over all trips provides an estimate of the landings per unit area. An equivalent procedure was used to estimate the revenue per unit area. This procedure does not account for the non-uniform distribution of fishing success over the course of a trip. Since most landings are likely to come from the areas fished the most intensively, it is likely that the application of the average success rate (i.e., lbs/hr) to all cells in a trip will overestimate the landings and revenue from marginal areas. Although the VMS reports record all trips, not all VMS trips can be matched with dealer records. The degree of matching exceeded 90% in all years. Unmatched records arise from a variety of sources and can generally be resolved by investigation of individual trips. In some instances it is necessary to combine several "trips" that give rise to a single landing event. Multiple VMS "trips" can arise when a vessel moves back and forth across inshore demarcation lines during a single trip.

Results

The scallop fishery is highly concentrated and the degree of concentration is consistent across years. The spatial distribution of fishing effort in 1998 and 1999 is depicted in Fig. 1. Fishing effort quartiles were estimated for the set of all cells (1 nm^2) in which fishing occurred in 1998 and 1999. Cells below the median hours of fishing activity experienced less than 9 hours of fishing activity per year. The upper quartile of fishing effort was highly concentrated in a zone of about 3000 square miles in all three years (Table 1). Estimated mean fishing activity in these areas was about 110 hr in 1998 and 1999. The fishing activity in cells below the median level is largely incidental and constitutes only about 4% of the total landings per year. It is hypothesized that such fishing activity is exploratory to recheck old fishing sites or to identify overlooked scallop concentrations. The most heavily fished areas produced the 77 to 88% of the total landings. Hence, the VMS data provides a heretofore unknown quantification of the concentration of fishing activity. The implications of this concentration may be important for bycatch and habitat issues (e.g., the environmental "footprint" of fishing effort).

Discussion

Monitoring of fleet behavior during the reopening of area II also revealed the importance localized concentrations of scallops on the distribution and intensity of fishing effort. The observed pattern of effort was consistent with the predicted "limiting distribution of fishing effort" described by Beverton and Holt (1957, p. 162). The concentration of effort on high abundance patches also suggests a reason why predicted yields based on *average* densities may not be realized. The ability to locate and exploit scallop beds will tend to maintain high average catch rates, while at the same time, reduce the true average density faster than would be predicted.

The long term value of the Vessel Monitoring System has been only partially exploited. At a minimum, it provides a common language for fishermen and scientists to gain insights into fishing behavior and resource distribution. Fishermen cannot argue that scientists don't know where the fleet actually fishes and what the catch is. Moreover, scientists cannot dismiss fishermen's observations as anecdotal fragments of the whole. In such circumstance the strengths and weaknesses of each others tenets can be evaluated. Cursory examination of the areal distribution of effort suggests coherence with substrate types. Such coherence may ultimately allow prediction of habitat impacts and bycatch considerations. Managers will find it easier to evaluate the effects of management measures in real time and make short-term corrections when appropriate.

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Appendix

Background on Sea Scallop Biology and Fishery

Sea scallops, *Placopecten magellanicus*, are found in western North Atlantic continental shelf waters from Newfoundland to North Carolina. Principal USA commercial fisheries in the EEZ are conducted primarily on Georges Bank, and in the Mid-Atlantic offshore region at depths between 40 and 100 m where water temperatures are less than 20° C. In terms of total revenue, the sea scallop fishery is the second most valuable fishery in the Northeast USA with annual values in excess of $100 million USD. Average price per kg of adductor muscle (meat) increases with average size with small scallops (~10 g) fetching approximately $8.80/kg and large scallops (>45g) valued at about $15.40/kg.

Scallops grow rapidly during the first several years of life. Between ages 3 and 5, scallops commonly increase 50 to 80% in shell height and quadruple their meat weight. During this time span, the number of meats per kg is reduced from greater than 220 to about 50. Maximum size is about 23 cm shell height, but scallops larger than 17 cm are rare. Sexual maturity commences at age 2, but scallops younger than age 4 probably contribute little to total egg production. Spawning occurs in late summer and early autumn; spring spawning may also occur in the Mid-Atlantic region. Eggs are buoyant, and larvae remain in the water column for four to six weeks before settling to the bottom.

Approximately 250 vessels participate in the year round commercial fishery for scallops. Nearly all landings are taken with dredges (89%) and otter trawls (10%). The USA fishery is managed under the New England Fishery Management Council's Fishery Management Plan for Atlantic Sea Scallops (*Placopecten magellanicus*). Current management measures include a moratorium on permits, days-at-sea limits, and restrictions on gear and crew size. Since the 1998 fishing year, vessels have been restricted to a maximum of 120 days at sea. Days at sea are monitored via a satellite tracking system that logs the position of all full-time scallop vessels on an hourly basis. Scallop dredges must use 3.5 inch (89mm) diameter steel rings to reduce capture of smaller scallops. Crew size is limited to seven individuals. As scallops are shucked by hand at sea, the crew size limitation constrains the daily landings rate during periods of high abundance. The minimum ring size was intended to reduce the catch of undersized scallops to improve yield per recruit, but the efficacy of this measure in the fishery was difficult to isolate in stock assessments (e.g., NEFSC 1997). In addition to these effort reduction measures, closed areas have excluded scallops from traditional harvest areas. Three large areas of Georges Bank were closed to scallop fishing in December 1994 to protect groundfish resources (Murawski et al. 2000). Later, in April 1998, two areas in the Mid-Atlantic were closed to protect undersized scallops present in these areas.

The National Marine Fisheries Service has conducted a stratified random survey of the scallop resource from Virginia to Georges Bank since 1975. In general, the relative biomass indices from scallop survey closely track the landings from the fishery. This is due largely to the intensity of the fishery which rapidly harvests recruiting size classes. The growth potential of sea scallops and the implications of reduced fishing mortality for management have been demonstrated in the closed areas of the Mid-Atlantic and Georges Bank regions (Murawski et al. 2000). Between 1994 and 1998, relative biomass indices from research vessel surveys increased between 5-15 fold in the Georges Bank areas closed to fishing compared to those areas open to fishing. Comparisons of the size structure between 1994 and 1998 for population inside and outside of the closed areas revealed the virtual absence of scallops greater than 110 mm shell height except in the closed area. By 1998 nearly 80% of the total scallop biomass resided in the closed areas. On Georges Bank the closed areas, which historically held about 50% of the total biomass, now had almost 90% of the total. Average densities in August 2000 in Georges Bank closed areas were approximately 4.5 times greater than densities in open areas. Similarly, relative densities of scallops in the Mid-Atlantic were about four times higher than in areas open to fishing (preliminary data from 2000 R/V survey) after only 27 months of closure.

Limited Reopening of Closed Areas in 1999

Partly as a result of information from cooperative studies, standard R/V surveys, and observer sea sampling, the New England Fishery Management Council voted to reopen a portion of Closed Area II south of 41° 30' N to limited scallop fishing. The reopening was subject to strict controls that included a total allowable catch of scallops (4,257 mt), a total allowable bycatch of yellowtail flounder (387 mt), individual vessel trip limits (4.54 mt/trip) , a restriction on the total number of trips per vessel (3 before Oct. 1; 3 after Oct, 1, 1999) , an intermediate decision date for authorization of additional trips (Oct. 1), a requirement for 8 inch (20.3 cm) mesh in the top panel of dredges to reduce yellowtail flounder bycatch, and a requirement that each trip, regardless of its duration, would use 10 of the 120 days-at-sea allotted to the vessel. Moreover, total scallop landings and yellowtail flounder bycatch were to be monitored on a daily basis. Under the plan, the area would be closed whenever the scallop landings or yellowtail flounder bycatch limits were attained. A 10 nm-wide "buffer" area around Area II was closed to improve enforcement of closed areas. The Council also specified a target level of 25% observer coverage for trips to the closed area.

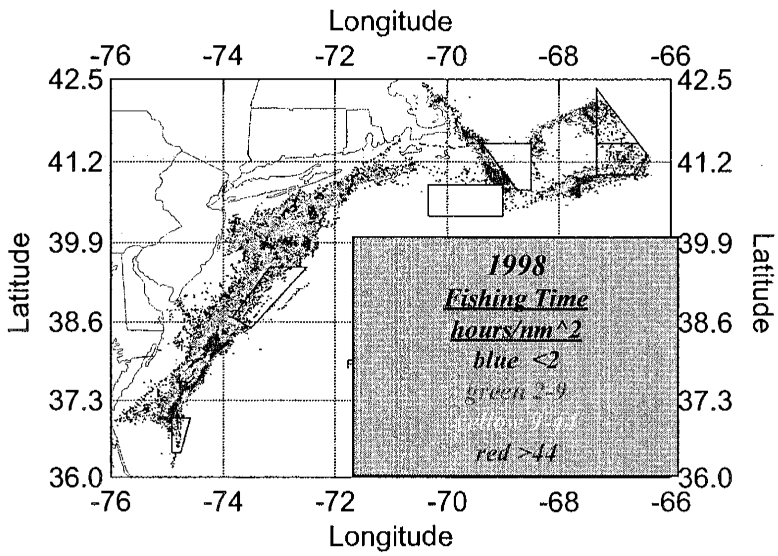
The real-time monitoring requirements for this management action were much greater than normal and would have been impossible to achieve without a vessel monitoring system (VMS). Beginning in May 1998, all full and part-time scallop vessels were required to have a VMS to track of days at sea usage. The VMS also allows the vessel to communicate via e-mail to a central site. Messages received at this site can then be routed to appropriate destinations. The vessel location is embedded in each transmission so it is possible to develop a general map of catch rates by location. Data forms were developed at the central site and distributed to all vessels; hence, the basic components of a real-time monitoring system were already in place. VMS position reports are logged and regularly loaded into a database— generating about 200,000 reports per month.

The limited fishery was closely monitored by observers and via electronic reporting of daily catches. Approximately 2,700 mt (meats) of scallops were landed from this area before closure based on attainment of the yellowtail bycatch limit. Approximately 23% of the vessel-days were covered by at-sea observers.

Table 1. Summary of hours of fishing activity and catches from Vessel Monitoring System data. Quartiles of fishing activity are based on distribution of total number of hours per 1 nm^3 grid for the 1998 and 1999 calendar years.

Year	Quartiles of Fishing Activity (hr) (Range) [mean]	Number of 1-nm sqr sub-areas in which fishing activity occurred	Total Effort—fishing activity (hr)	Total Catch (lb)**	Percent of Total Catch	Value of Catch ** (million $)
1998	(0.1-1.9) [1.0]	2,604	2,521	59,149	1	0.36
	(2-9.2) [4.4]	2,992	13,039	245,087	3	1.65
	(9.3 - 44) [23.9]	3,808	91,181	1,613,070	20	10.04
	(44.1-591) [103.3]	2,796	289,792	6,283,570	77	37.58
	Total	12,200	395,532	8,200,870	100	49.51
1999	(0.1-1.9) [1.0]	3,181	3,127	141,163	1	0.90
	(2-9.2) [4.1]	3,023	12,287	468,550	2	2.83
	(9.3 - 44) [22.5]	2,026	45,677	1,855,170	10	10.43
	(44.1-857.7) [119.4]	2,999	357,934	16,854,300	87	98.63
	Total	11,608	407,787	19,319,200	100	105.48
2000	(0.1-1.9) [0.9]	4,403	3,930	225,839	1	1.14
	(2-9.2) [4.2]	2,953	12,495	760,983	3	3.90
	(9.3 - 44) [23.6]	2,500	59,096	3,883,500	15	20.0
	(44.1-1,543) [104.9]	2,946	309,045	20,620,200	81	102.39
	Total	12,802	384,565	25,490,500	100	127.45

**total catch based on match of VMS data with landings records from commercial dealers. In 1999 the landings were about 91%. In 1998 the match was only 68% in part due to lack of VMS requirement until May 1998



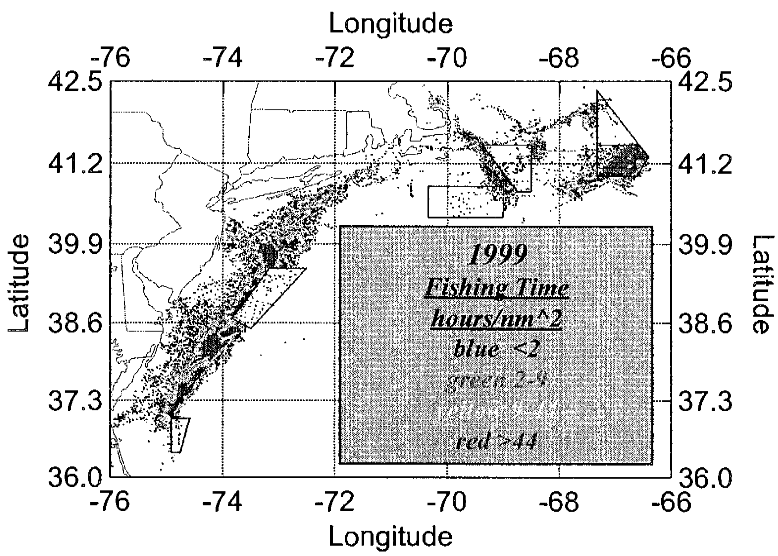


Fig. 1. Spatial distribution of fishing activity by sea scallop fleet in 1998 and 1999. Area II cooperative survey was conducted in 1998; Area I and Nantucket Lightship cooperative surveys were conducted in 1999. Area II was fished commercially in 1999.

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Northeast Fisheries Science Center
National Marine Fisheries Service, NOAA
166 Water St.
Woods Hole, MA 02543-1026

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Publications and Reports of the Northeast Fisheries Science Center

The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment." As the research arm of the NMFS's Northeast Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS mission by "planning, developing, and managing multidisciplinary programs of basic and applied research to: 1) better understand the living marine resources (including marine mammals) of the Northwest Atlantic, and the environmental quality essential for their existence and continued productivity; and 2) describe and provide to management, industry, and the public, options for the utilization and conservation of living marine resources and maintenance of environmental quality which are consistent with national and regional goals and needs, and with international commitments." Results of NEFSC research are largely reported in primary scientific media (*e.g.*, anonymously-peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own media. Those media are in four categories:

NOAA Technical Memorandum NMFS-NE -- This series is issued irregularly. The series typically includes: data reports of long-term or large area studies; synthesis reports for major resources or habitats; annual reports of assessment or monitoring programs; documentary reports of oceanographic conditions or phenomena; manuals describing field and lab techniques; literature surveys of major resource or habitat topics; findings of task forces or working groups; summary reports of scientific or technical workshops; and indexed and/or annotated bibliographies. All issues receive internal scientific review and most issues receive technical and copy editing.

Northeast Fisheries Science Center Reference Document -- This series is issued irregularly. The series typically includes: data reports on field and lab observations or experiments; progress reports on continuing experiments, monitoring, and assessments; background papers for scientific or technical workshops; and simple bibliographies. Issues receive internal scientific review, but no technical or copy editing.

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The Shark Tagger -- This newsletter is an annual summary of tagging and recapture data on large pelagic sharks as derived from the NMFS's Cooperative Shark Tagging Program; it also presents information on the biology (movement, growth, reproduction, etc.) of these sharks as subsequently derived from the tagging and recapture data. There is internal scientific review, but no technical or copy editing, of this newsletter.

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APPENDIX E: EFH FOR OVERLAPPING SPECIES

Essential Fish Habitat Description
American plaice (*Hippoglossoides platessoides*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined American plaice is currently overfished. This determination is based on the fishing mortality rate. Essential Fish Habitat for American plaice is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 6.1 - 6.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters of the Gulf of Maine and Georges Bank as depicted in Figure 6.1. Generally, the following conditions exist where most American plaice eggs are found: sea surface temperatures below 12° C, water depths between 30 and 90 meters and a wide range of salinities. American plaice eggs are observed all year in the Gulf of Maine, but only from December through June on Georges Bank, with peaks in both areas in April and May.

Larvae: Surface waters of the Gulf of Maine, Georges Bank and southern New England as depicted in Figure 6.2. Generally, the following conditions exist where most American plaice larvae are found: sea surface temperatures below 14° C, water depths between 30 and 130 meters and a wide range of salinities. American plaice larvae are observed between January and August, with peaks in April and May.

Juveniles: Bottom habitats with fine-grained sediments or a substrate of sand or gravel in the Gulf of Maine as depicted in Figure 6.3. Generally, the following conditions exist where most American plaice juveniles are found: water temperatures below 17° C, depths between 45 and 150 meters and a wide range of salinities.

Adults: Bottom habitats with fine-grained sediments or a substrate of sand or gravel in the Gulf of Maine and Georges Bank as depicted in Figure 6.4. Generally, the following conditions exist where most American plaice adults are found: water temperatures below 17° C, depths between 45 and 175 meters and a wide range of salinities.

Spawning Adults: Bottom habitats of all substrate types in the Gulf of Maine and Georges Bank as depicted in Figure 6.4. Generally, the following conditions exist where most spawning American plaice adults are found: water temperatures below 14° C, depths less than 90 meters and a wide range of salinities. Spawning begins in March and continues through June.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
American plaice (*Hippoglossoides platessoides*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay	S	S	m,s	S	S
Englishman/Machias Bay	S	S	m,s	S	S
Narraguagus Bay	S	S	m,s	S	S
Blue Hill Bay	S	S	m,s	S	S
Penobscot Bay	S	S	m,s	S	S
Muscongus Bay	S	S	m,s	S	S
Damariscotta River	S	S	m,s	S	S
Sheepscot River	S	S	m,s	S	S
Kennebec / Androscoggin Rivers	S	S	m,s	S	S
Casco Bay	S	S	m,s	S	S
Saco Bay	S	S	S	S	S
Wells Harbor					
Great Bay					
Merrimack River					
Massachusetts Bay	S	S	S	S	S
Boston Harbor	S	S	S	S	S
Cape Cod Bay	S	S	S	S	S
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
American plaice (*Hippoglossoides platessoides*) Eggs

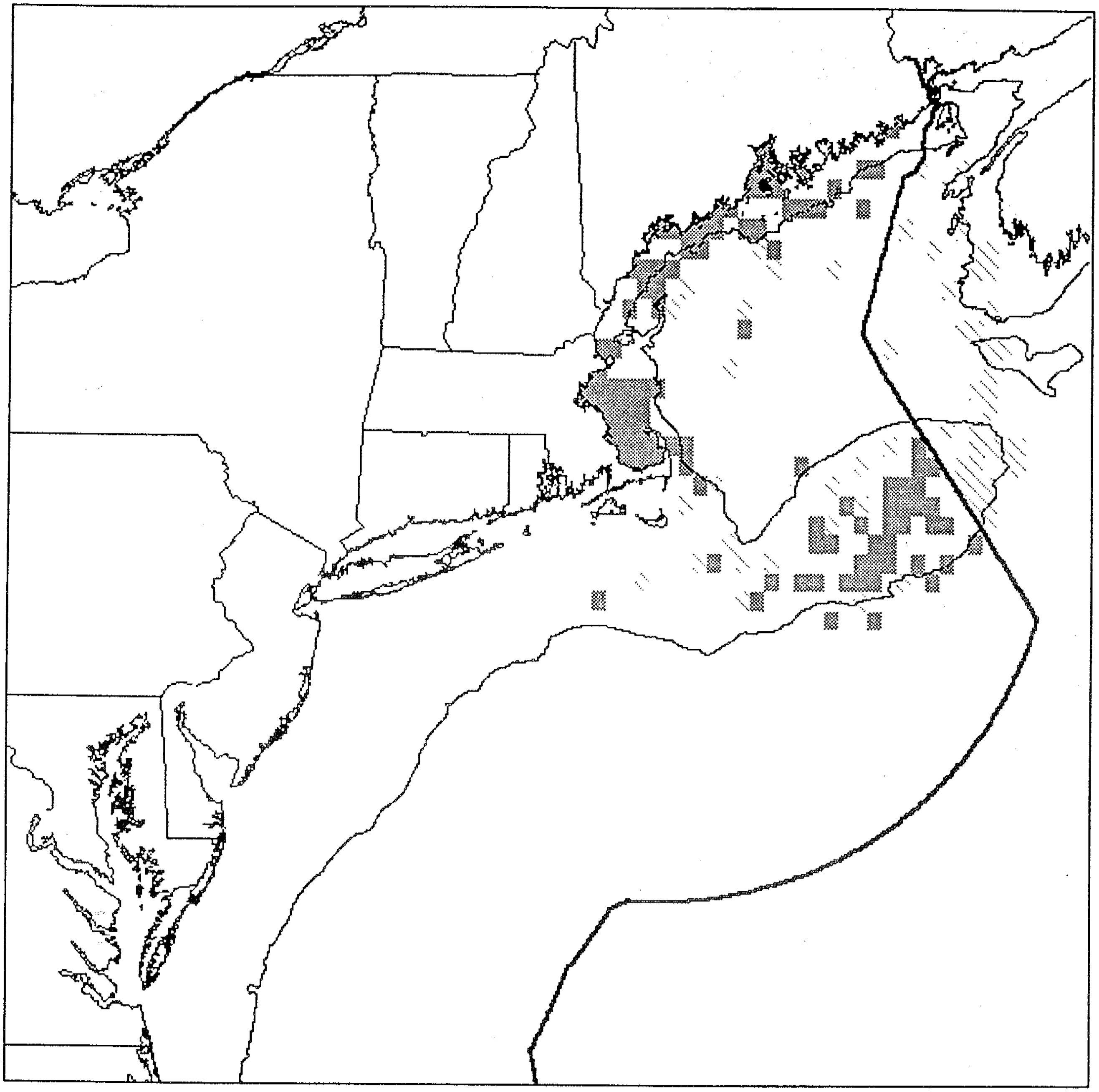


Figure 6.1: The EFH designation for American plaice eggs is based upon alternative 2 for American plaice eggs. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting American plaice eggs at the "common" or "abundant" level. This alternative was selected to represent those areas most important to American plaice spawning and egg survival, while not including those areas where American plaice eggs occurred in relatively low concentrations. The light shading represents the entire observed range of American plaice eggs.

Essential Fish Habitat
American plaice (*Hippoglossoides platessoides*) Larvae

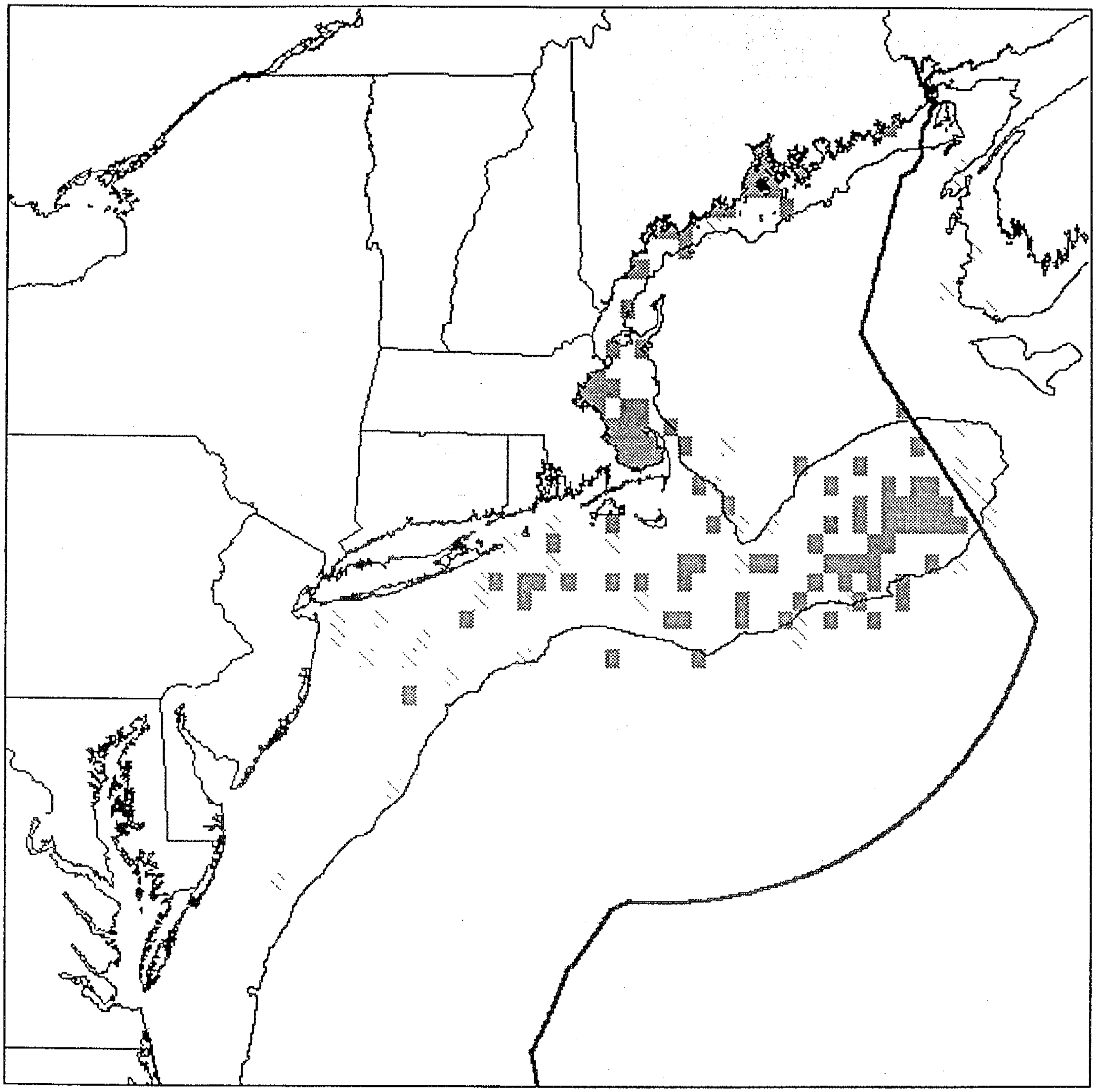


Figure 6.2: The EFH designation for American plaice larvae is based upon alternative 2 for American plaice larvae. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting American plaice larvae at the "common" or "abundant" level. This alternative was selected to represent those areas most important to American plaice spawning and larval survival, while not including those areas where American plaice larvae occurred in relatively low concentrations. The light shading represents the entire observed range of American plaice larvae.

Essential Fish Habitat
American plaice (*Hippoglossoides platessoides*) Juveniles

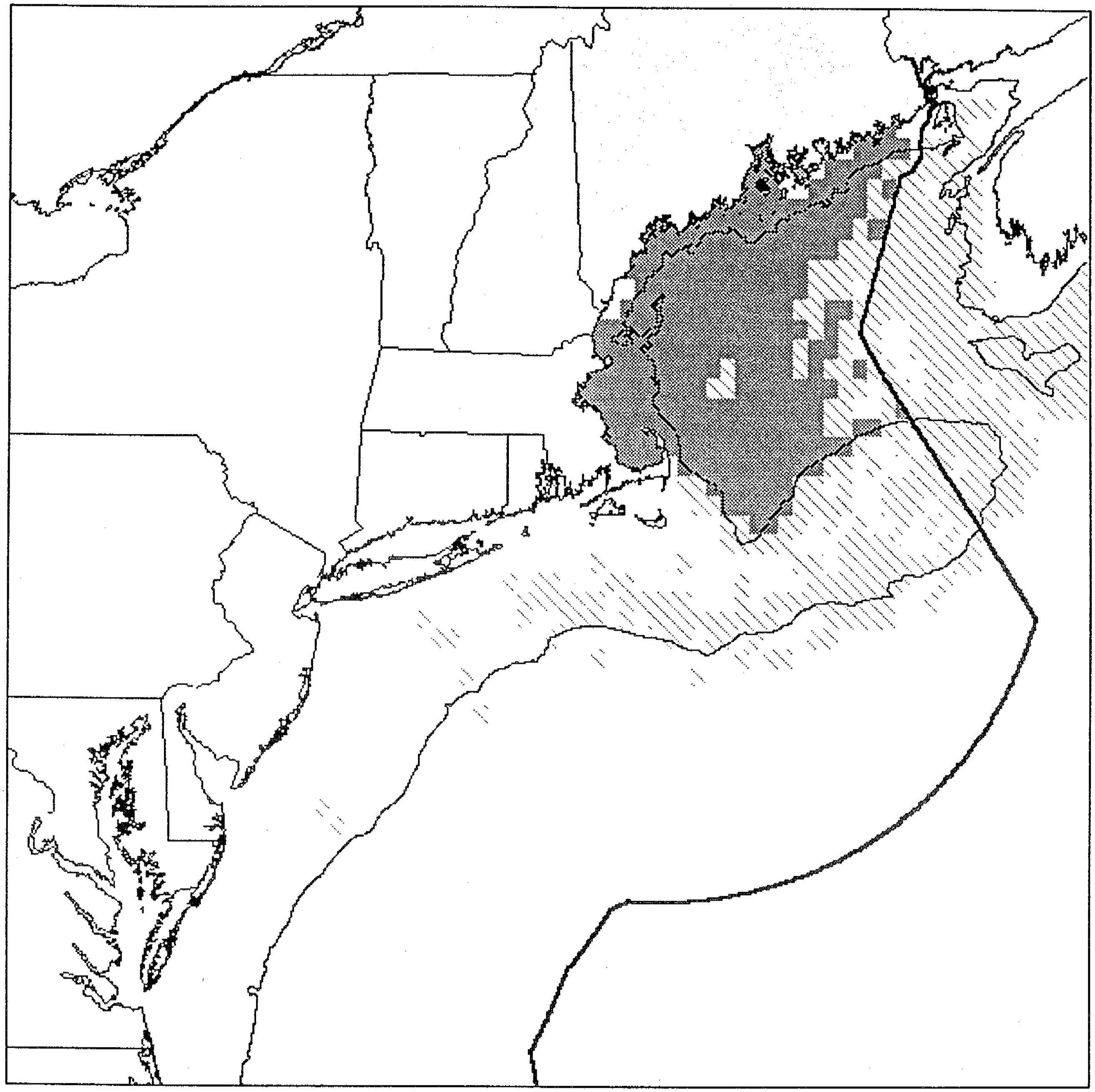


Figure 6.3: The EFH designation for juvenile American plaice is based upon alternative 3 for American plaice juveniles. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for American plaice juveniles, as well as those bays and estuaries identified by the NOAA ELMR program as supporting American plaice juveniles at the "common" or "abundant" level. This designation was selected to include the areas where American plaice are most abundant, given that they are most concentrated in the Gulf of Maine and occur in relatively low concentrations on Georges Bank. The light shading represents the entire observed range of juvenile American plaice.

Essential Fish Habitat
American plaice (*Hippoglossoides platessoides*) Adults

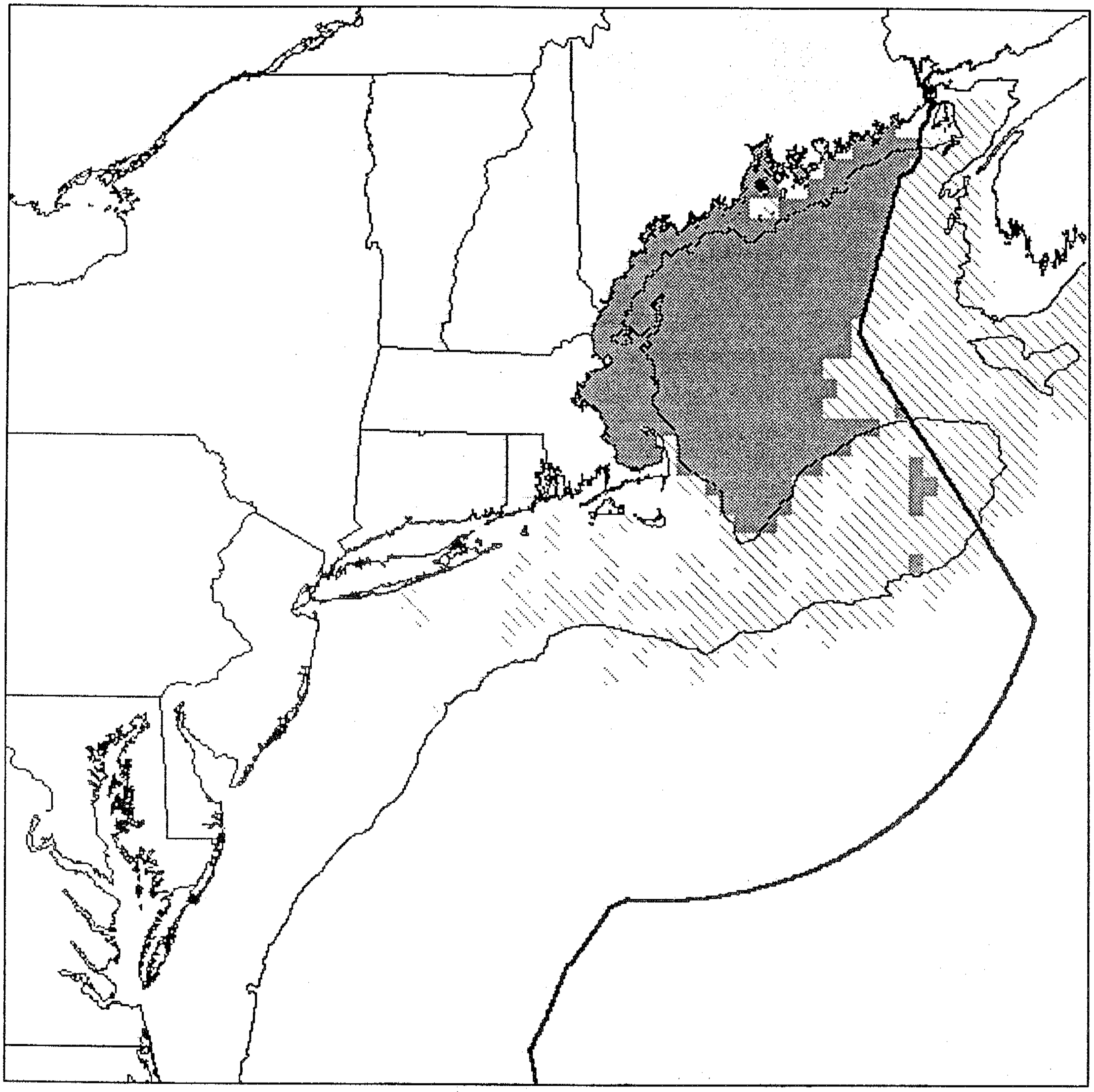


Figure 6.4: The EFH designation for adult American plaice is based upon alternative 3 for American plaice adults. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for American plaice adults, as well as those bays and estuaries identified by the NOAA ELMR program as supporting American plaice adults at the "common" or "abundant" level. This designation was selected to include the areas where American plaice are most abundant, given that they are most concentrated in the Gulf of Maine and occur in relatively low concentrations on Georges Bank. The light shading represents the entire observed range of adult American plaice.

Essential Fish Habitat Description
Atlantic cod (*Gadus morhua*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined the Gulf of Maine stock of cod is considered overfished, based on the fishing mortality rate. The Georges Bank stock of cod is not considered overfished, also based on the fishing mortality rate associated with this stock. For both stocks of cod, essential fish habitat is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 1.1 - 1.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters around the perimeter of the Gulf of Maine, Georges Bank, and the eastern portion of the continental shelf off southern New England as depicted in Figure 1.1. Generally, the following conditions exist where cod eggs are found: sea surface temperatures below 12° C, water depths less than 110 meters, and a salinity range from 32 - 33‰. Cod eggs are most often observed beginning in the fall, with peaks in the winter and spring.

Larvae: Pelagic waters of the Gulf of Maine, Georges Bank, and the eastern portion of the continental shelf off southern New England as depicted in Figure 1.2. Generally, the following conditions exist where cod larvae are found: sea surface temperatures below 10° C, waters depths from 30 - 70 meters, and a salinity range from 32 - 33‰. Cod larvae are most often observed in the spring.

Juveniles: Bottom habitats with a substrate of cobble or gravel in the Gulf of Maine, Georges Bank, and the eastern portion of the continental shelf off southern New England as depicted in Figure 1.3. Generally, the following conditions exist where cod juveniles are found: water temperatures below 20° C, depths from 25 - 75 meters, and a salinity range from 30 - 35‰.

Adults: Bottom habitats with a substrate of rocks, pebbles, or gravel in the Gulf of Maine, Georges Bank, southern New England, and the middle Atlantic south to Delaware Bay as depicted in Figure 1.4. Generally, the following conditions exist where cod adults are found: water temperatures below 10° C, depths from 10 - 150 meters, and a wide range of oceanic salinities.

Spawning Adults: Bottom habitats with a substrate of smooth sand, rocks, pebbles, or gravel in the Gulf of Maine, Georges Bank, southern New England, and the middle Atlantic south to Delaware Bay as depicted in Figure 1.4. Generally, the following conditions exist where spawning cod adults are found: water temperatures below 10° C, depths from 10 - 150 meters, and a wide range of oceanic salinities. Cod are most often observed spawning during fall, winter, and early spring.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Atlantic cod (*Gadus morhua*)

Estuaries and Embayments	Eggs	Larvae	Juvenile	Adult	Spawning Adults
Passamaquoddy Bay		S	S	S	
Englishman/Machias Bay	S	S	S	S	S
Narraguagus Bay	S	S	S	S	S
Blue Hill Bay	S	S	S	S	S
Penobscot Bay		S	S	S	
Muscongus Bay			S	S	
Damariscotta River			S	S	
Sheepscot River	S	S	S	S	S
Kennebec / Androscoggin Rivers			S	S	
Casco Bay	S	S	S	S	
Saco Bay	S	S	S	S	
Wells Harbor					
Great Bay	S	S			
Merrimack River					
Massachusetts Bay	S	S	S	S	S
Boston Harbor	S	S	m,s	m,s	S
Cape Cod Bay	S	S	S	S	S
Waquoit Bay					
Buzzards Bay	S	S	S	S	
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Atlantic cod (*Gadus morhua*) Eggs

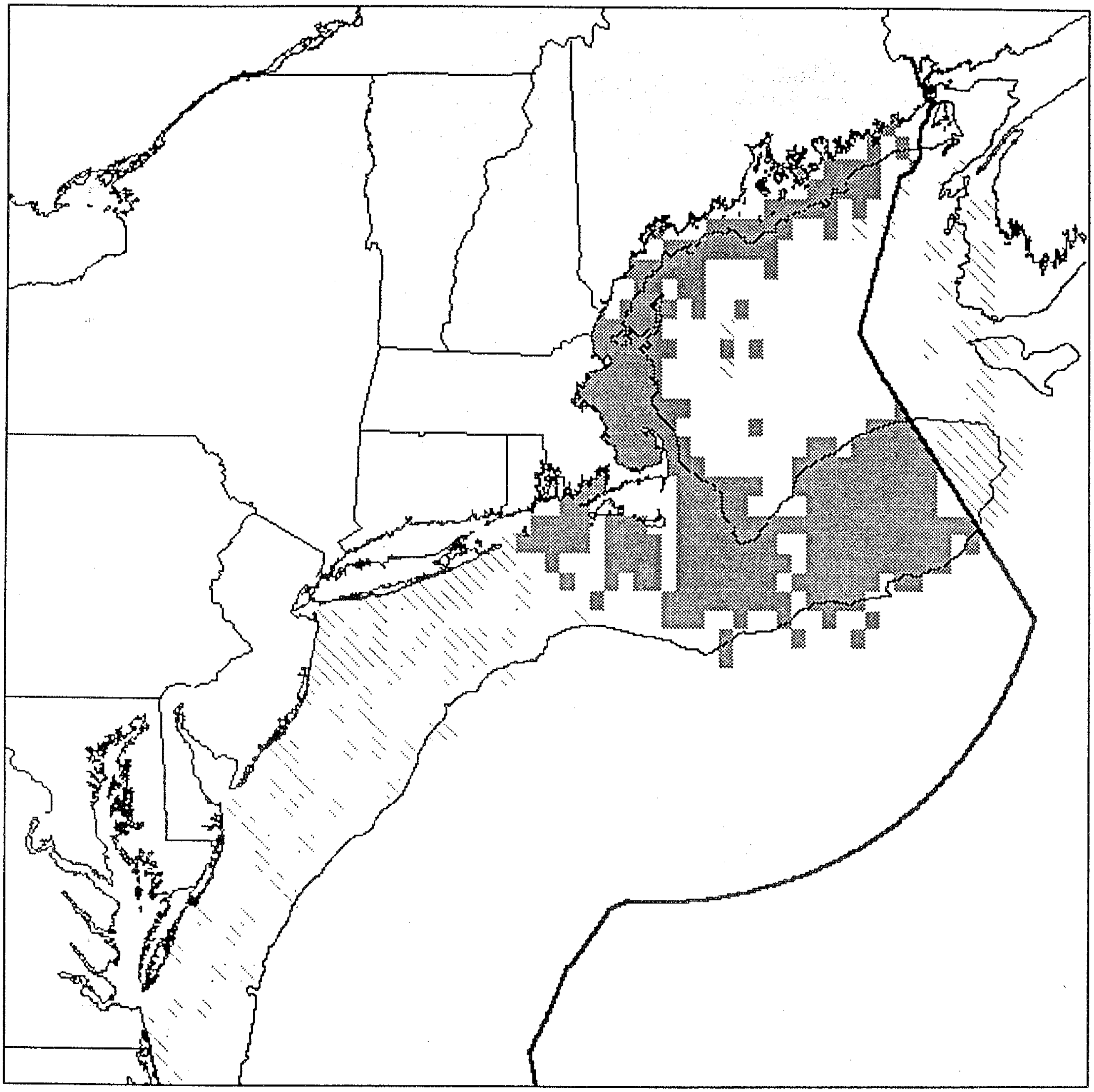


Figure 1.1: The EFH designation for Atlantic cod eggs is based upon a combination of alternative 3 for juvenile Atlantic cod plus alternative 3 for Atlantic cod eggs within the range of juvenile cod. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic cod eggs at a "common" or "abundant" level. This approach was selected because the data on the distribution of cod eggs include areas believed to be not conducive to their survival. Eggs that occur south of Long Island are either passively transported southward by currents or spawned by fish on the southern edge of the range and the environmental conditions in this area are believed to be not suitable for survival. The component of the adult cod population in this area is migratory in nature; thus, these eggs do not contribute to this population. The light shading represents the entire observed range of Atlantic cod eggs.

Essential Fish Habitat
Atlantic cod (*Gadus morhua*) Larvae

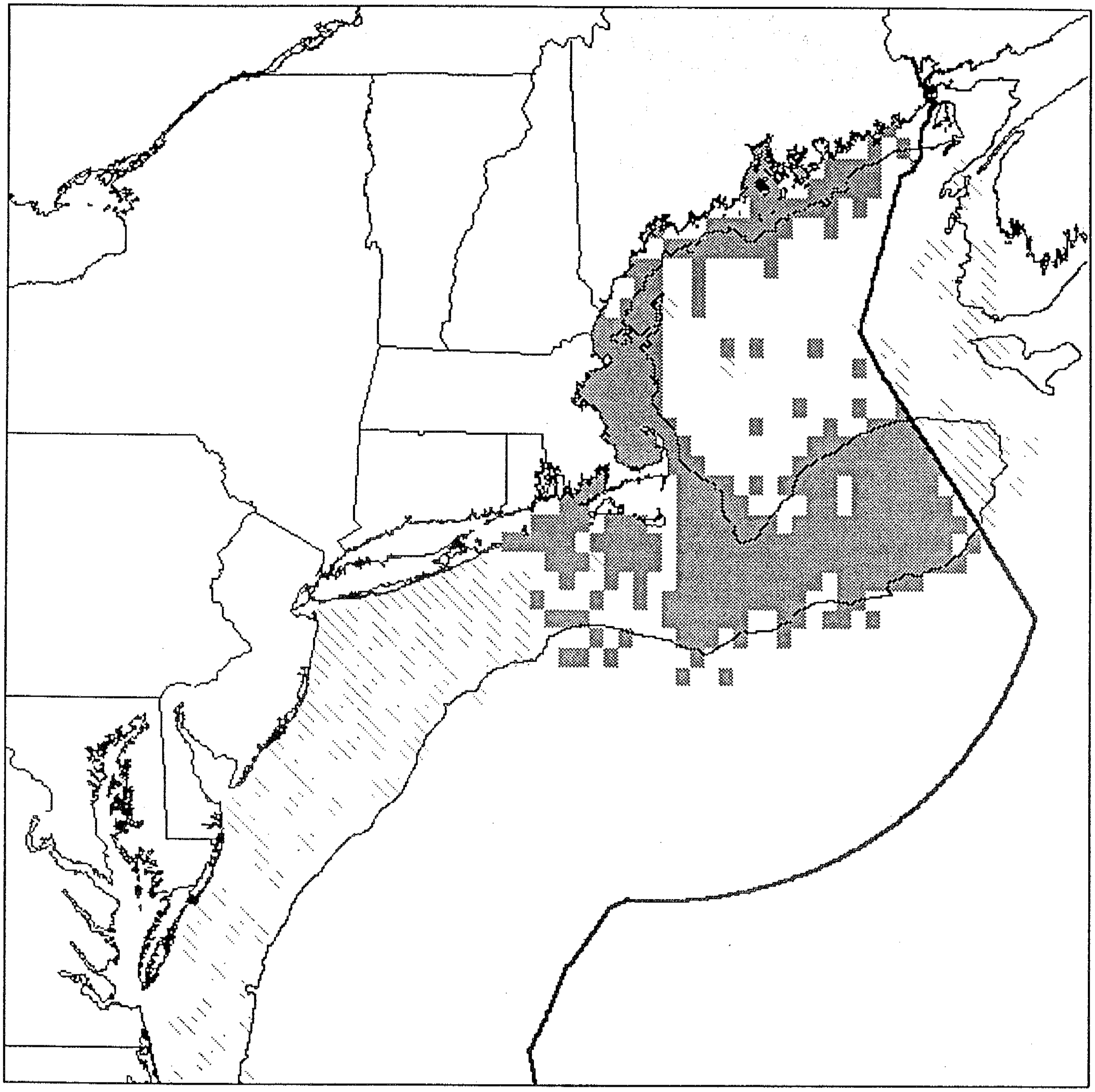


Figure 1.2: The EFH designation for Atlantic cod larvae is based upon a combination of alternative 3 for juvenile Atlantic cod plus alternative 3 for Atlantic cod larvae within the range of juvenile cod. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic cod larvae at a "common" or "abundant" level. This approach was selected because the data on the distribution of cod larvae include areas believed to be not conducive to their survival. Eggs and larvae that occur south of Long Island are either passively transported southward by currents or spawned by fish on the southern edge of the range and the environmental conditions in this area are believed to be not suitable for survival. The component of the adult cod population in this area is migratory in nature; thus, these larvae do not contribute to this population. The light shading represents the entire observed range of Atlantic cod larvae.

Essential Fish Habitat
Atlantic cod (*Gadus morhua*) Juveniles

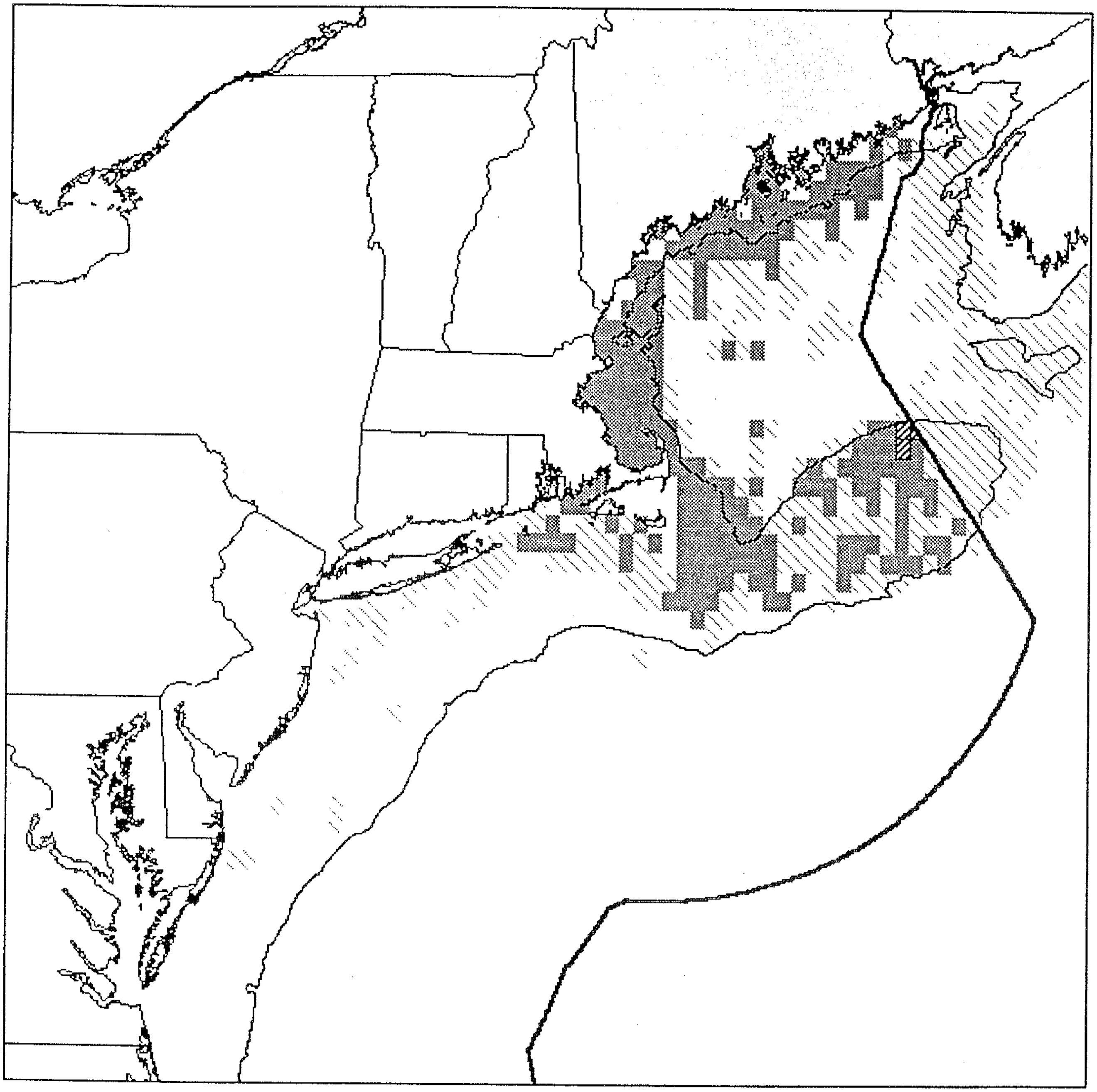


Figure 1.3: The EFH designation for juvenile Atlantic cod is based upon alternative 3 for cod juveniles plus information from the fishing industry. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting juvenile Atlantic cod at a "common" or "abundant" level and information from the Massachusetts Inshore Trawl Survey. The other alternatives were not selected because they either include too little area (less than half the range of this overfished species), or include areas where cod occur in relatively low concentrations. The small area highlighted on the northern edge of Georges Bank represents the "habitat area of particular concern" designation for juvenile Atlantic cod (see Section 3.3.1). The light shading represents the entire observed range of Atlantic cod juveniles.

Essential Fish Habitat
Atlantic cod (*Gadus morhua*) Adults

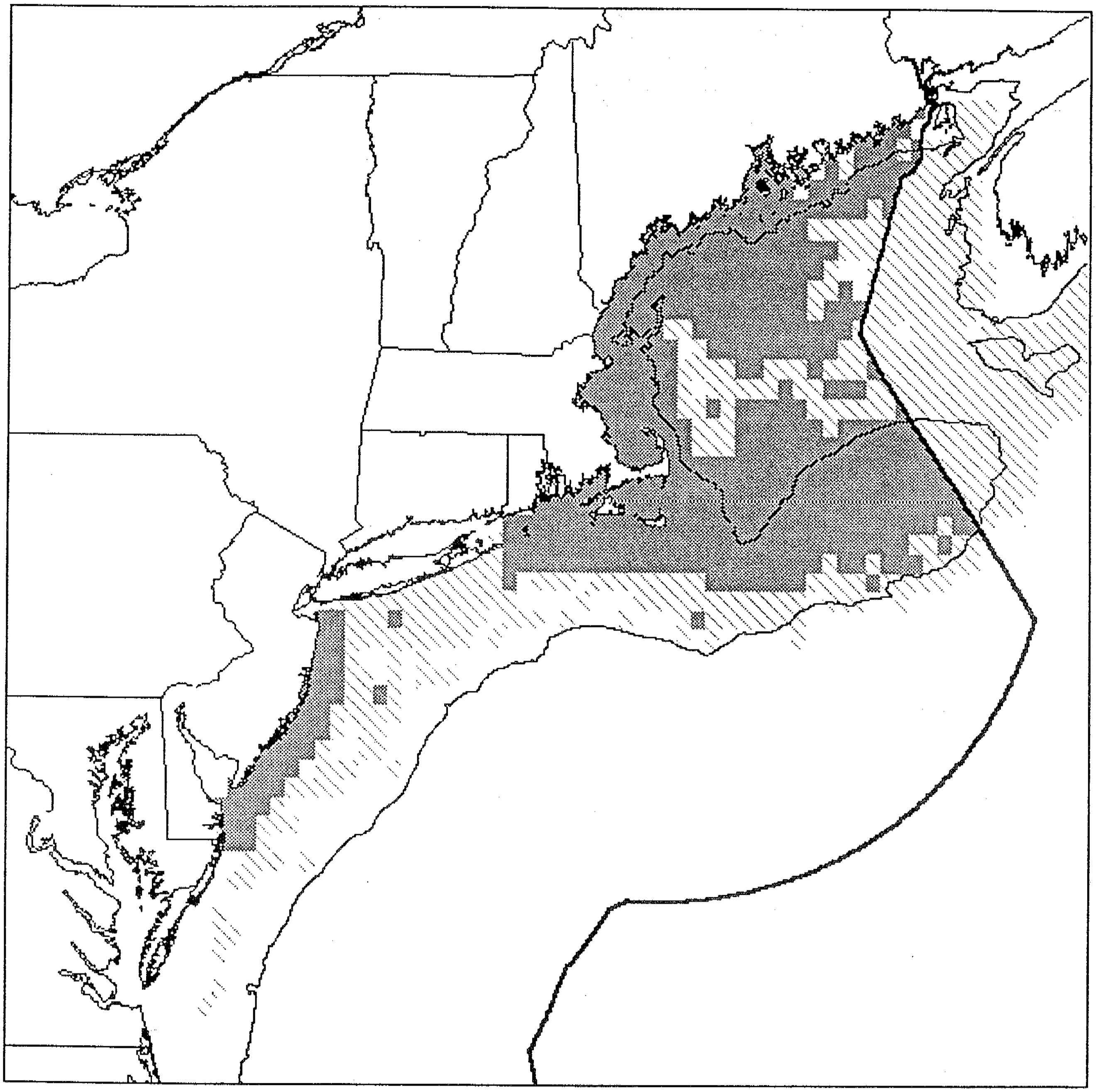


Figure 1.4: The EFH designation for adult Atlantic cod is based upon alternative 3 for cod adults plus areas identified as important spawning grounds and information from the fishing industry. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting adult Atlantic cod at a "common" or "abundant" level. The shaded areas south of Massachusetts and Rhode Island and along the coast of New Jersey and Delaware were selected for EFH designation based on their historical importance for a portion of the adult population that migrates to this area for feeding in the winter. The other alternatives were not selected because they either include too little area (less than half the range of this overfished species), or include areas where cod occur in relatively low concentrations. The light shading represents the entire observed range of Atlantic cod adults.

Essential Fish Habitat Description
Atlantic halibut (*Hippoglossus hippoglossus*)

According to the NMFS' *Report to Congress: Status of the Fisheries of the United States* (September 1997), Atlantic halibut is currently overfished. This determination is based on an assessment of stock level. Essential Fish Habitat for Atlantic halibut is described as the area of the coastal and offshore waters (out to the offshore U.S. boundary of the Exclusive Economic Zone) that is designated on Figure 18.1 and meets the following conditions:

Eggs: Pelagic waters to the sea floor of the Gulf of Maine and Georges Bank as depicted in Figure 18.1. Generally, the following conditions exist where Atlantic halibut eggs are found: water temperatures between 4 and 7° C, water depths less than 700 meters, and salinities less than 35‰. Atlantic halibut eggs are observed between late fall and early spring, with peaks in November and December.

Larvae: Surface waters of the Gulf of Maine and Georges Bank as depicted in Figure 18.1. Generally, the following conditions exist where Atlantic halibut larvae are found: salinities between 30 and 35‰.

Juveniles: Bottom habitats with a substrate of sand, gravel, or clay in the Gulf of Maine and Georges Bank as depicted in Figure 18.1. Generally, the following conditions exist where Atlantic halibut juveniles are found: water temperatures above 2° C and depths from 20 - 60 meters.

Adults: Bottom habitats with a substrate of sand, gravel, or clay in the Gulf of Maine and Georges Bank as depicted in Figure 18.1. Generally, the following conditions exist where Atlantic halibut adults are found: water temperatures below 13.6° C, depths from 100 - 700 meters, and salinities between 30.4 - 35.3‰.

Spawning Adults: Bottom habitats with a substrate of soft mud, clay, sand, or gravel in the Gulf of Maine and Georges Bank, as well as rough or rocky bottom locations along the slopes of the outer banks, as depicted in Figure 18.1. Generally, the following conditions exist where spawning Atlantic halibut are found: water temperatures below 7° C, depths less than 700 meters, and salinities less than 35‰. Atlantic halibut are most often observed spawning between late fall and early spring, with peaks in November and December.

The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

Essential Fish Habitat
Atlantic halibut (*Hippoglossus hippoglossus*) All life stages

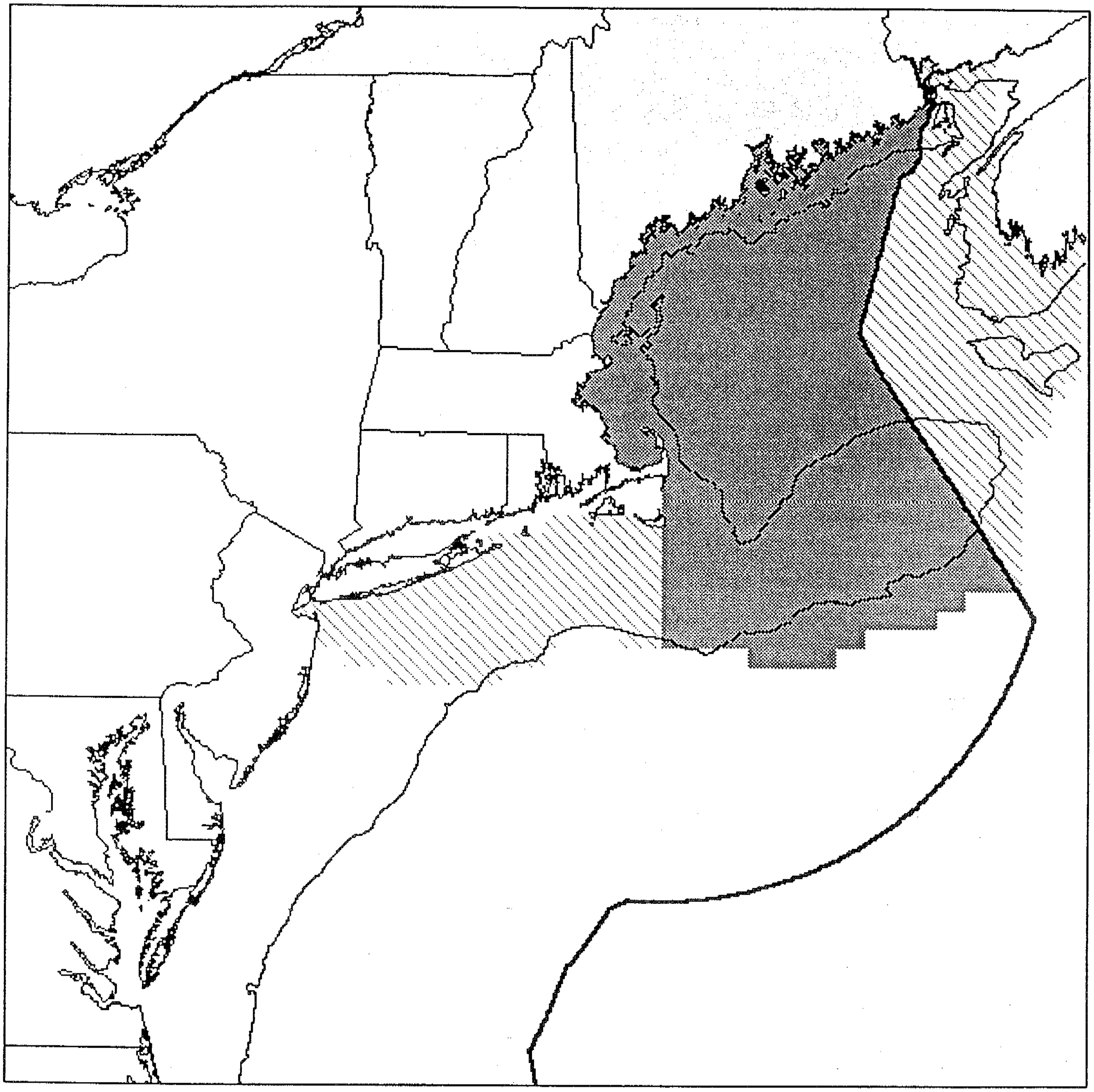


Figure 18.1: The EFH designation for all life history stages of Atlantic halibut is based on the portion of the historic range of Atlantic halibut that coincides with entire observed range of Atlantic halibut (alternative 4). The historic range is based on a composite of areas known to support Atlantic halibut, described by: (1) Bigelow and Schroeder, 1953; (2) Goode and Collins, 1887; (3) Rich, 1929; and, (4) EFH Source Document, 1998. In the absence of other information, this portion of the historic range most accurately represents the areas used by and important to this species, where halibut are likely to be caught in the foreseeable future. The light shading represents the entire reported historic range of Atlantic halibut.

Essential Fish Habitat Description
Atlantic herring (*Clupea harengus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined Atlantic herring is not currently overfished. This determination is based on the fishing mortality rate. Essential Fish Habitat for Atlantic herring is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 3.1 - 3.4 and in the accompanying table and meet the following conditions:

Eggs: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine and Georges Bank as depicted in Figure 3.1. Eggs adhere to the bottom, forming extensive egg beds which may be many layers deep. Generally, the following conditions exist where Atlantic herring eggs are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are most often found in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring eggs are most often observed during the months from July through November.

Larvae: Pelagic waters in the Gulf of Maine, Georges Bank, and southern New England that comprise 90% of the observed range of Atlantic herring larvae as depicted in Figure 3.2. Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 16° C, water depths from 50 - 90 meters, and salinities around 32‰. Atlantic herring larvae are observed between August and April, with peaks from September through November.

Juveniles: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 3.3. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10° C, water depths from 15 - 135 meters, and a salinity range from 26 - 32‰.

Adults: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 3.4. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10° C, water depths from 20 - 130 meters, and salinities above 28‰.

Spawning Adults: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 3.4. Generally, the following conditions exist where spawning Atlantic herring adults are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring are most often observed spawning during the months from July through November.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Atlantic herring (*Clupea harengus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay		m,s	m,s	m,s	
Englishman/Machias Bay	s	m,s	m,s	m,s	s
Narraguagus Bay		m,s	m,s	m,s	
Blue Hill Bay		m,s	m,s	m,s	
Penobscot Bay		m,s	m,s	m,s	
Muscongus Bay		m,s	m,s	m,s	
Damariscotta River		m,s	m,s	m,s	
Sheepscot River		m,s	m,s	m,s	
Kennebec / Androscoggin Rivers		m,s	m,s	m,s	
Casco Bay	s	m,s	m,s	s	
Saco Bay		m,s	m,s	s	
Wells Harbor		m,s	m,s	s	
Great Bay		m,s	m,s	s	
Merrimack River		m	m		
Massachusetts Bay		s	s	s	
Boston Harbor		s	m,s	m,s	
Cape Cod Bay	s	s	m,s	m,s	
Waquoit Bay					
Buzzards Bay			m,s	m,s	
Narragansett Bay		s	m,s	m,s	
Long Island Sound			m,s	m,s	
Connecticut River					
Gardiners Bay			s	s	
Great South Bay			s	s	
Hudson River / Raritan Bay		m,s	m,s	m,s	
Barnegat Bay			m,s	m,s	
Delaware Bay			m,s	s	
Chincoteague Bay					
Chesapeake Bay				s	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Eggs

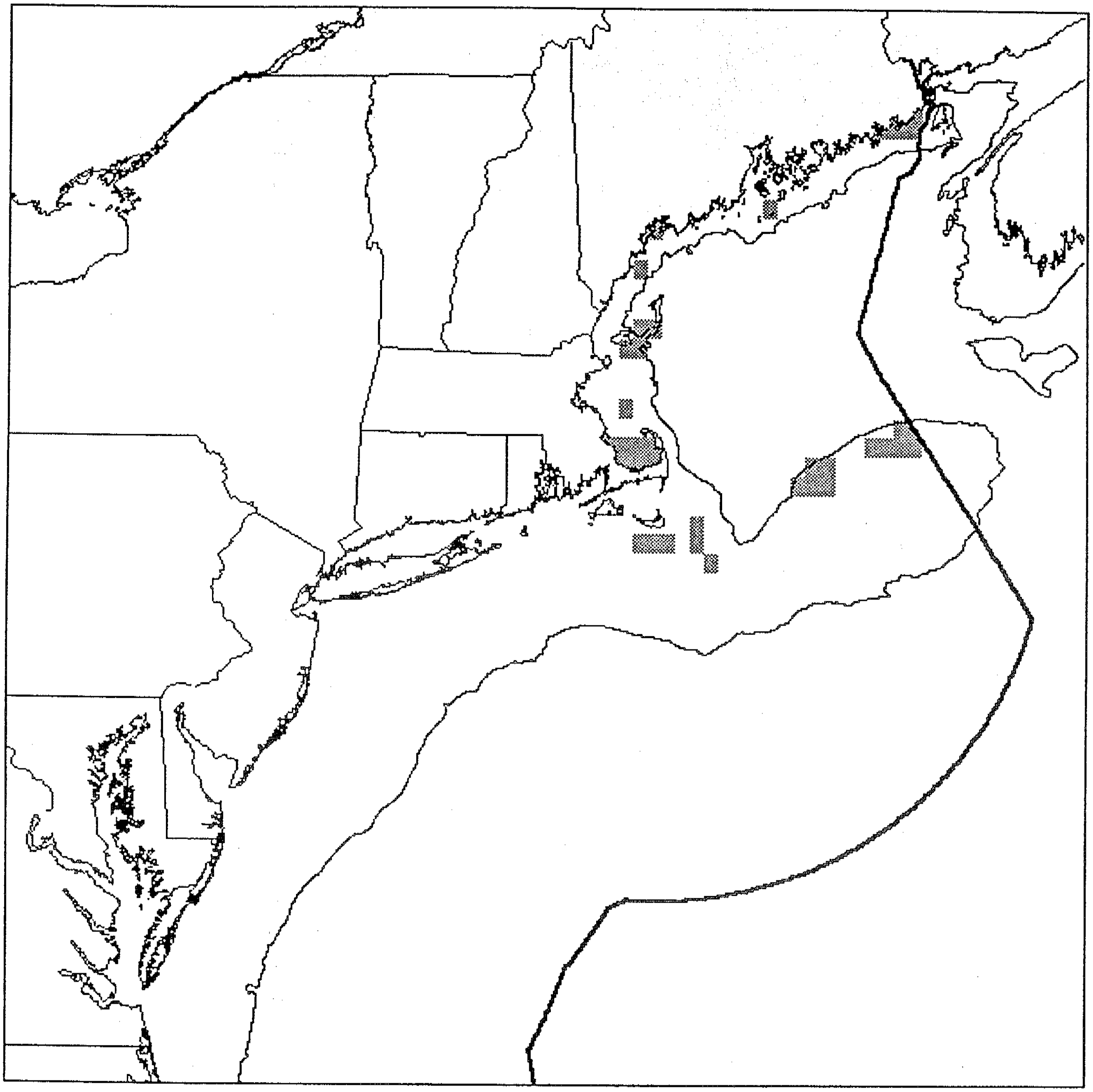


Figure 3.1: The EFH designation for Atlantic herring eggs represents 100% of the known Atlantic herring egg beds. These egg beds were identified based on a review of all available information on the current and historical herring egg bed locations. All known herring beds were identified for EFH designation to be as inclusive as possible for this critical life history stage, and because all known egg beds only represent a portion of all herring egg sites. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting herring eggs at the "rare", "common", or "abundant" level. There were no specific alternatives considered by the Council, although the Council did have the option to designate fewer than 100% of the known herring egg beds.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Larvae

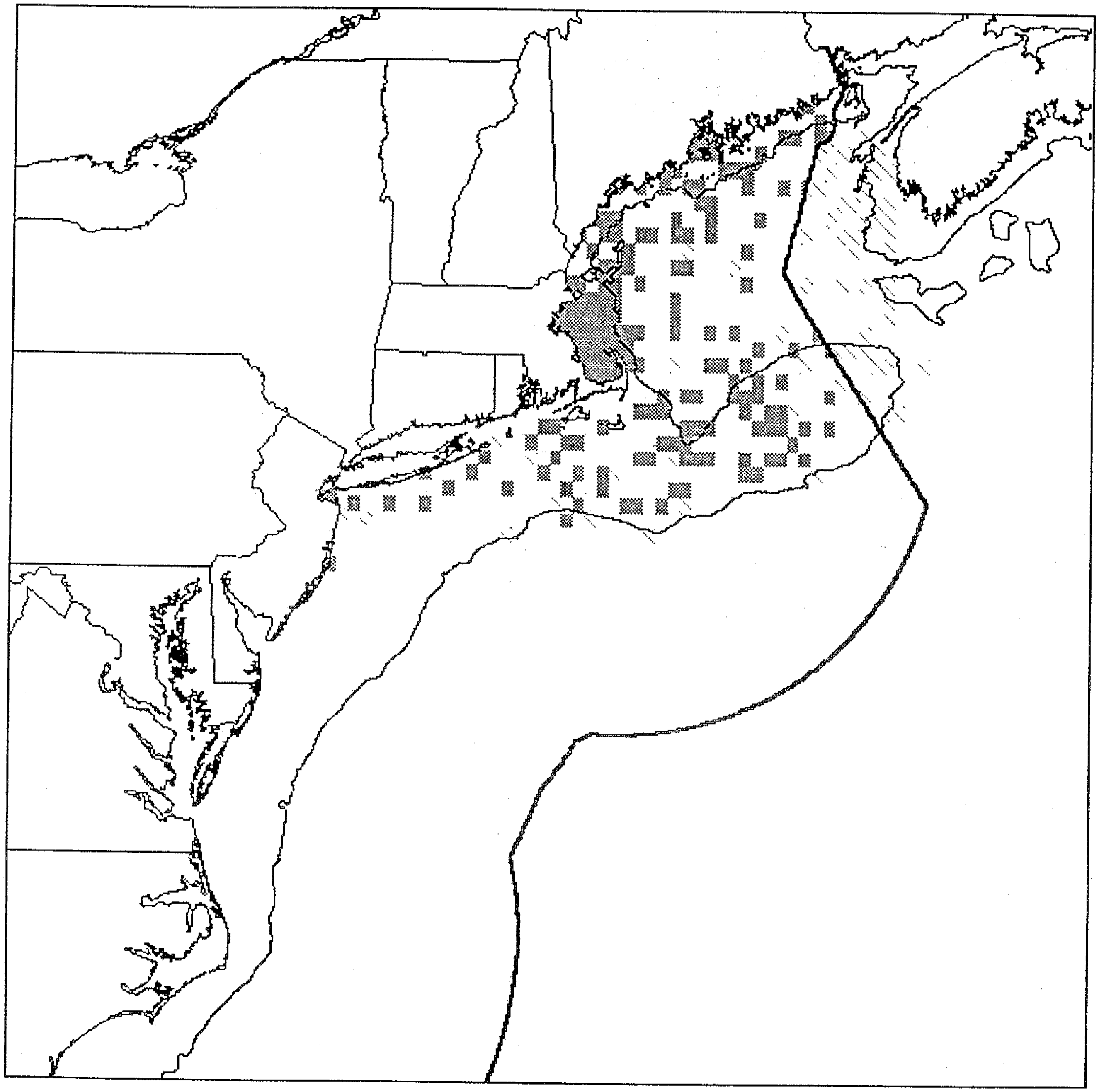


Figure 3.2: The EFH designation for Atlantic herring larvae is based upon alternative 3 for herring larvae. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic herring larvae at a "common" or "abundant" level. This alternative was selected to include all areas where herring larvae are found in relatively high concentrations, but not those areas where herring larvae are found in relatively very low concentrations. The light shading represents the entire observed range of Atlantic herring larvae.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Juveniles

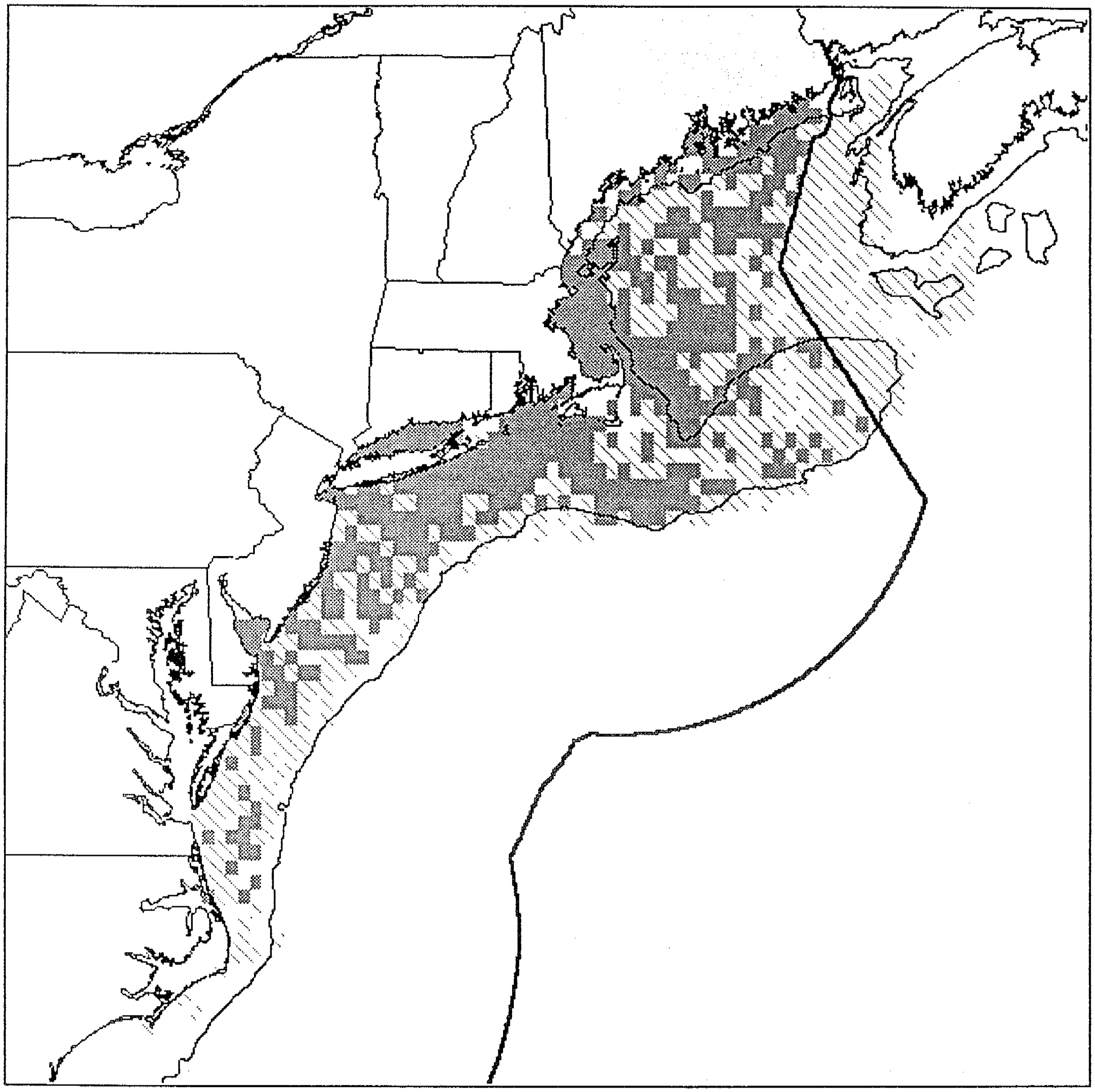


Figure 3.3: The EFH designation for juvenile Atlantic herring is based upon alternative 2 for juvenile herring, plus areas of relatively high concentrations of juvenile herring from the State of Massachusetts inshore trawl survey. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting juvenile Atlantic herring at a "common" or "abundant" level. This alternative was selected to ensure inclusion of all areas where herring occur in relatively high concentrations. The other alternatives were not selected because they either include too little area (less than half of the range of the species) or include areas where herring occur in relatively low concentrations. The light shading represents the entire observed range of juvenile Atlantic herring.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Adults

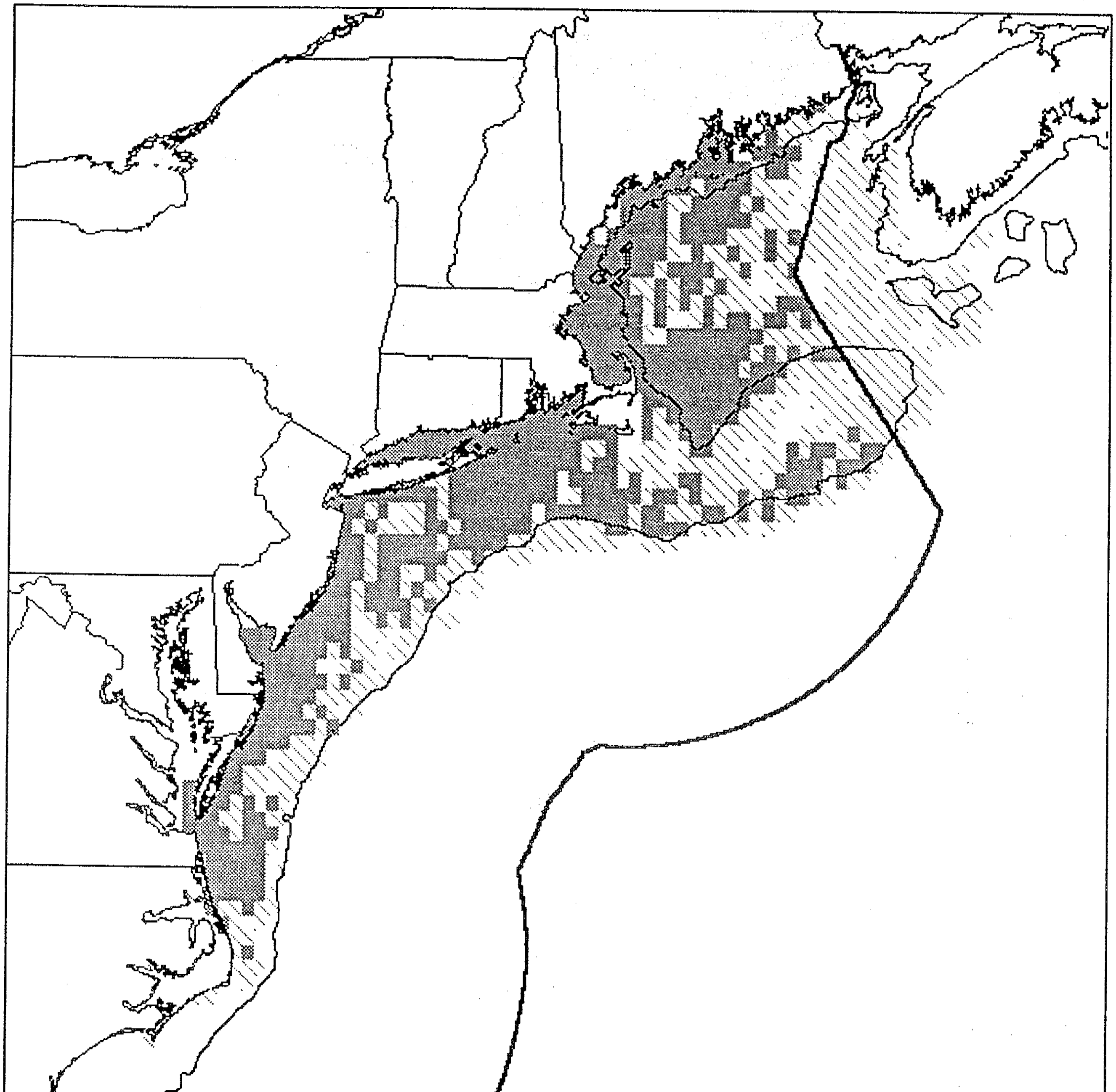


Figure 3.4: The EFH designation for adult Atlantic herring is based upon alternative 2 for adult herring, combined with the 50% alternative of the 1997 recorded catch data. This designation also includes information from the fishing industry and those bays and estuaries identified by the NOAA ELMR program as supporting adult Atlantic herring at a "common" or "abundant" level. This alternative was selected to ensure inclusion of all areas where herring occur in relatively high concentrations. The other alternatives were not selected because they either include too little area (less than half of the range of the species) of include areas where herring occur in relatively low concentrations. The light shading represents the entire observed range of adult Atlantic herring.

Essential Fish Habitat Description
Atlantic salmon (*Salmo salar)*

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined Atlantic salmon is considered overfished, based upon an assessment of stock level. Essential fish habitat for Atlantic salmon is described as all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut identified as EFH in Figures 10.1 - 10.3 and in the accompanying table and that meet the following conditions:

Eggs: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of rivers as depicted in Figure 10.1. Generally, the following conditions exist in the egg pits (redds): water temperatures below 10° C, and clean, well-oxygenated fresh water. Atlantic salmon eggs are most frequently observed between October and April.

Larvae: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of rivers as depicted in Figure 10.1. Generally, the following conditions exist where Atlantic salmon larvae, or alevins/fry, are found: water temperatures below 10° C, and clean, well-oxygenated fresh water. Atlantic salmon alevins/fry are most frequently observed between March and June.

Juveniles: Bottom habitats of shallow gravel / cobble riffles interspersed with deeper riffles and pools in rivers and estuaries as depicted in Figure 10.2. Generally, the following conditions exist where Atlantic salmon parr are found: clean, well-oxygenated fresh water, water temperatures below 25° C, water depths between 10 cm and 61 cm, and water velocities between 30 and 92 cm per second. As they grow, parr transform into smolts. Atlantic salmon smolts require access downstream to make their way to the ocean. Upon entering the sea, "post-smolts" become pelagic and range from Long Island Sound north to the Labrador Sea.

Adults: For adult Atlantic salmon returning to spawn, habitats with resting and holding pools in rivers and estuaries as depicted in Figure 10.3. Returning Atlantic salmon require access to their natal streams and access to the spawning grounds. Generally, the following conditions exist where returning Atlantic salmon adults are found migrating to the spawning grounds: water temperatures below 22.8° C, and dissolved oxygen above 5 ppm. Oceanic adult Atlantic salmon are primarily pelagic and range from the waters of the continental shelf off southern New England north throughout the Gulf of Maine.

Spawning Adults: Bottom habitats with a gravel or cobble riffle (redd) above or below a pool of rivers as depicted in Figure 10.3. Generally, the following conditions exist where spawning Atlantic salmon adults are found: water temperatures below 10° C, water depths between 30 cm and 61 cm, water velocities around 61 cm per second, and clean, well-oxygenated fresh water. Spawning Atlantic salmon adults are most frequently observed during October and November.

Atlantic salmon EFH includes all aquatic habitats in the watersheds of the identified rivers, including all tributaries, to the extent that they are currently or were historically accessible for salmon migration. Atlantic salmon EFH excludes areas upstream of longstanding naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). All of the above EFH descriptions include those bays and estuaries listed on the following table.

EFH Designation of Estuaries and Embayments
Atlantic salmon (*Salmo salar*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay			f,m,s	f,m,s	
Englishman/Machias Bay			f,m,s	f,m,s	
Narraguagus Bay			f,m,s	f,m,s	
Blue Hill Bay			f,m,s	f,m,s	
Penobscot Bay	f	f	f,m,s	f,m,s	f
Muscongus Bay			f,m,s	f,m,s	
Damariscotta River					
Sheepscot River	f	f	f,m,s	f,m,s	f
Kennebec / Androscoggin Rivers	f	f	f,m,s	f,m,s	f
Casco Bay			f,m,s	f,m,s	
Saco Bay			f,m,s	f,m,s	
Wells Harbor					
Great Bay			f,m		
Merrimack River			f,m	f,m	
Massachusetts Bay					
Boston Harbor					
Cape Cod Bay					
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound			f,m	f,m,s	
Connecticut River			f,m	f,m	
Gardiners Bay			m,s	m,s	
Great South Bay				s	
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Atlantic salmon (*Salmo salar*) Eggs and Larvae

Figure 10.1: The EFH designation for Atlantic salmon eggs and larvae represents all rivers where Atlantic salmon are currently present [26 rivers]. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic salmon eggs and larvae at the "abundant", "common" or "rare" level. This alternative was selected to ensure that all rivers currently capable of supporting Atlantic salmon are included in the EFH designation. The guidance in the Interim Final Rule directs that for overfished species where habitat loss or degradation may be contributing to the overfished condition, all habitats currently used by the species should be considered essential. The rivers from which Atlantic salmon have been extirpated were not selected as EFH on the presumption that it would be extremely unlikely that these rivers will again support Atlantic salmon without artificial supplementation or stocking.

Essential Fish Habitat
Atlantic salmon (*Salmo salar*) Juveniles

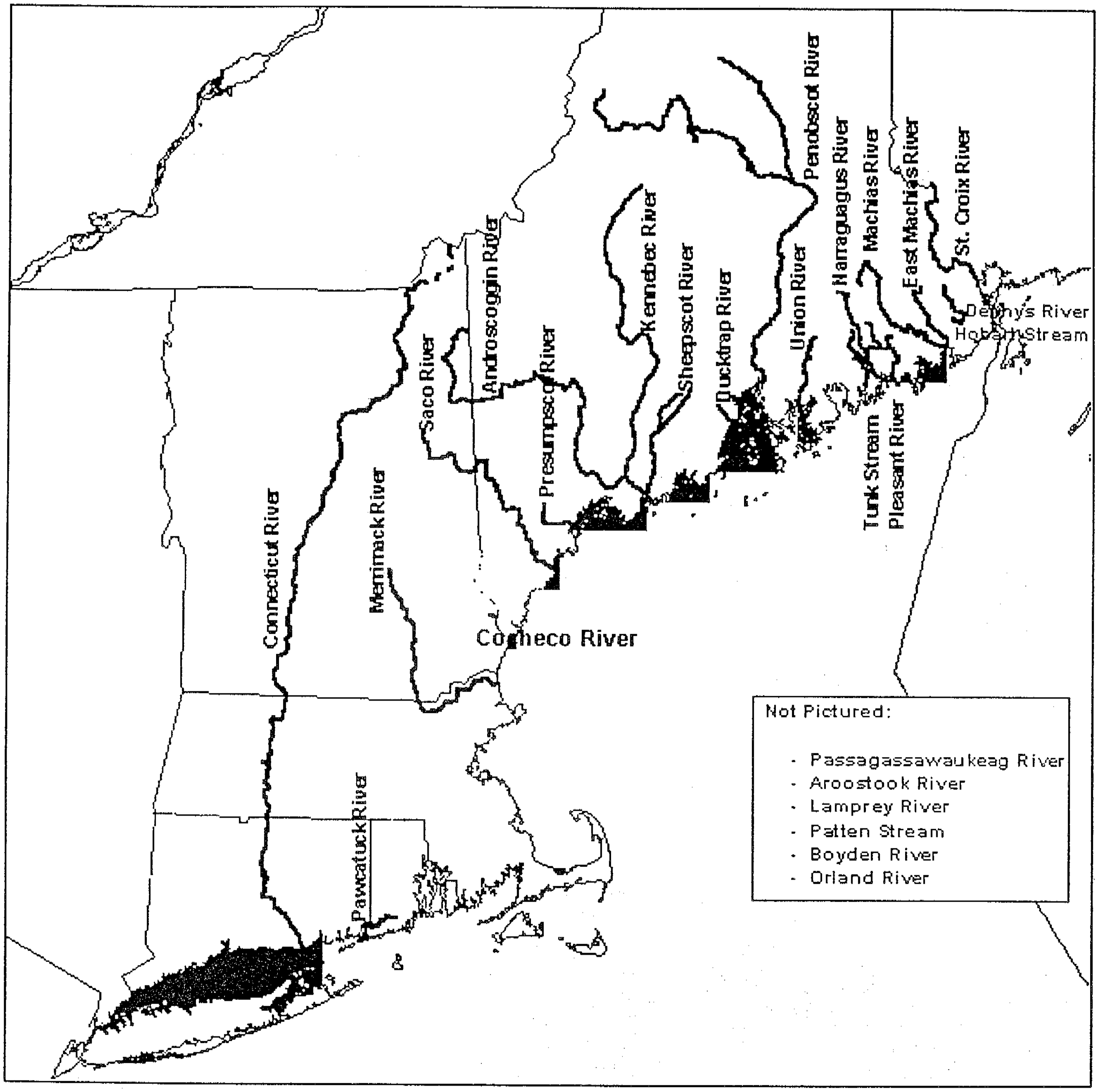


Figure 10.2: The EFH designation for Atlantic salmon juveniles represents all rivers where Atlantic salmon are currently present [26 rivers]. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic salmon juveniles at the "abundant", "common" or "rare" level. This alternative was selected to ensure that all rivers currently capable of supporting Atlantic salmon are included in the EFH designation. The guidance in the Interim Final Rule directs that for overfished species where habitat loss or degradation may be contributing to the overfished condition, all habitats currently used by the species should be considered essential. The rivers from which Atlantic salmon have been extirpated were not selected as EFH on the presumption that it would be extremely unlikely that these rivers will again support Atlantic salmon without artificial supplementation or stocking.

Essential Fish Habitat
Atlantic salmon (*Salmo salar*) Adults

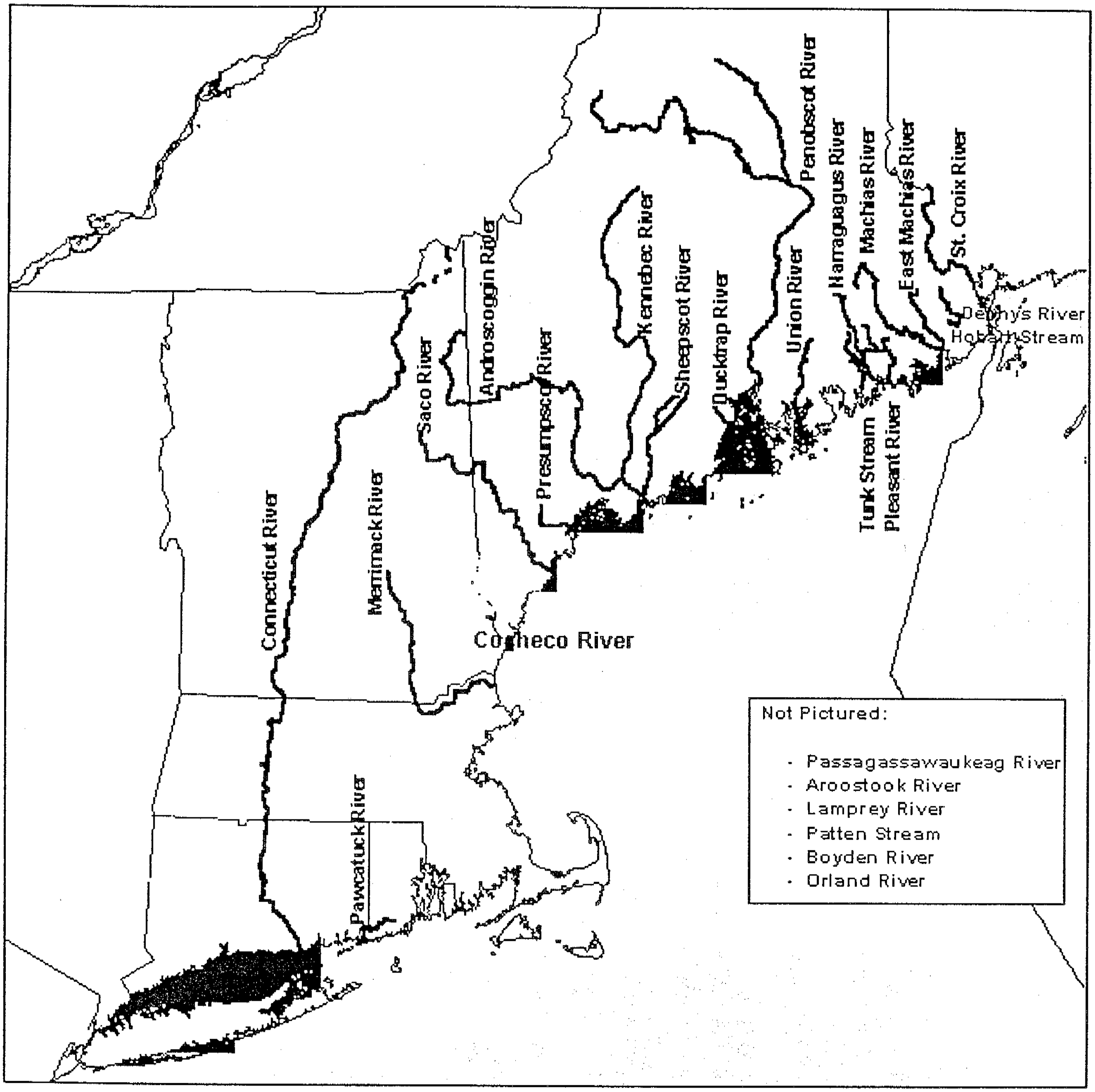


Figure 10.3: The EFH designation for Atlantic salmon adults represents all rivers where Atlantic salmon are currently present [26 rivers]. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic salmon adults at the "abundant", "common" or "rare" level. This alternative was selected to ensure that all rivers currently capable of supporting Atlantic salmon are included in the EFH designation. The guidance in the Interim Final Rule directs that for overfished species where habitat loss or degradation may be contributing to the overfished condition, all habitats currently used by the species should be considered essential. The rivers from which Atlantic salmon have been extirpated were not selected as EFH on the presumption that it would be extremely unlikely that these rivers will again support Atlantic salmon without artificial supplementation or stocking.

Essential Fish Habitat Description
Atlantic sea scallops (*Placopecten magellanicus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined Atlantic sea scallops are currently overfished. This determination is based on the fishing mortality rate. Essential fish habitat for Atlantic sea scallops is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figure 11.1 and in the accompanying table and meet the following conditions:

Eggs: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border as depicted in Figure 11.1. Eggs are heavier than seawater and remain on the seafloor until they develop into the first free-swimming larval stage. Generally, sea scallop eggs are thought to occur where water temperatures are below 17° C. Spawning occurs from May through October, with peaks in May and June in the middle Atlantic area and in September and October on Georges Bank and in the Gulf of Maine.

Larvae: Pelagic waters and bottom habitats with a substrate of gravelly sand, shell fragments, and pebbles, or on various red algae, hydroids, amphipod tubes and bryozoans in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border as depicted in Figure 11.1. Generally, the following conditions exist where sea scallop larvae are found: sea surface temperatures below 18° C and salinities between 16.9‰ and 30‰.

Juveniles: Bottom habitats with a substrate of cobble, shells and silt in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border that support the highest densities of sea scallops as depicted in Figure 11.1. Generally, the following conditions exist where most sea scallop juveniles are found: water temperatures below 15° C, and water depths from 18 - 110 meters.

Adults: Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border that support the highest densities of sea scallops as depicted in Figure 11.1. Generally, the following conditions exist where most sea scallop adults are found: water temperatures below 21° C, water depths from 18 - 110 meters, and salinities above 16.5‰.

Spawning Adults: Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border that support the highest densities of sea scallops as depicted in Figure 11.1. Generally, the following conditions exist where spawning sea scallop adults are found: water temperatures below 16° C, depths from 18 - 110 meters, and salinities above 16.5‰. Spawning occurs from May through October, with peaks in May and June in the middle Atlantic area and in September and October on Georges Bank and in the Gulf of Maine.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Atlantic sea scallops (*Placopecten magellanicus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay	S	S	S	S	S
Englishman/Machias Bay	S	S	S	S	S
Narraguagus Bay	S	S	S	S	S
Blue Hill Bay	S	S	S	S	S
Penobscot Bay	S	S	S	S	S
Muscongus Bay	S	S	S	S	S
Damariscotta River	S	S	S	S	S
Sheepscot River	S	S	S	S	S
Kennebec / Androscoggin Rivers					
Casco Bay	S	S	S	S	S
Saco Bay					
Wells Harbor					
Great Bay			S	S	
Merrimack River					
Massachusetts Bay	S	S	S	S	S
Boston Harbor					
Cape Cod Bay	S	S	S	S	S
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Atlantic sea scallops (*Placopecten magellanicus*) All Life Stages

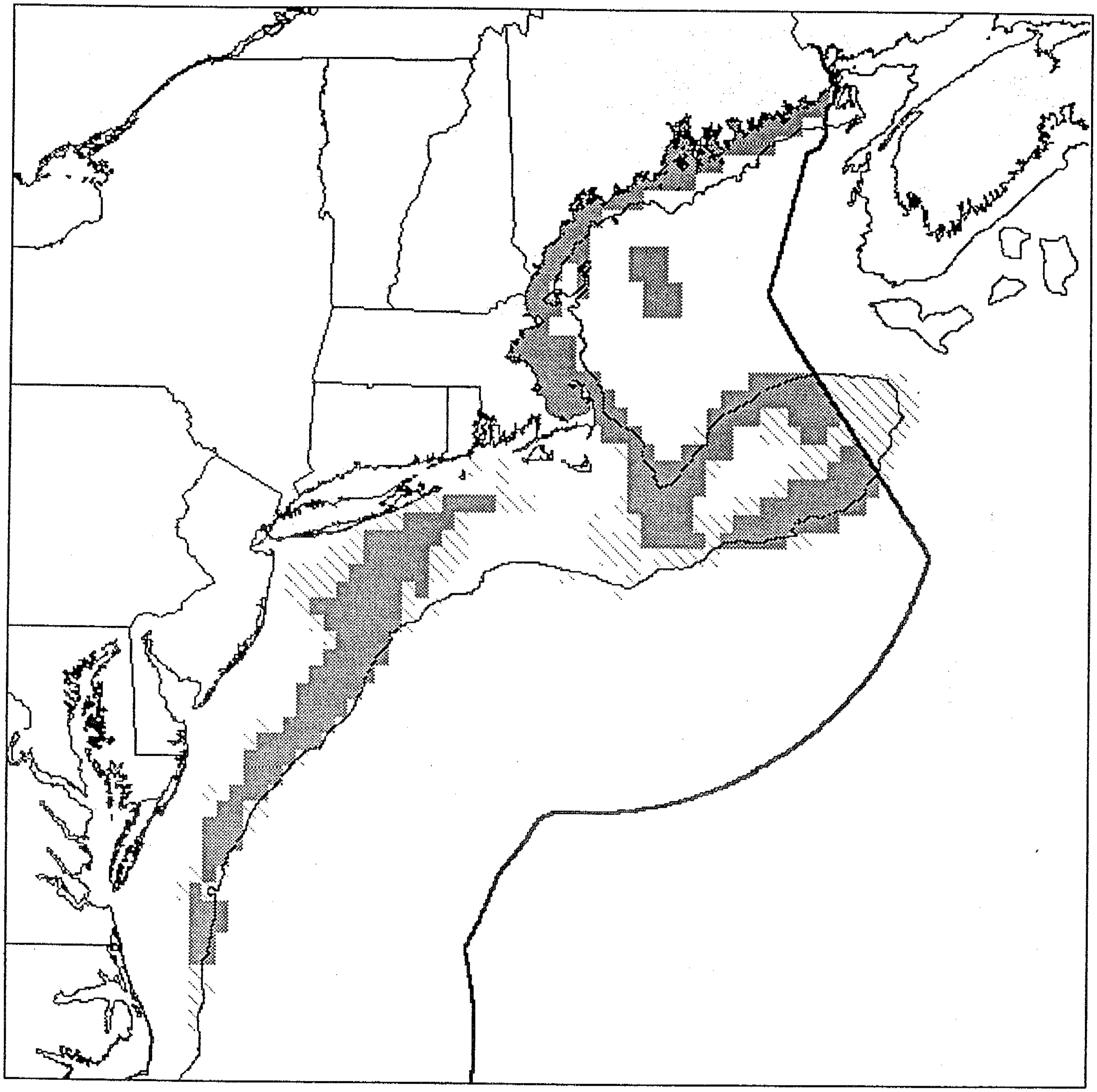


Figure 11.1: The EFH designation for Atlantic sea scallops is based upon alternative 2, based on the NMFS scallop survey (1982 - 1997), plus areas identified by the fishing industry and by NMFS as important for sea scallops. The designation also includes the mid-Atlantic juvenile sea scallop closed areas (the Hudson Canyon Closed Area and the Virginia Beach Closed Area) and those bays and estuaries identified by the NOAA ELMR program as supporting sea scallops at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where sea scallops occur in relatively low concentrations. The light shading represents the entire observed range of Atlantic sea scallops.

Essential Fish Habitat Description
Haddock (*Melanogrammus aeglefinus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined the Georges Bank stock of haddock is neither currently overfished nor approaching an overfished condition. The report also concluded that there is not enough information to determine if the Gulf of Maine stock is overfished or approaching an overfished condition. For both stocks of haddock, essential fish habitat is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 2.1 - 2.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters over Georges Bank southwest to Nantucket Shoals and the coastal areas of the Gulf of Maine as depicted in Figure 2.1. Generally, the following conditions exist where haddock eggs are found: sea surface temperatures below 10° C, water depths from 50 - 90 meters, and salinity ranges from 34 - 36‰. Haddock eggs are most often observed during the months from March to May, April being most important.

Larvae: Surface waters over Georges Bank southwest to the middle Atlantic south to Delaware Bay as depicted in Figure 2.2. Generally, the following conditions exist where haddock larvae are found: sea surface temperatures below 14° C, water depths from 30 - 90 meters, and salinity ranges from 34 - 36‰. Haddock larvae are most often observed in these areas from January through July with peaks in April and May.

Juveniles: Bottom habitats with a substrate of pebble gravel on the perimeter of Georges Bank, the Gulf of Maine, and the middle Atlantic south to Delaware Bay as depicted in Figure 2.3. Generally, the following conditions exist where haddock juveniles are found: water temperatures below 11° C, depths from 35 - 100 meters, and a salinity range from 31.5 - 34‰.

Adults: Bottom habitats with a substrate of broken ground, pebbles, smooth hard sand and smooth areas between rocky patches on Georges Bank and the eastern side of Nantucket Shoals, and throughout the Gulf of Maine, plus additional area of Nantucket Shoals and the Great South Channel inclusive of the historic range as depicted in Figure 2.4. This additional area more accurately reflects historic patterns of distribution and abundance. Generally, the following conditions exist where haddock adults are found: water temperatures below 7° C, depths from 40 - 150 meters, and a salinity range from 31.5 - 35‰.

Spawning Adults: Bottom habitats with a substrate of pebble gravel or gravelly sand on Georges Bank, Nantucket Shoals, along the Great South Channel, and throughout the Gulf of Maine, plus additional area inclusive of the historic range as depicted in Figure 2.4. Generally, the following conditions exist where spawning haddock adults are found: water temperatures below 6° C, depths from 40 - 150 meters, and a salinity range from 31.5 - 34‰. Haddock are observed spawning most often during the months January to June.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council notes the historic importance of areas where haddock were once commonly found (Rich 1929). The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Haddock (*Melanogrammus aeglefinus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay					
Englishman/Machias Bay					
Narraguagus Bay					
Blue Hill Bay					
Penobscot Bay					
Muscongus Bay					
Damariscotta River					
Sheepscot River					
Kennebec / Androscoggin Rivers					
Casco Bay					
Saco Bay					
Wells Harbor					
Great Bay	S	S			
Merrimack River					
Massachusetts Bay	S	S			
Boston Harbor	S	S			
Cape Cod Bay	S	S			
Waquoit Bay					
Buzzards Bay	S	S			
Narragansett Bay		S			
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Haddock (*Melanogrammus aeglefinus*) Eggs

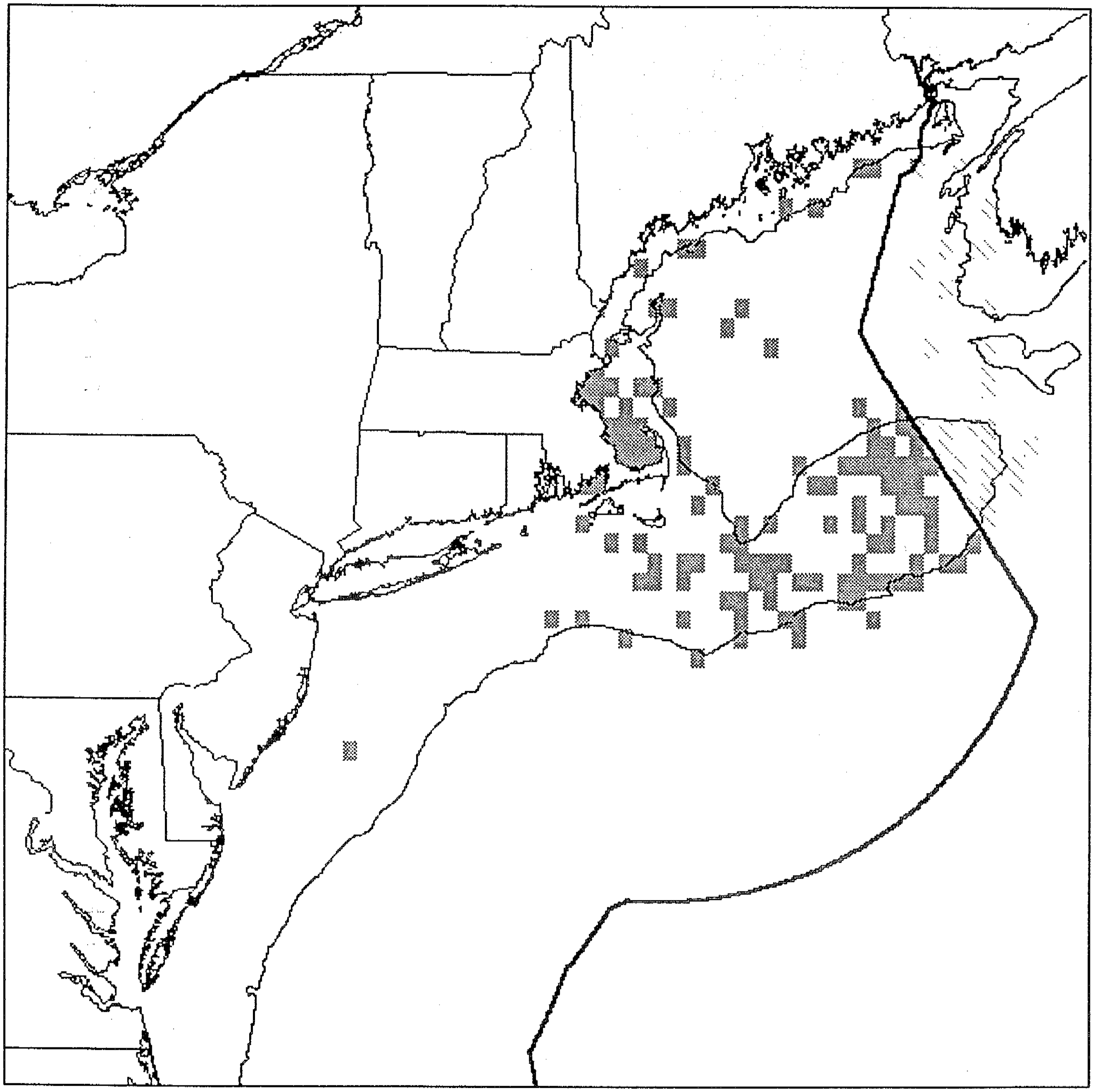


Figure 2.1: The EFH designation for haddock eggs is based upon alternative 4 for haddock eggs. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting haddock eggs at the "rare", "common", or "abundant" level. This alternative was selected to be as inclusive as possible, given the distribution of haddock eggs. The light shading represents the entire observed range of haddock eggs.

Essential Fish Habitat
Haddock (*Melanogrammus aeglefinus*) Larvae

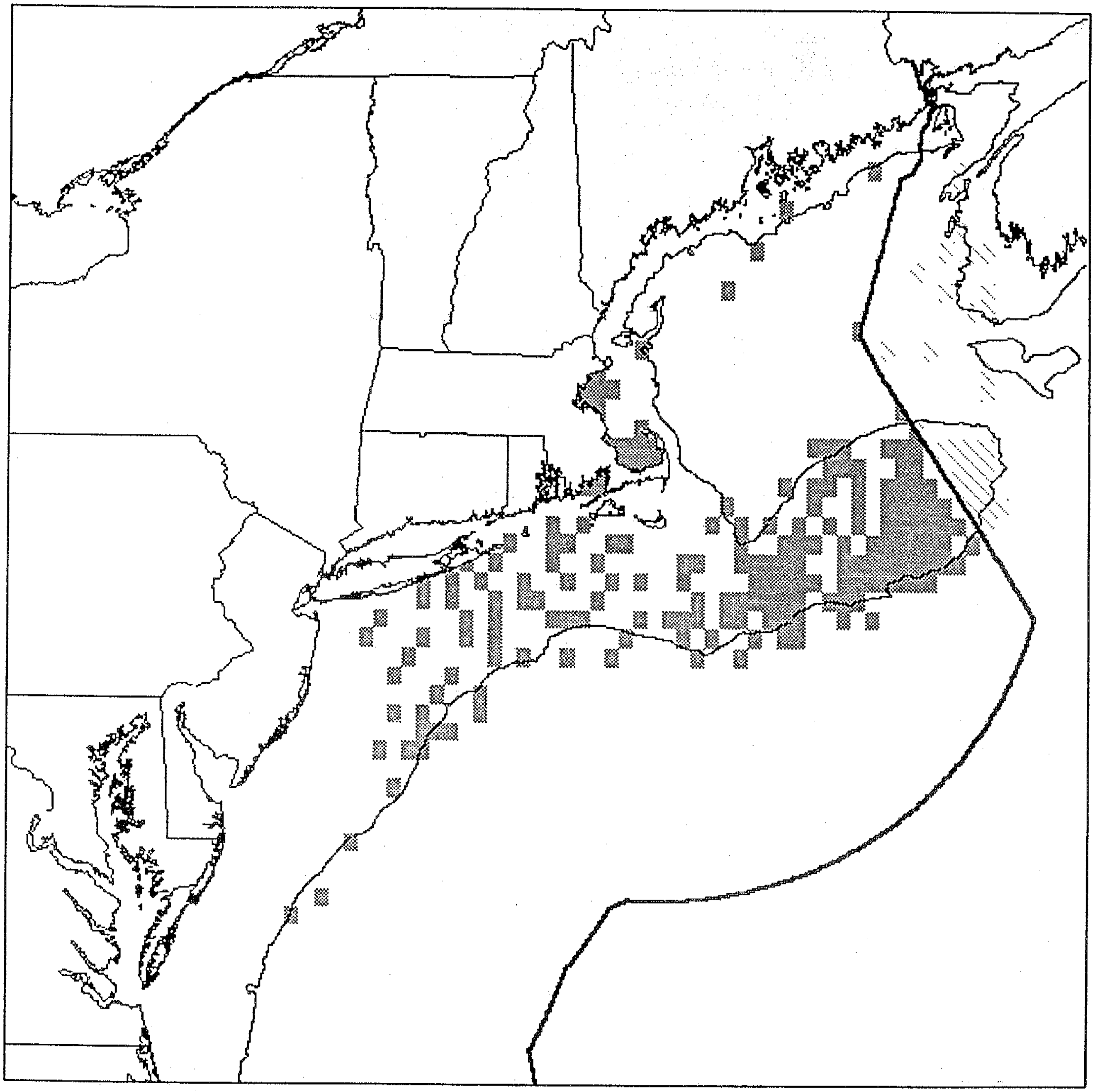


Figure 2.2: The EFH designation for haddock larvae is based upon alternative 4 for haddock larvae. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting haddock larvae at the "rare", "common", or "abundant" level. This alternative was selected to be as inclusive as possible, given the distribution of haddock larvae. The light shading represents the entire observed range of haddock larvae.

Essential Fish Habitat
Haddock (*Melanogrammus aeglefinus*) Juveniles

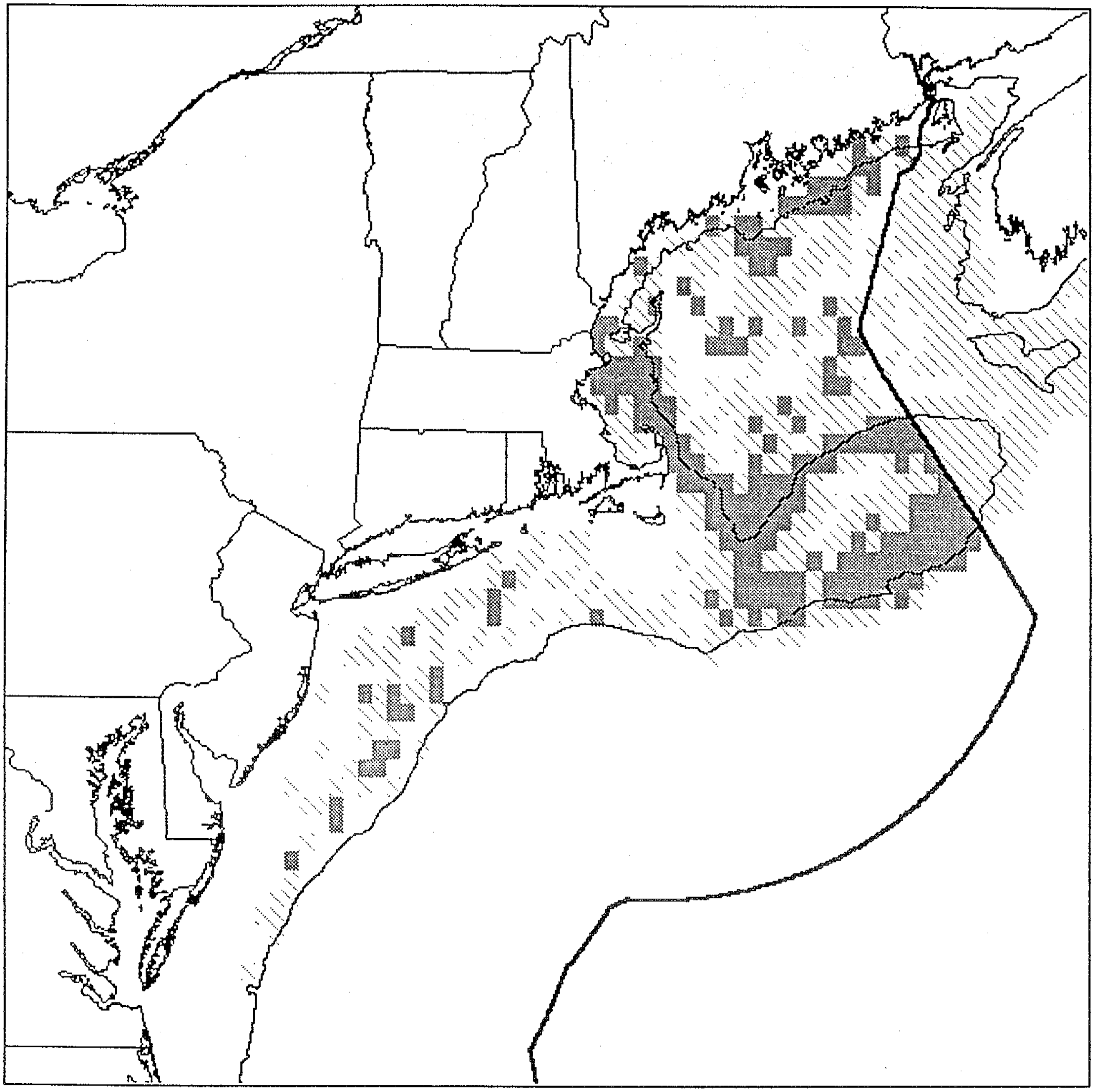


Figure 2.3: The EFH designation for juvenile haddock is based upon alternative 3 for haddock juveniles. This alternative was selected because it included all areas where haddock juveniles were observed in relatively high concentrations, but did not include areas where they occurred in low concentrations. The light shading represents the entire observed range of juvenile haddock.

Essential Fish Habitat
Haddock (*Melanogrammus aeglefinus*) Adults

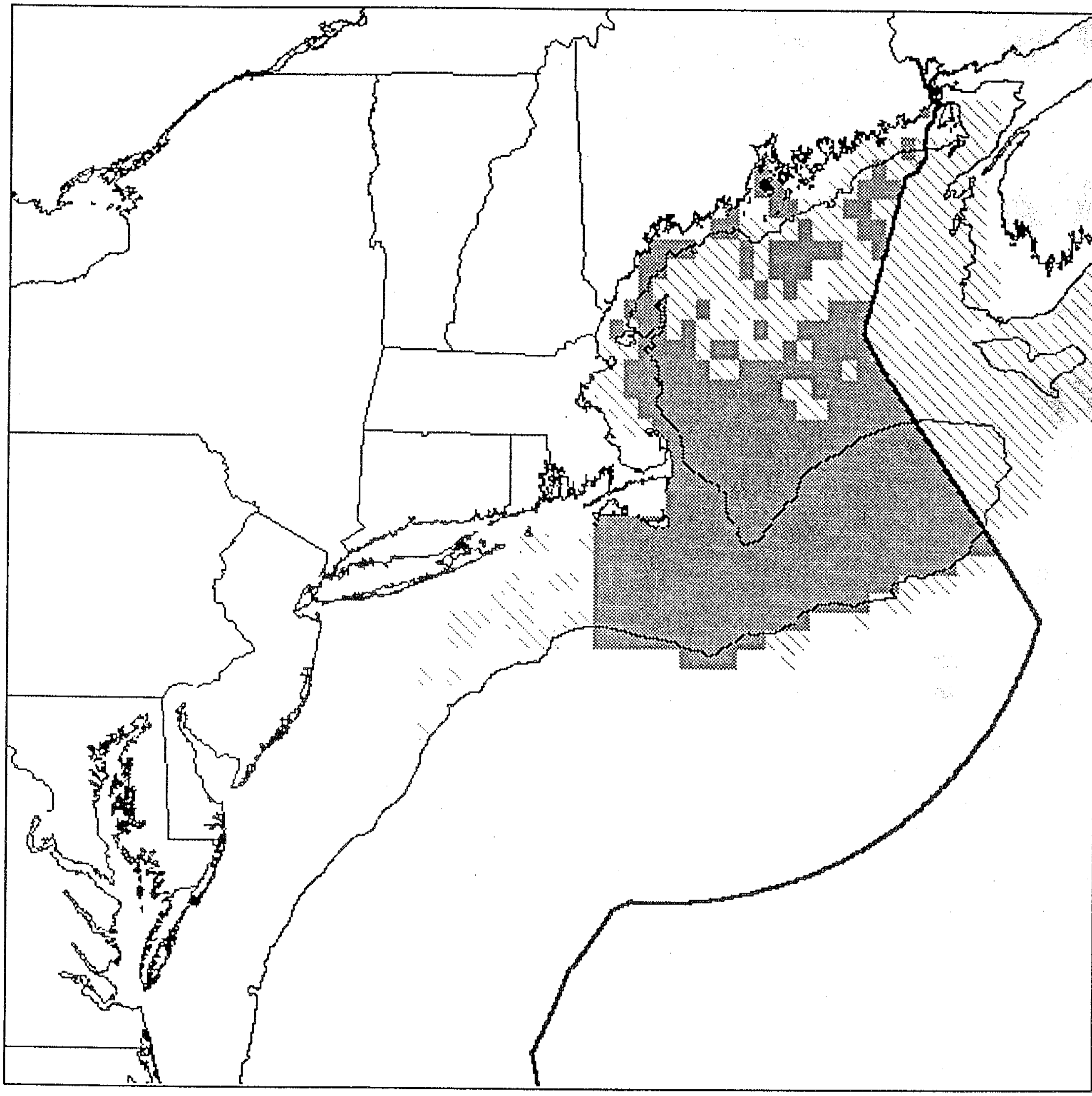


Figure 2.4: The EFH designation for adult haddock is based upon alternative 3 for haddock adults. In addition, this designation includes a portion of the historic range and known spawning areas to more accurately reflect traditional patterns of distribution and abundance. This alternative was selected because it included all areas where haddock adults were observed in relatively high concentrations, but did not include areas where they occurred in low concentrations. Areas of historic importance were included to ensure that potentially important historic habitat was reflected in the EFH designation. The light shading represents the entire observed range of adult haddock.

Essential Fish Habitat Description
Monkfish (*Lophius americanus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined monkfish is currently overfished. This determination is based on an assessment of stock size. Essential Fish Habitat for monkfish is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 4.1 - 4.4 and meet the following conditions:

Eggs: Surface waters of the Gulf of Maine, Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras, North Carolina as depicted in Figure 4.1. Generally, the following conditions exist where monkfish egg veils are found: sea surface temperatures below 18° C and water depths from 15 - 1000 meters. Monkfish egg veils are most often observed during the months from March to September.

Larvae: Pelagic waters of the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras, North Carolina as depicted in Figure 4.2. Generally, the following conditions exist where monkfish larvae are found: water temperatures 15° C and water depths from 25 - 1000 meters. Monkfish larvae are most often observed during the months from March to September.

Juveniles: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud along the outer continental shelf in the middle Atlantic, the mid-shelf off southern New England, and all areas of the Gulf of Maine as depicted in Figure 4.3. Generally, the following conditions exist where monkfish juveniles are found: water temperatures below 13° C, depths from 25 - 200 meters, and a salinity range from 29.9 - 36.7‰.

Adults: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud along the outer continental shelf in the middle Atlantic, the mid-shelf off southern New England, along the outer perimeter of Georges Bank and all areas of the Gulf of Maine as depicted in Figure 4.4. Generally, the following conditions exist where monkfish adults are found: water temperatures below 15° C, depths from 25 - 200 meters, and a salinity range from 29.9 - 36.7‰.

Spawning Adults: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud along the outer continental shelf in the middle Atlantic, the mid-shelf off southern New England, along the outer perimeter of Georges Bank and all areas of the Gulf of Maine as depicted in Figure 4.4. Generally, the following conditions exist where spawning monkfish adults are found: water temperatures below 13° C, depths from 25 - 200 meters, and a salinity range from 29.9 - 36.7‰. Monkfish are observed spawning most often during the months from February to August.

The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

Essential Fish Habitat
Monkfish (*Lophius americanus*) Eggs

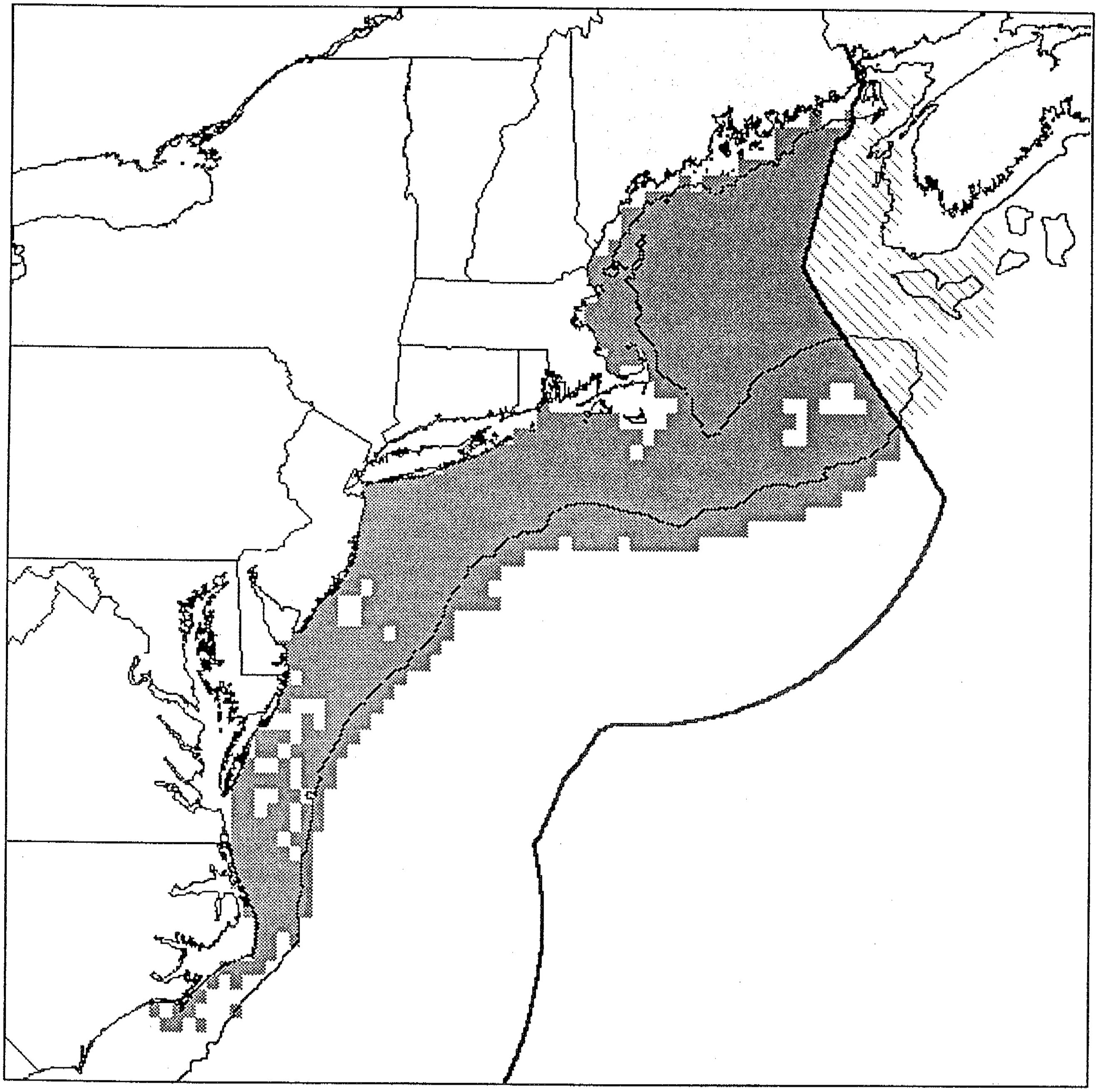


Figure 4.1: The EFH designation for monkfish eggs is based upon alternative 4 for monkfish larvae in combination with alternative 4 for monkfish adults. Due to the difficulty of sampling monkfish eggs, the combination of larvae and adults was used as a proxy. This alternative was selected to be as conservative as possible given the lack of information on the distribution of monkfish eggs. The light shading represents the entire observed range of adult monkfish.

Essential Fish Habitat
Monkfish (*Lophius americanus*) Larvae

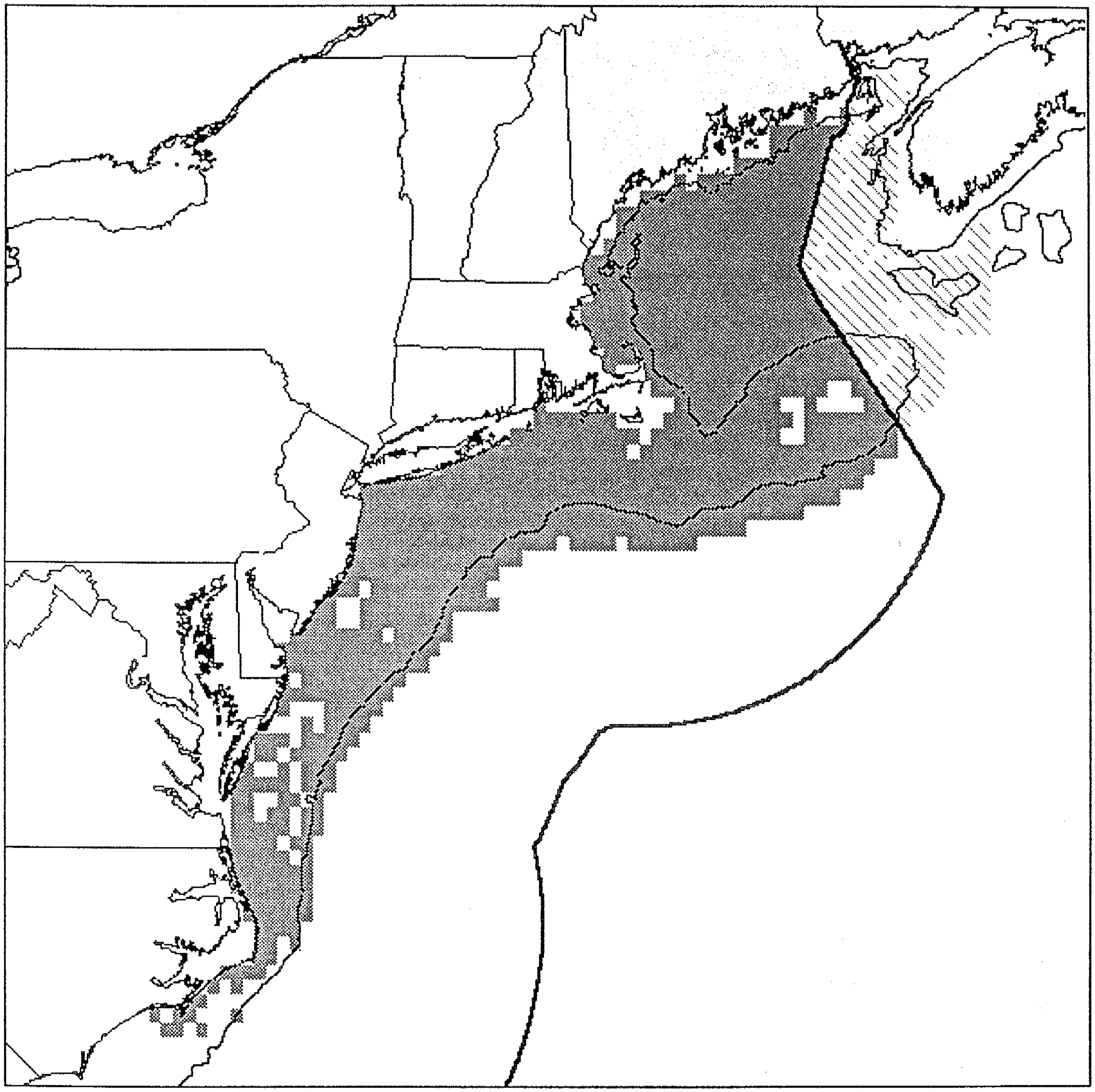


Figure 4.2: The EFH designation for monkfish larvae is based upon alternative 4 for monkfish larvae in combination with alternative 4 for monkfish adults. Due to the somewhat patchy and sparse distribution of monkfish larvae observations, the combination of larvae and adults was used as a proxy. This alternative was selected to be as conservative as possible given the patchy nature of the distribution of monkfish larvae. The light shading represents the entire observed range of adult monkfish.

Essential Fish Habitat
Monkfish (*Lophius americanus*) Juveniles

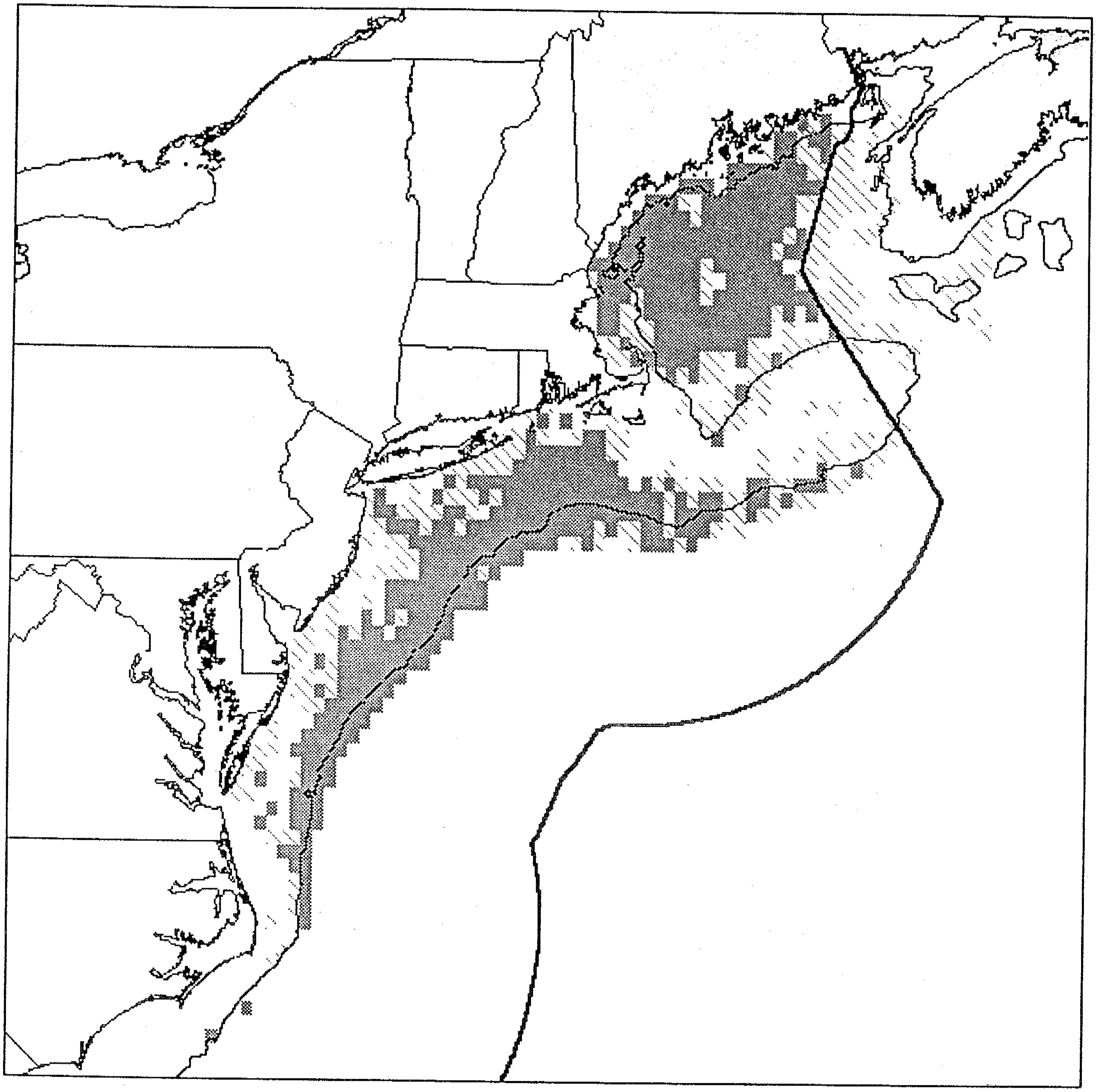


Figure 4.3: The EFH designation for juvenile monkfish is based upon alternative 3 for monkfish juveniles. This alternative was selected because it included all areas where monkfish juveniles were observed in relatively high concentrations, but did not include areas where they occurred in low concentrations. The light shading represents the entire observed range of juvenile monkfish.

Essential Fish Habitat
Monkfish (*Lophius americanus*) Adults

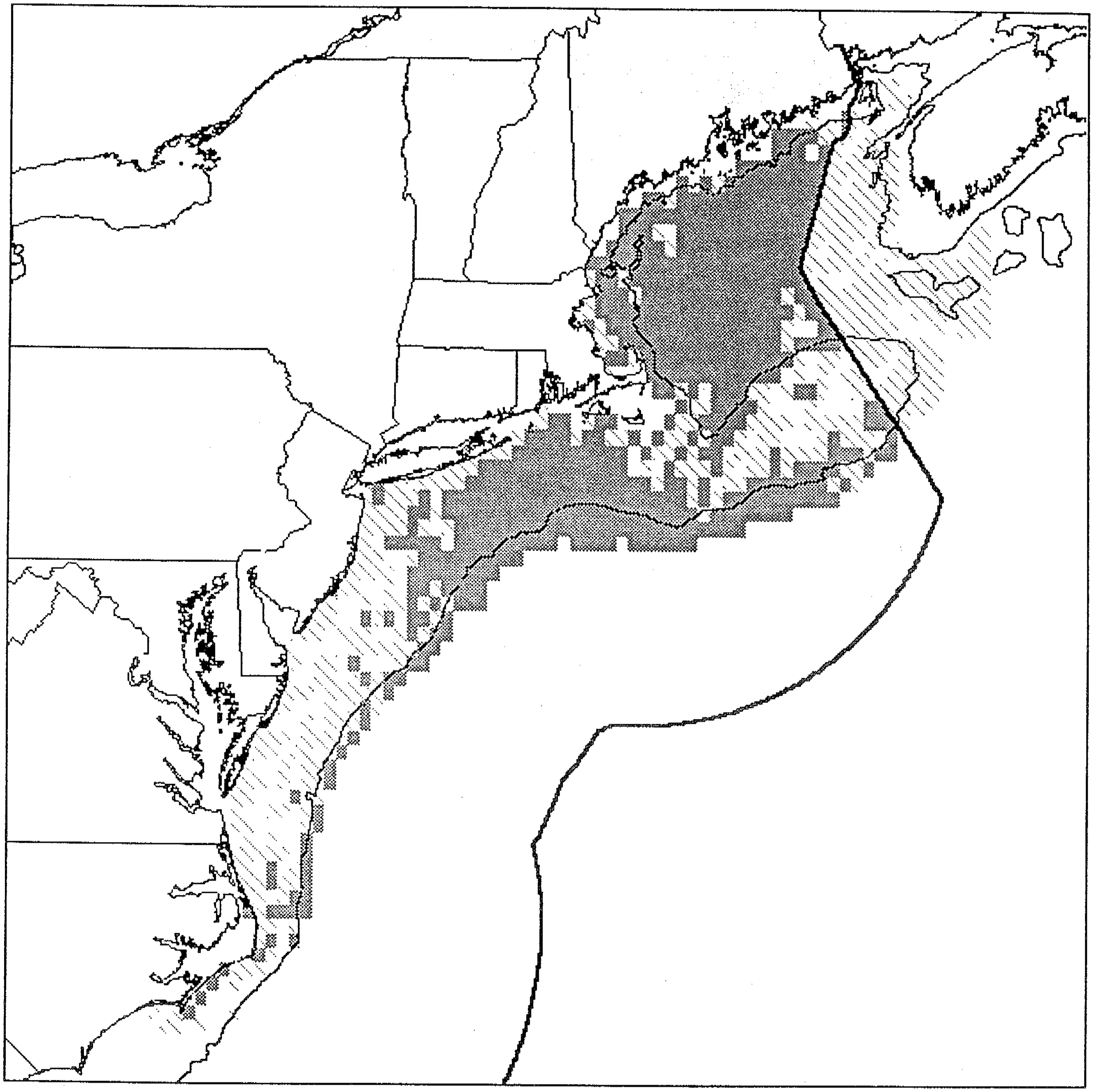


Figure 4.4: The EFH designation for adult monkfish is based upon alternative 3 for monkfish adults. This alternative was selected because it included all areas where monkfish adults were observed in relatively high concentrations, but did not include areas where they occurred in low concentrations. The light shading represents the entire observed range of adult monkfish.

Essential Fish Habitat
Pollock (*Pollachius virens*) Larvae

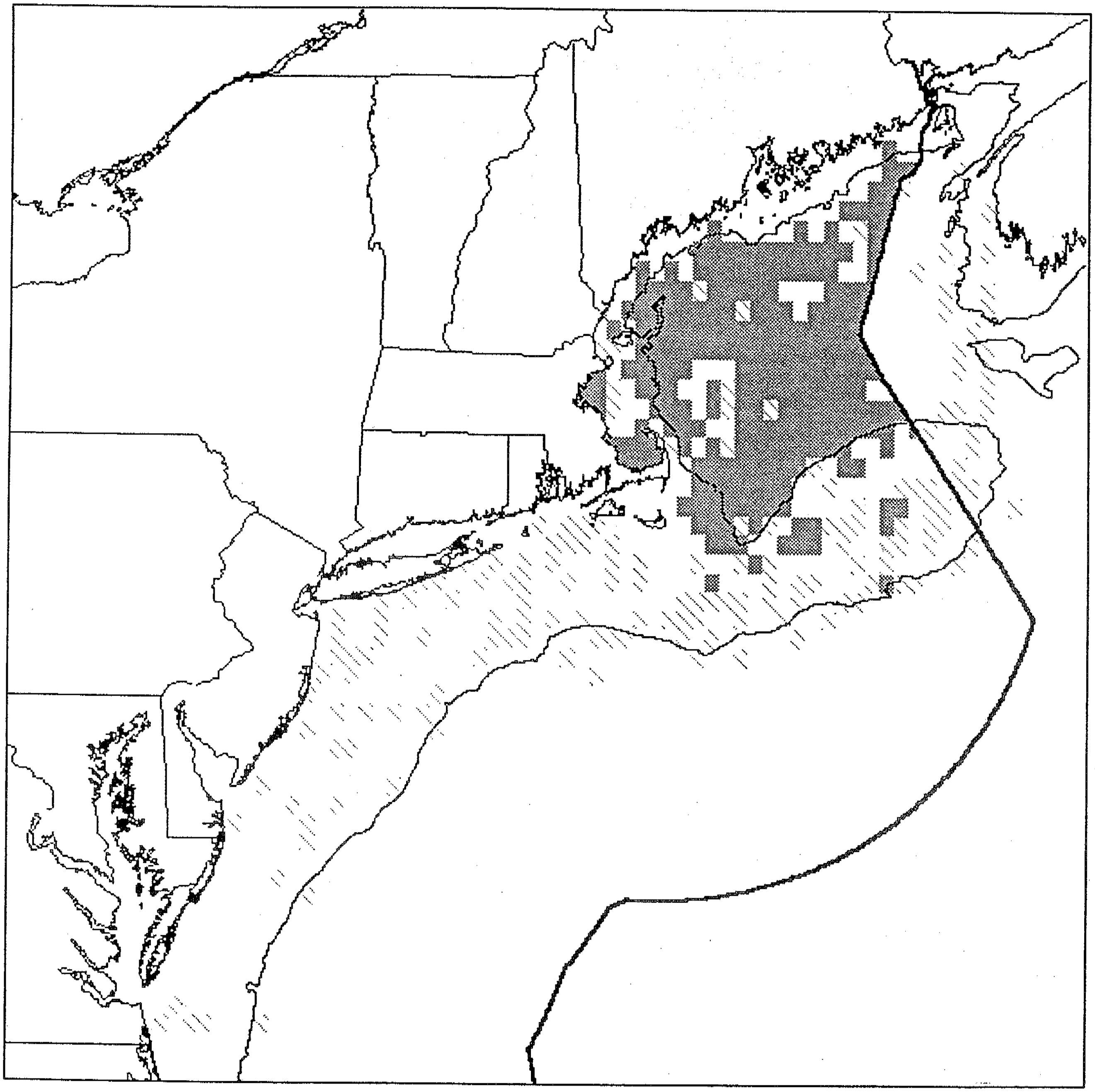


Figure 7.2: The EFH designation for pollock larvae is based upon alternative 3 for pollock adults. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting pollock larvae at the "common" or "abundant" level. The observed distribution of pollock larvae is very patchy and widely dispersed and does not match up with distributions of juveniles or adults, thus the distribution of adults was used as a proxy. This alternative was selected as it appears to best identify that portion of the range of pollock most important to all life history stages. The light shading represents the entire observed range of pollock larvae.

Essential Fish Habitat
Pollock (*Pollachius virens*) Juveniles

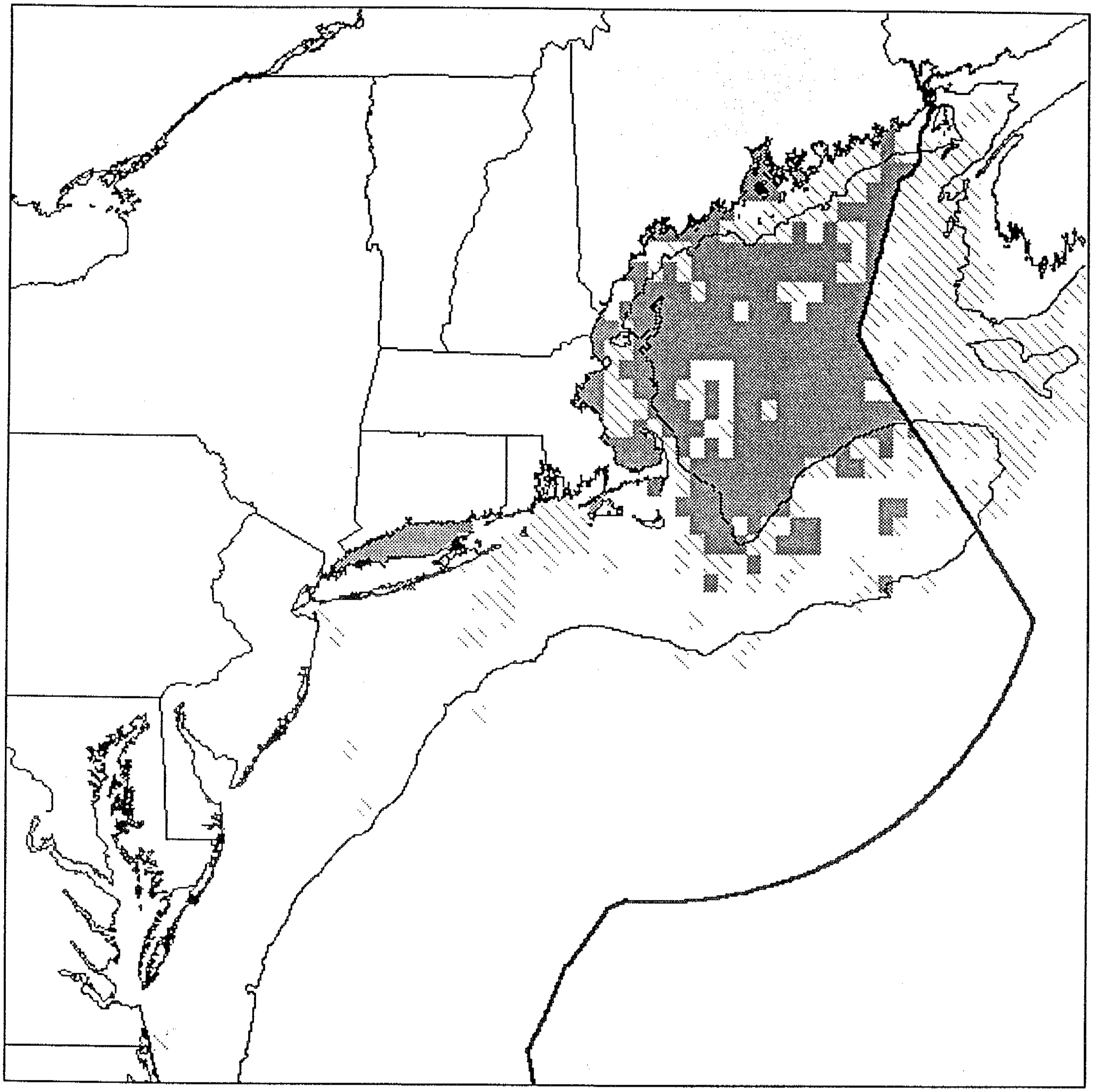


Figure 7.3: The EFH designation for juvenile pollock is based upon alternative 3 for pollock adults. This alternative was selected as it appears to best identify that portion of the range of pollock most important to all life history stages. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for pollock, as well as those bays and estuaries identified by the NOAA ELMR program as supporting juvenile pollock at the "common" or "abundant" level. The light shading represents the entire observed range of juvenile pollock.

Essential Fish Habitat
Pollock (*Pollachius virens*) Adults

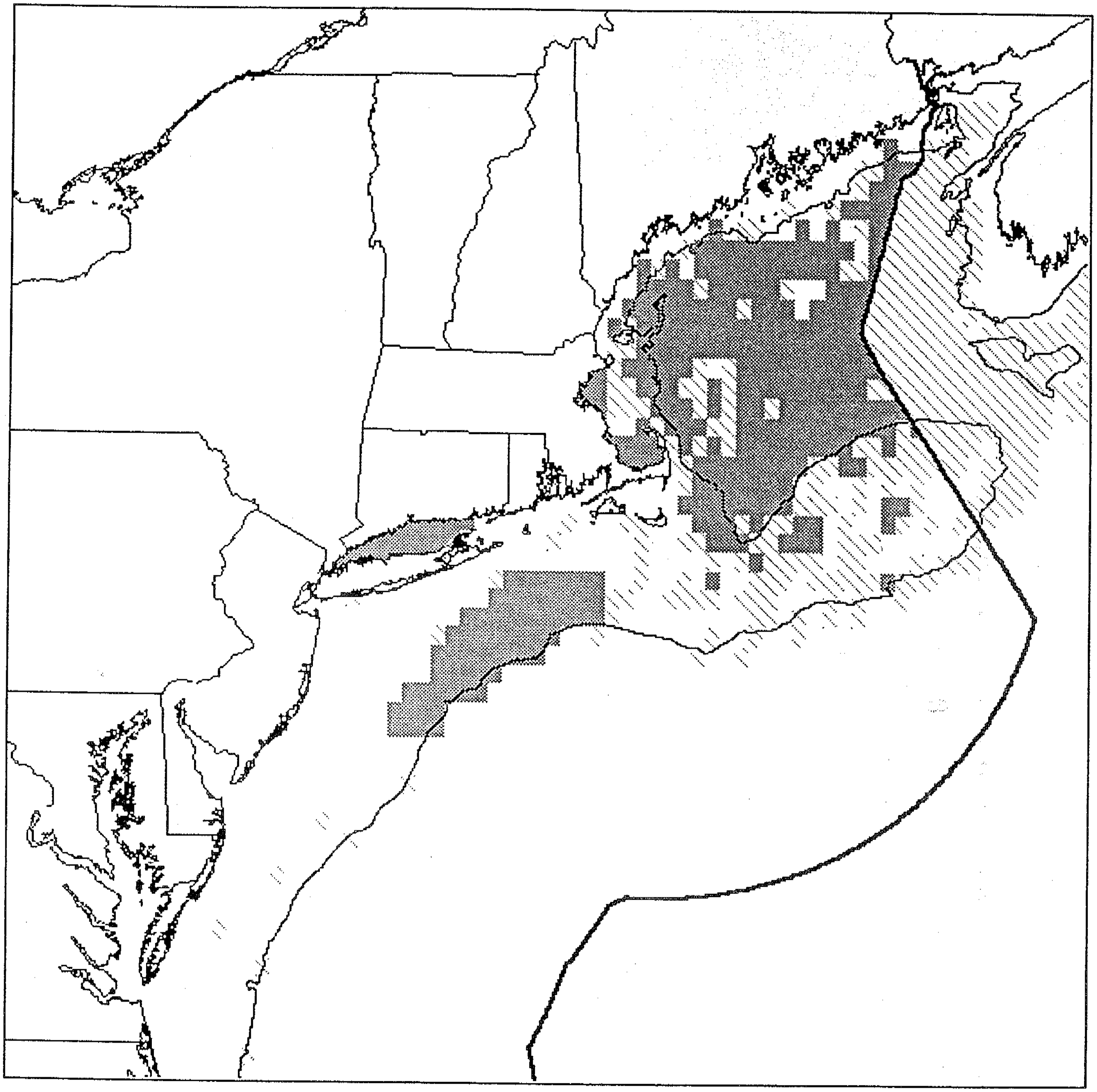


Figure 7.4: The EFH designation for adult pollock is based upon alternative 3 for pollock adults. This alternative was selected as it appears to best identify that portion of the range of pollock most important to all life history stages. The EFH designation also includes areas identified by the fishing industry and the inshore surveys as important for pollock, as well as those bays and estuaries identified by the NOAA ELMR program as supporting adult pollock at the "common" or "abundant" level. The light shading represents the entire observed range of adult pollock.

Essential Fish Habitat Description
Ocean pout (*Macrozoarces americanus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined ocean pout is not currently overfished. This determination is based on an assessment of stock level. Essential Fish Habitat for ocean pout is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 5.1 - 5.4 and in the accompanying table and meet the following conditions:

Eggs: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 5.1. Due to low fecundity, relatively few eggs (< 4200) are laid in gelatinous masses, generally in hard bottom sheltered nests, holes, or crevices where they are guarded by either female or both parents. Generally, the following conditions exist where ocean pout eggs are found: water temperatures below 10° C, depths less than 50 meters, and a salinity range from 32 - 34‰. Ocean pout egg development takes two to three months during late fall and winter.

Larvae: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 5.2. Larvae are relatively advanced in development and are believed to remain in close proximity to hard bottom nesting areas. Generally, the following conditions exist where ocean pout larvae are found: sea surface temperatures below 10° C, depths less than 50 meters, and salinities greater than 25‰. Ocean pout larvae are most often observed from late fall through spring.

Juveniles: Bottom habitats, often smooth bottom near rocks or algae in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 5.3. Generally, the following conditions exist where ocean pout juveniles are found: water temperatures below 14° C, depths less than 80 meters, and salinities greater than 25‰.

Adults: Bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 5.4. Generally, the following conditions exist where ocean pout adults are found: water temperatures below 15° C, depths less than 110 meters, and a salinity range from 32 - 34‰.

Spawning Adults: Bottom habitats with a hard bottom substrate, including artificial reefs and shipwrecks, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 5.4. Generally, the following conditions exist where spawning ocean pout adults are found: water temperatures below 10° C, depths less than 50 meters, and a salinity range from 32 - 34‰. Ocean pout spawn from late summer through early winter, with peaks in September and October.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Ocean pout (*Macrozoarces americanus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay	S	S	S	S	S
Englishman/Machias Bay	S	S	S	S	S
Narraguagus Bay	S	S	S	S	S
Blue Hill Bay	S	S	S	S	S
Penobscot Bay	S	S	S	S	S
Muscongus Bay	S	S	S	S	S
Damariscotta River	S	S	S	S	S
Sheepscot River	S	S	S	S	S
Kennebec / Androscoggin Rivers	S	S	S	S	S
Casco Bay	S	S	S	S	S
Saco Bay	S	S	S	S	S
Wells Harbor					
Great Bay					
Merrimack River					
Massachusetts Bay	S	S	S	S	S
Boston Harbor			S	S	
Cape Cod Bay	S	S	S	S	S
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Ocean pout (*Macrozoarces americanus*) Eggs

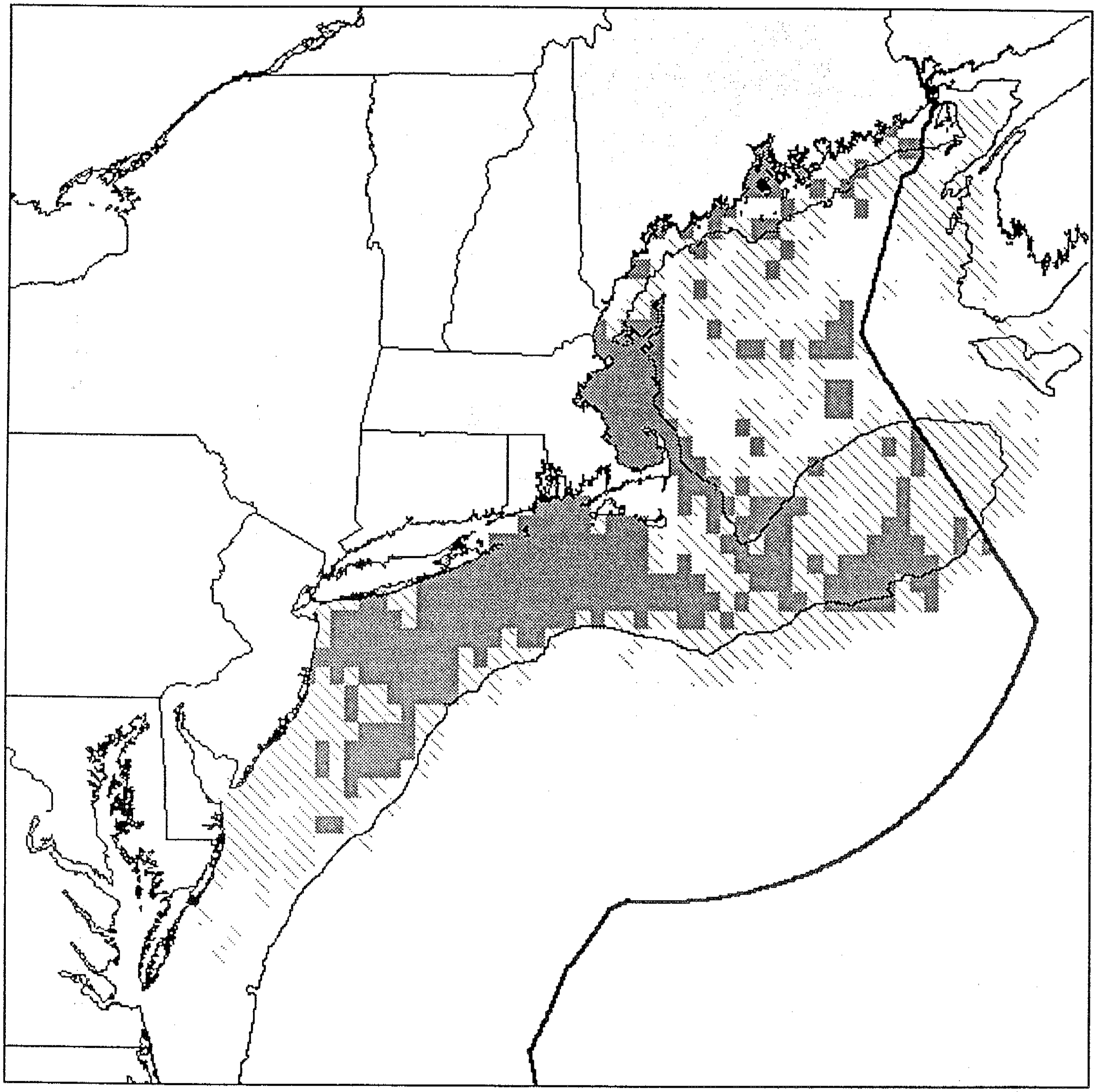


Figure 5.1: The EFH designation for ocean pout eggs is based upon the combination of alternative 3 for ocean pout juveniles and alternative 3 for ocean pout adults, in addition to those bays and estuaries identified by the NOAA ELMR program as supporting ocean pout eggs at a "common" or "abundant" level. This designation also includes areas of relatively high concentrations of ocean pout from the State of Massachusetts inshore trawl survey and the Connecticut Long Island Sound survey. Ocean pout eggs are found only in demersal nests, thus eggs are not sampled effectively with the MARMAP ichthyoplankton survey. The distribution of ocean pout juveniles and adults serves as a proxy for actual distribution data on eggs. This alternative was selected as most representative of where ocean pout eggs are likely to be found in relatively high concentrations. The light shading represents the entire observed range of ocean pout adults.

Essential Fish Habitat
Ocean pout (*Macrozoarces americanus*) Larvae

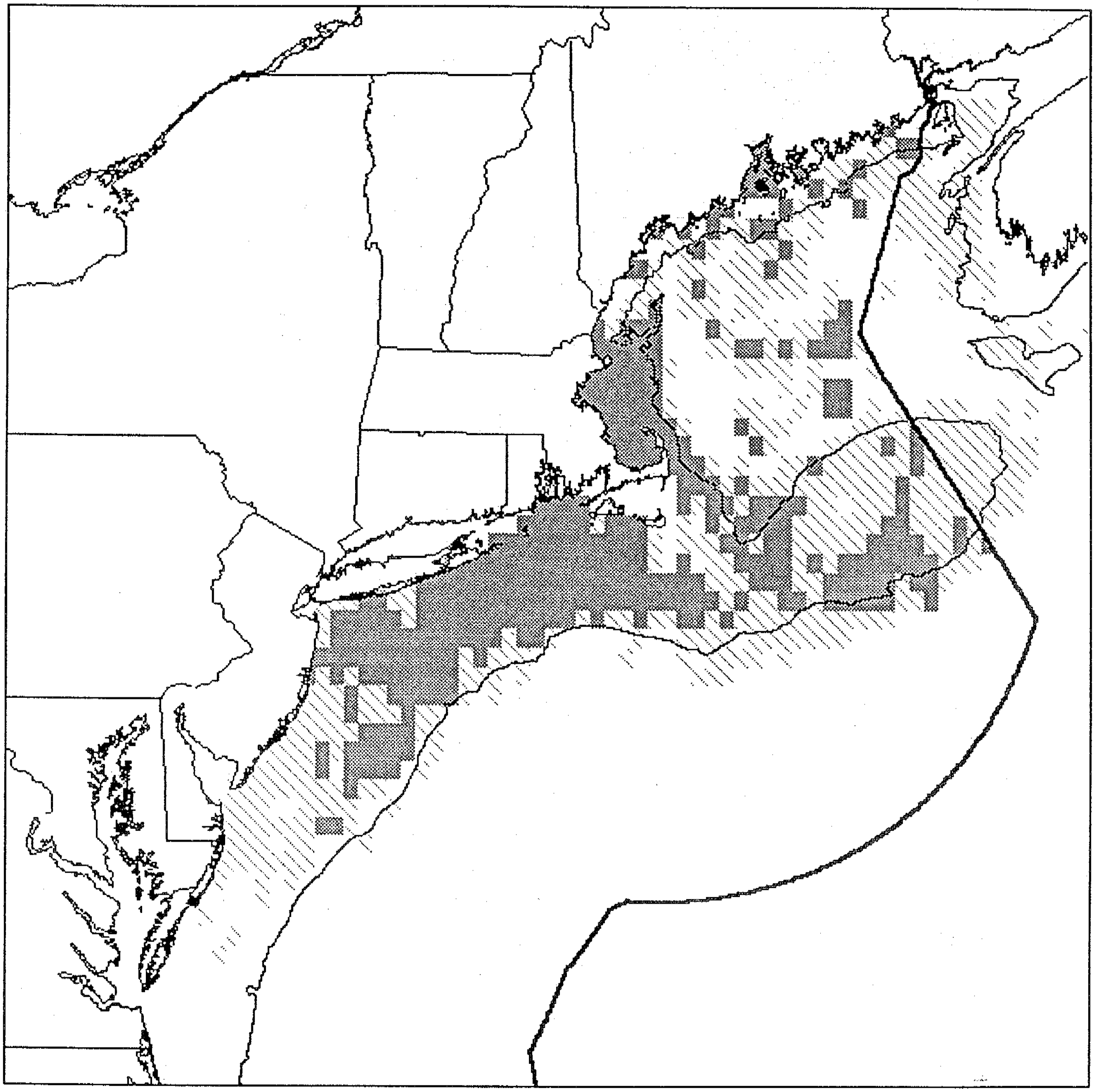


Figure 5.2: The EFH designation for ocean pout larvae is based upon the combination of alternative 3 for ocean pout juveniles and alternative 3 for ocean pout adults, in addition to those bays and estuaries identified by the NOAA ELMR program as supporting ocean pout larvae at a "common" or "abundant" level. This designation also includes areas of relatively high concentrations of ocean pout from the State of Massachusetts inshore trawl survey and the Connecticut Long Island Sound survey. Ocean pout larvae remain in close proximity with the nests, thus larvae are not sampled effectively with the MARMAP ichthyoplankton survey. The distribution of ocean pout juveniles and adults serves as a proxy for actual distribution data on larvae. This alternative was selected as most representative of where ocean pout larvae are likely to be found in relatively high concentrations. The light shading represents the entire observed range of ocean pout adults.

Essential Fish Habitat
Ocean pout (*Macrozoarces americanus*) Juveniles

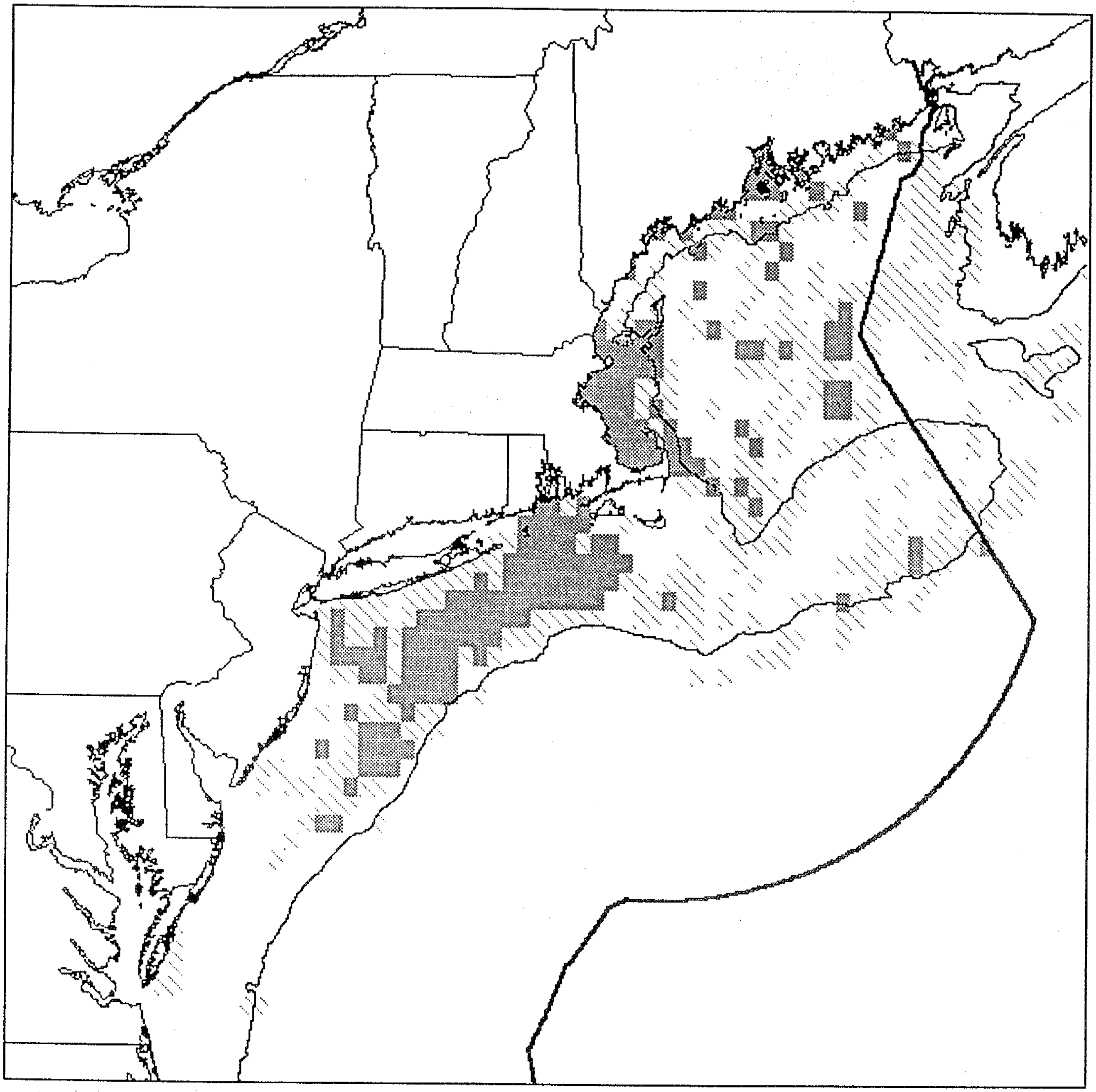


Figure 5.3: The EFH designation for juvenile ocean pout is based upon alternative 3 for juvenile ocean pout, plus those bays and estuaries identified by the NOAA ELMR program as supporting juvenile ocean pout at a "common" or "abundant" level. This designation also includes areas of relatively high concentrations of ocean pout from the State of Massachusetts inshore trawl survey and the Connecticut Long Island Sound survey. This alternative was selected to be inclusive of most areas where ocean pout occur in relatively high concentrations. The light shading represents the entire observed range of juvenile ocean pout.

Essential Fish Habitat
Ocean pout (*Macrozoarces americanus*) Adults

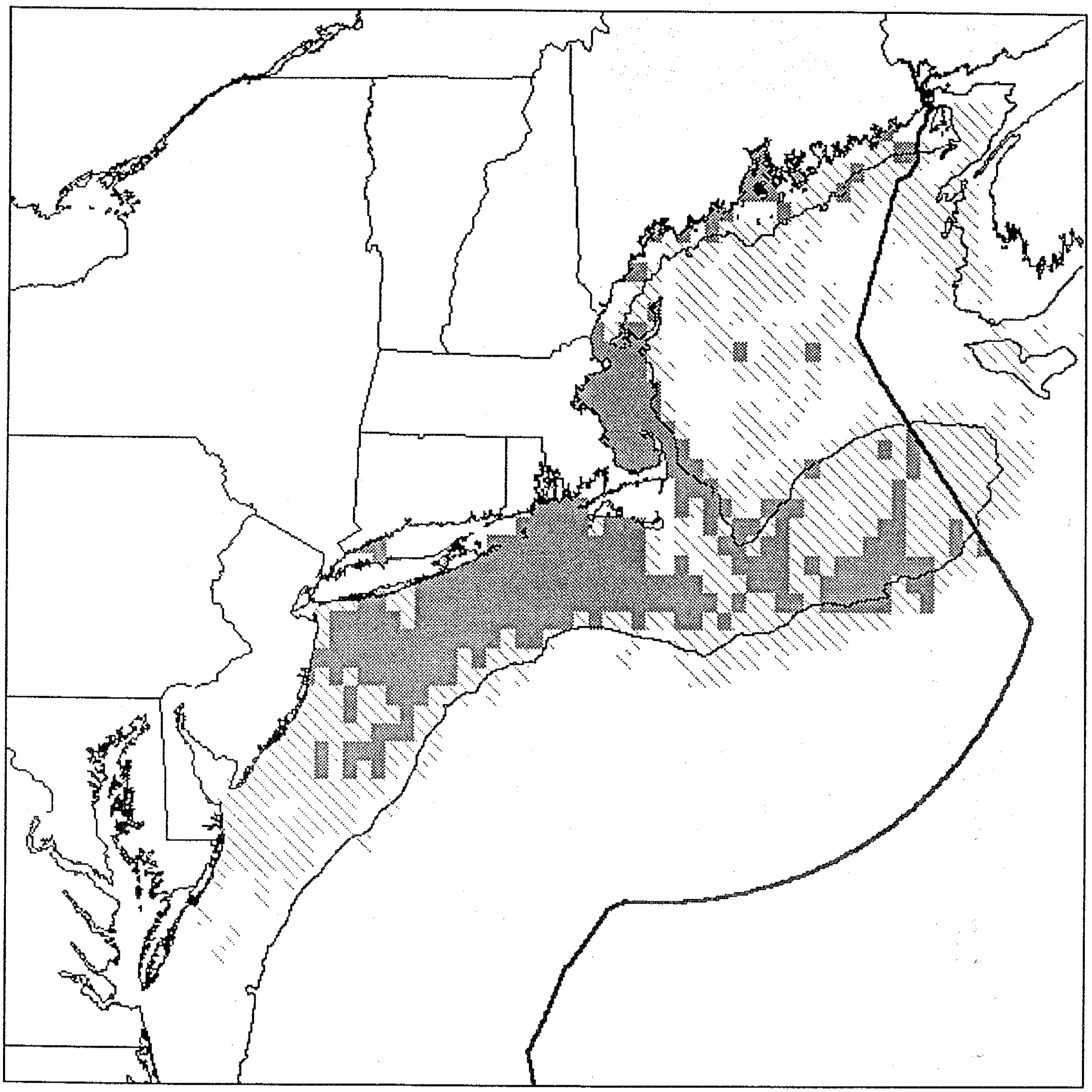


Figure 5.4: The EFH designation for adult ocean pout is based upon alternative 3 for adult ocean pout, plus those bays and estuaries identified by the NOAA ELMR program as supporting adult ocean pout at a "common" or "abundant" level. This designation also includes areas of relatively high concentrations of ocean pout from the State of Massachusetts inshore trawl survey and the Connecticut Long Island Sound survey. This alternative was selected to be inclusive of most areas where ocean pout occur in relatively high concentrations. The light shading represents the entire observed range of adult ocean pout.

Essential Fish Habitat Description
Pollock (*Pollachius virens*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined there is not enough information to determine if pollock is overfished or approaching an overfished condition. Essential Fish Habitat for pollock is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 7.1 - 7.4 and in the accompanying table and meet the following conditions:

Eggs: Pelagic waters of the Gulf of Maine and Georges Bank as depicted in Figure 7.1. Generally, the following conditions exist where pollock eggs are found: sea surface temperatures less than 17° C, water depths 30 and 270 meters, and salinities between 32 - 32.8‰. Pollock eggs are often observed from October through June with peaks from November to February.

Larvae: Pelagic waters of the Gulf of Maine and Georges Bank as depicted in Figure 7.2. Generally, the following conditions exist where pollock larvae are found: sea surface temperatures less than 17° C and water depths between 10 and 250 meters. Pollock larvae are often observed from September to July with peaks from December to February.

Juveniles: Bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks in the Gulf of Maine and Georges Bank as depicted in Figure 7.3. Generally, the following conditions exist where pollock juveniles are found: water temperatures below 18° C, depths from 0 - 250 meters, and salinities between 29 - 32‰.

Adults: Bottom habitats in the Gulf of Maine and Georges Bank and hard bottom habitats (including artificial reefs) off southern New England and the middle Atlantic south to New Jersey as depicted in Figure 7.4. Generally, the following conditions exist where pollock adults are found: water temperatures below 14° C, depths from 15 - 365 meters, and salinities between 31 - 34‰.

Spawning Adults: Bottom habitats with a substrate of hard, stony or rocky bottom in the Gulf of Maine and hard bottom habitats (including artificial reefs) off southern New England and the middle Atlantic south to New Jersey as depicted in Figure 7.4. Generally, the following conditions exist where pollock adults are found: water temperatures below 8° C, depths from 15 - 365 meters, and salinities between 32 - 32.8‰. Pollock are most often observed spawning during the months September to April with peaks from December to February.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Pollock (*Pollachius virens*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay		s	m,s	s	
Englishman/Machias Bay			m,s		
Narraguagus Bay			m,s		
Blue Hill Bay			m,s		
Penobscot Bay			m,s		
Muscongus Bay			m,s		
Damariscotta River			m,s	s	
Sheepscot River		s	m,s		
Kennebec / Androscoggin Rivers			m,s		
Casco Bay			m,s		
Saco Bay			m,s		
Wells Harbor					
Great Bay	s	s	s		
Merrimack River	m	m	m		
Massachusetts Bay	s	s	s	s	s
Boston Harbor	s	s	m,s		
Cape Cod Bay		s	m,s	s	
Waquoit Bay			s		
Buzzards Bay					
Narragansett Bay					
Long Island Sound			s	s	
Connecticut River					
Gardiners Bay					
Great South Bay			s		
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity ≥ 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Pollock (*Pollachius virens*) Eggs

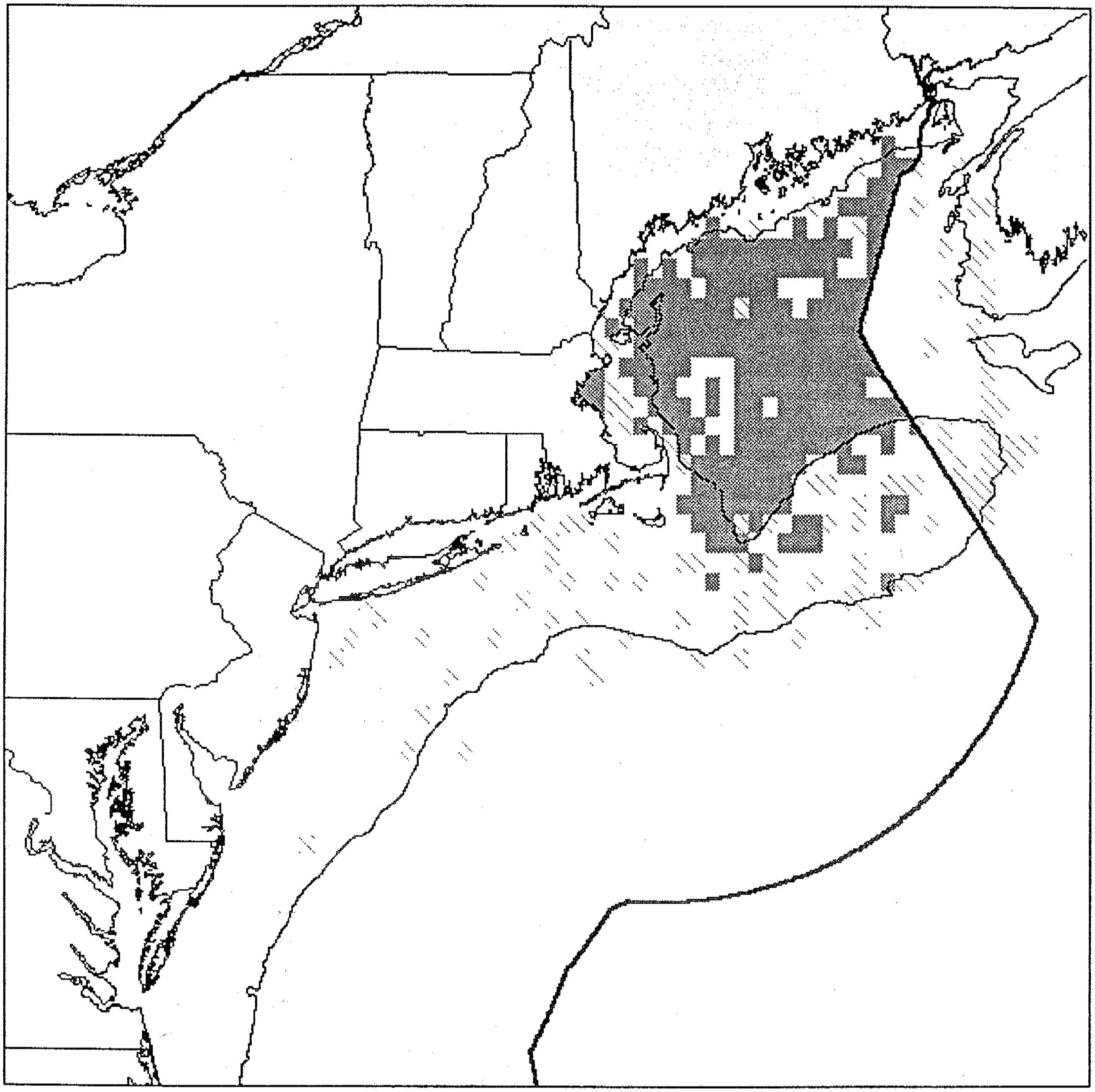


Figure 7.1: The EFH designation for pollock eggs is based upon alternative 3 for pollock adults. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting pollock eggs at the "common" or "abundant" level. The observed distribution of pollock eggs is very patchy and widely dispersed and does not match up with distributions of juveniles or adults, thus the distribution of adults was used as a proxy. This alternative was selected as it appears to best identify that portion of the range of pollock most important to all life history stages. The light shading represents the entire observed range of pollock eggs.

Essential Fish Habitat Description
Red hake (*Urophycis chuss*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined red hake is currently overfished. This determination is based on an assessment of stock size. Essential Fish Habitat for red hake is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 8.1 - 8.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 8.1. Generally, the following conditions exist where hake eggs are found: sea surface temperatures below 10° C along the inner continental shelf with a salinity less than 25‰. Hake eggs are most often observed during the months from May - November, with peaks in June and July.

Larvae: Surface waters of Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 8.2. Generally, the following conditions exist where red hake larvae are found: sea surface temperatures below 19° C, water depths less than 200 meters, and a salinity greater than 0.5‰. Red hake larvae are most often observed from May through December, with peaks in September - October.

Juveniles: Bottom habitats with a substrate of shell fragments, including areas with an abundance of live scallops, in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 8.3. Generally, the following conditions exist where red hake juveniles are found: water temperatures below 16° C, depths less than 100 meters and a salinity range from 31 - 33‰.

Adults: Bottom habitats in depressions with a substrate of sand and mud in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 8.4. Generally, the following conditions exist where red hake adults are found: water temperatures below 12° C, depths from 10 - 130 meters, and a salinity range from 33 - 34‰ .

Spawning Adults: Bottom habitats in depressions with a substrate of sand and mud in the Gulf of Maine, the southern edge of Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 8.4. Generally, the following conditions exist where spawning red hake adults are found: water temperatures below 10° C, water depths less than 100 meters and salinity less than 25‰. Red hake are most often observed spawning during the months from May - November, with peaks in June and July.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Red hake (*Urophycis chuss*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay			m,s	m,s	
Englishman/Machias Bay			s	s	
Narraguagus Bay			s	s	
Blue Hill Bay			s	s	
Penobscot Bay			m,s	m,s	
Muscongus Bay			m,s	m,s	
Damariscotta River			m,s	s	
Sheepscot River		s	m,s	m,s	s
Kennebec / Androscoggin Rivers			m,s	m,s	
Casco Bay			s	s	
Saco Bay			s	s	
Wells Harbor					
Great Bay			s	s	
Merrimack River					
Massachusetts Bay		s	s	s	s
Boston Harbor		s	s	s	
Cape Cod Bay		s	m,s	m,s	s
Waquoit Bay					
Buzzards Bay		s	m,s	m,s	s
Narragansett Bay		s	s	s	s
Long Island Sound			m,s	m,s	
Connecticut River			m	m	
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay		m,s	m,s	m,s	
Barnegat Bay					
Delaware Bay				s	
Chincoteague Bay					
Chesapeake Bay			s	s	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Red hake (*Urophycis chuss*) Eggs

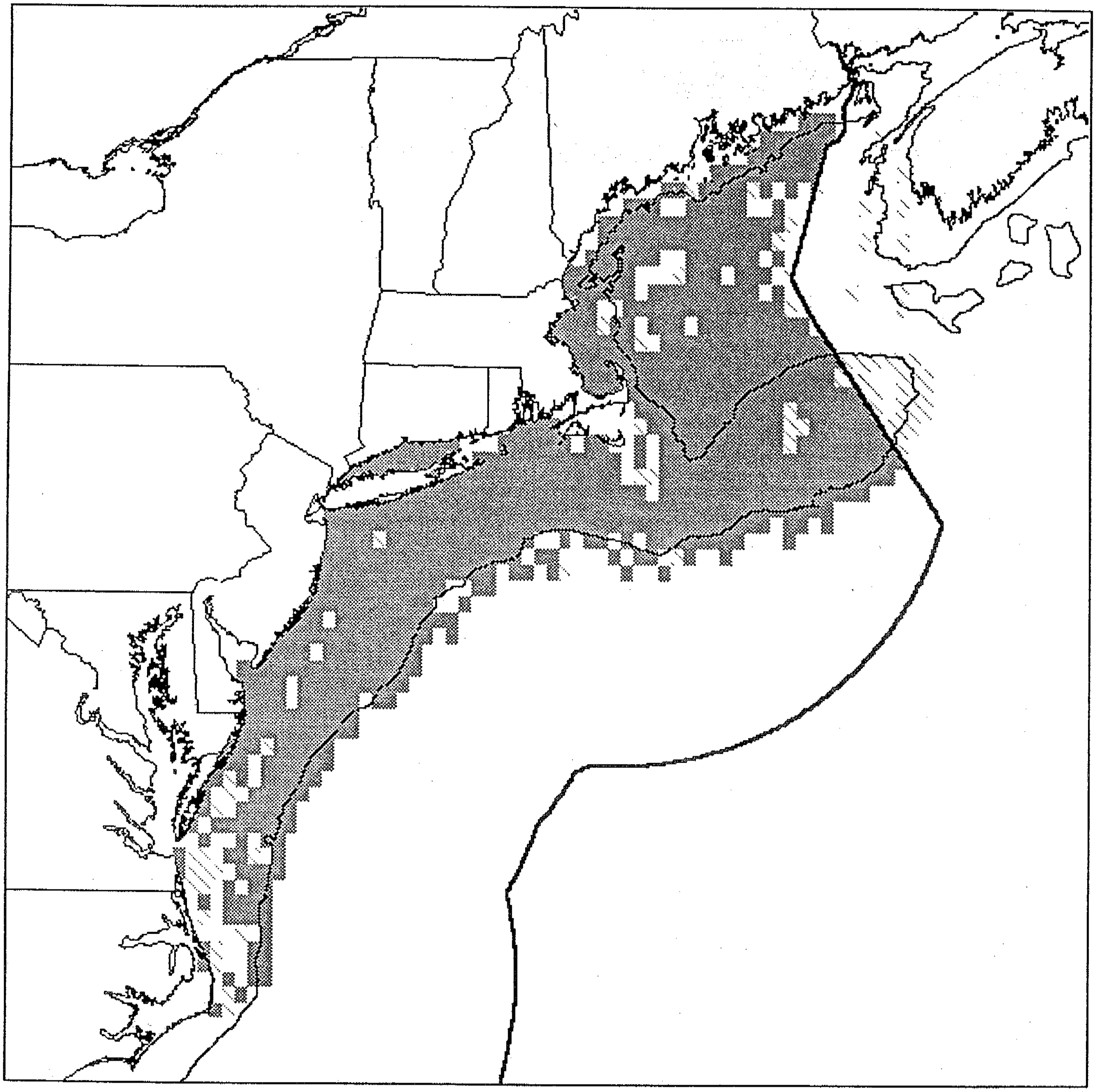


Figure 8.1: The EFH designation for red hake eggs is based upon alternative 3 for red hake juveniles in combination with alternative 3 for hake (*Urophycis* spp.) eggs. The observed distribution of hake eggs was not unique to red hake and did not reflect the portion of the population in the Gulf of Maine, so the combination of juveniles and eggs was used as a proxy to identify those areas important to red hake eggs. These alternatives were selected to cover the areas most important to red hake development. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting red hake eggs at a "common" or "abundant" level. The light shading represents the entire observed range of hake eggs.

Essential Fish Habitat
Red hake (*Urophycis chuss*) Larvae

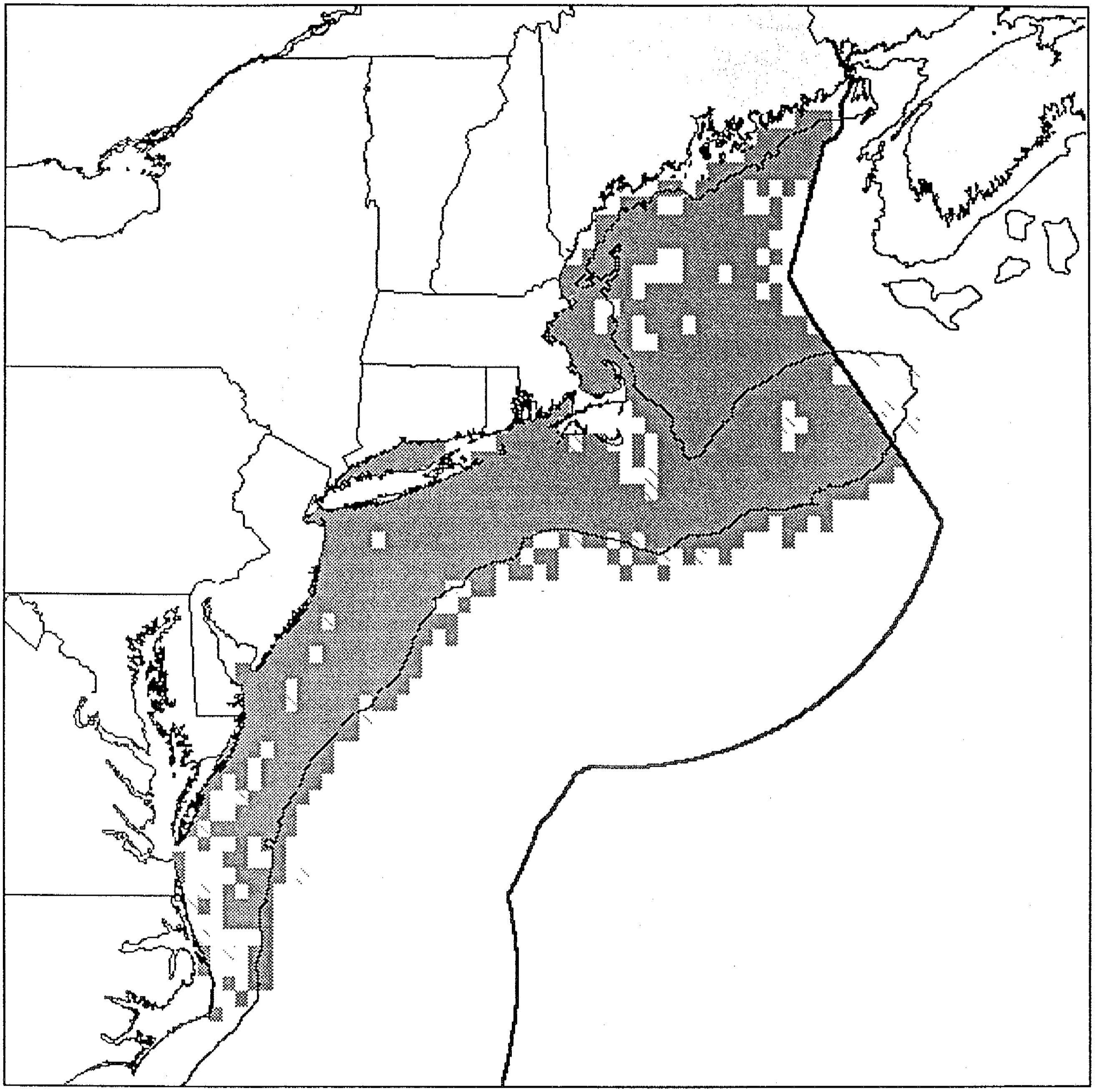


Figure 8.2: The EFH designation for red hake larvae is based upon alternative 3 for red hake juveniles in combination with alternative 3 for hake (*Urophycis* spp.) eggs. The observed distribution of red hake larvae was patchy and sparse, so the combination of juveniles and eggs was used as a proxy to identify those areas important to red hake larvae. These alternatives were selected to cover the areas most important to red hake development. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting red hake larvae at a "common" or "abundant" level. The light shading represents the entire observed range of hake larvae.

Essential Fish Habitat
Red hake (*Urophycis chuss*) Juveniles

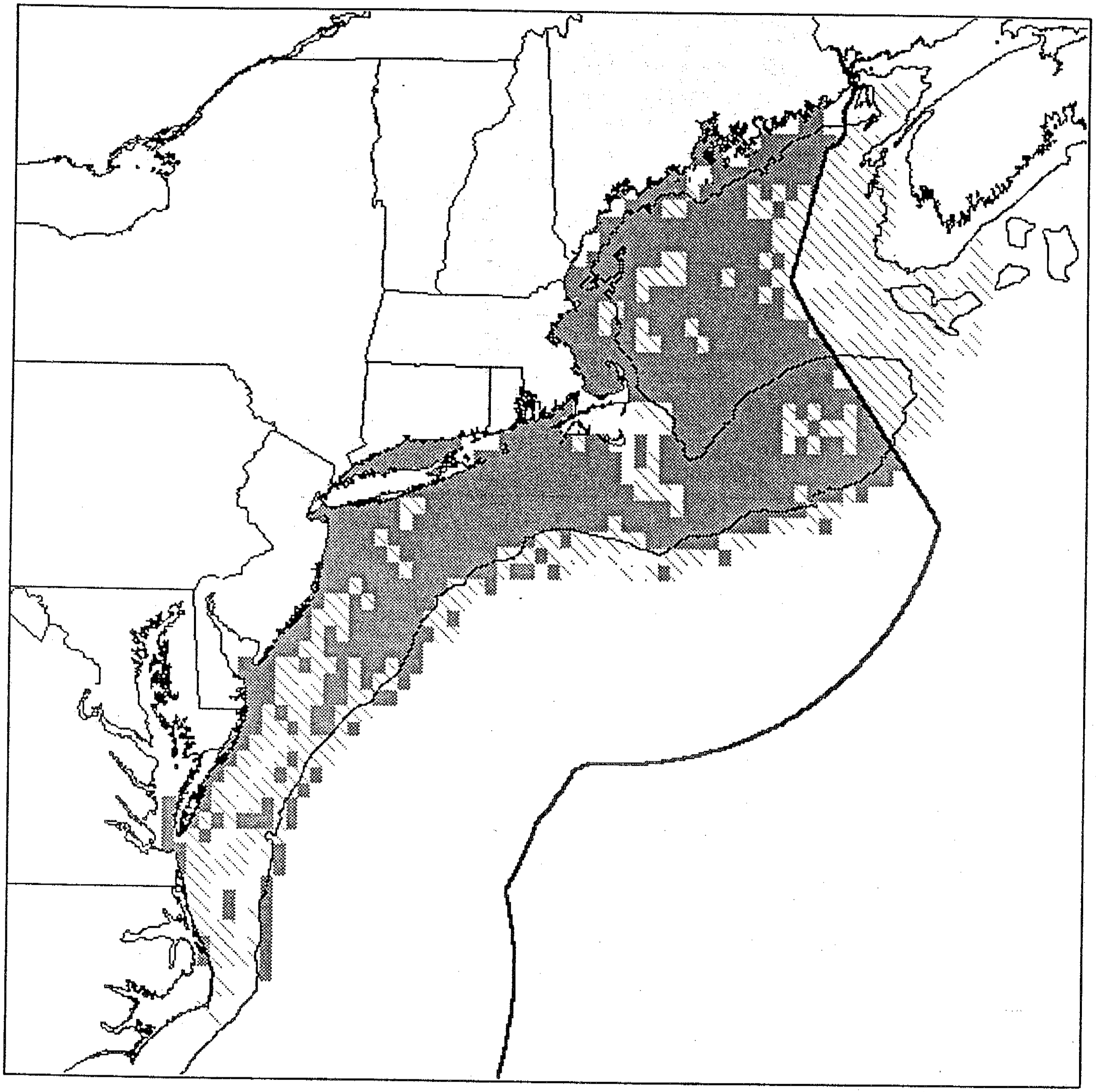


Figure 8.3: The EFH designation for juvenile red hake is based upon alternative 3 for juvenile red hake. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting juvenile red hake at a "common" or "abundant" level. This alternative was selected to be inclusive of most areas where red hake occur in relatively high concentrations. The light shading represents the entire observed range of juvenile red hake.

Essential Fish Habitat
Red hake (*Urophycis chuss*) Adults

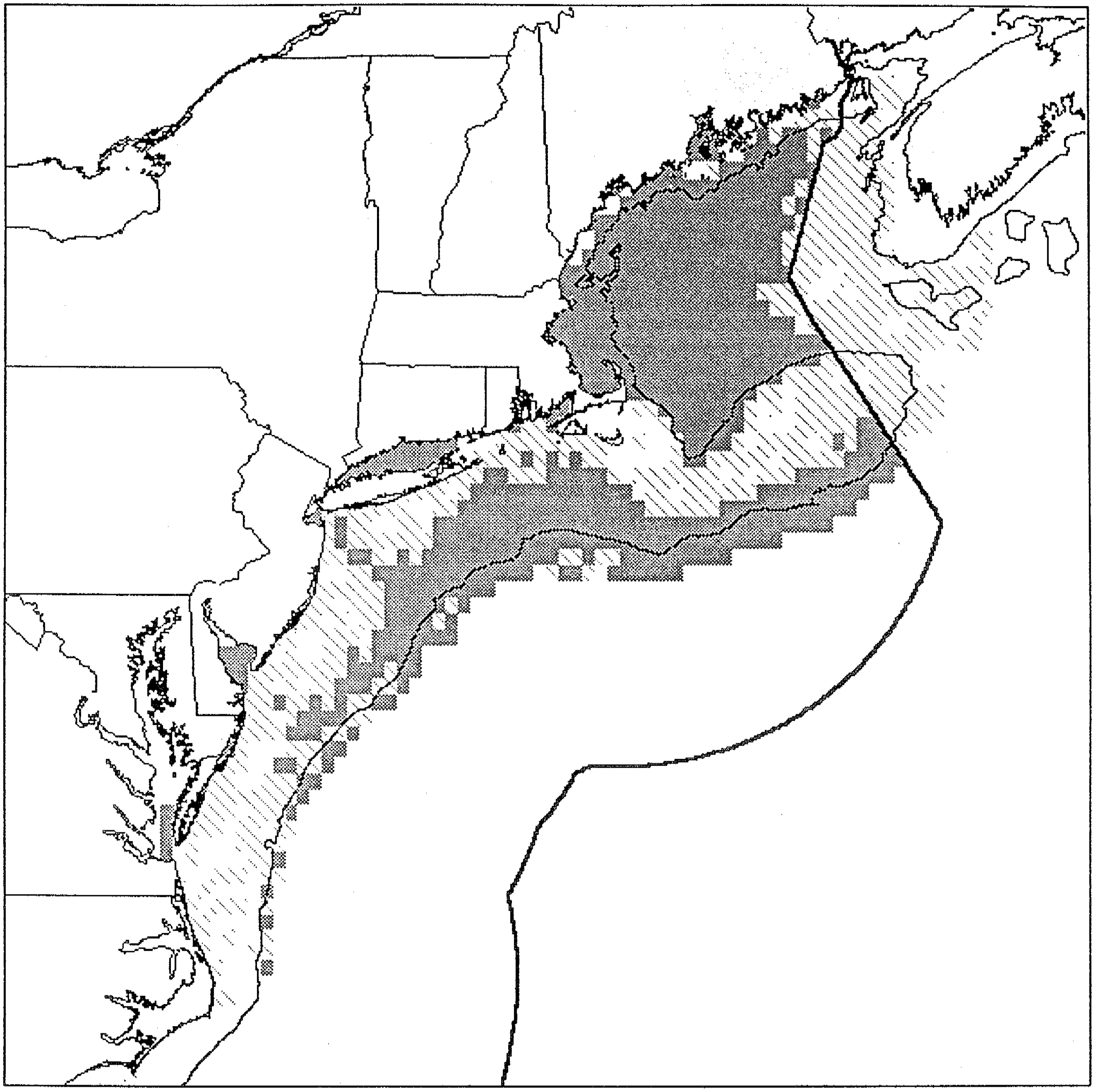


Figure 8.4: The EFH designation for adult red hake is based upon alternative 3 for adult red hake. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting adult red hake at a "common" or "abundant" level. This alternative was selected to be inclusive of most areas where red hake occur in relatively high concentrations. The light shading represents the entire observed range of adult red hake.

Essential Fish Habitat Description
Redfish (*Sebastes* spp.)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined redfish is neither currently overfished nor approaching an overfished condition. This determination is based on the fishing mortality rate. The identification and description of EFH for redfish includes two species, *Sebastes faciatus* and *S. mentella*. Essential Fish Habitat for redfish is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 9.1 - 9.3 and meet the following conditions:

Eggs: Redfish are ovoviviparous. Redfish eggs are fertilized internally and develop into larvae within the oviduct. Therefore, there is no essential fish habitat identification or description for this life history stage.

Larvae: Pelagic waters in the Gulf of Maine and southern Georges Bank as depicted in Figure 9.1. Generally, the following conditions exist where redfish larvae are found: sea surface temperatures below 15° C and water depths between 50 and 270 meters. Redfish larvae are most often observed from March through October, with a peak in August.

Juveniles: Bottom habitats with a substrate of silt, mud or hard bottom in the Gulf of Maine and on the southern edge of Georges Bank as depicted in Figure 9.2. Generally, the following conditions exist where redfish juveniles are found: water temperatures below 13° C, depths from 25 - 400 meters, and a salinity range from 31 - 34‰.

Adults: Bottom habitats with a substrate of silt, mud or hard bottom in the Gulf of Maine and on the southern edge of Georges Bank as depicted in Figure 9.3. Generally, the following conditions exist where redfish adults are found: water temperatures below 13° C, depths from 50 - 350 meters, and a salinity range from 31 - 34‰.

Spawning Adults: Bottom habitats with a substrate of silt, mud or hard bottom in the Gulf of Maine and on the southern edge of Georges Bank as depicted in Figure 9.3. Generally, the following conditions exist where redfish adults are found: water temperatures below 13° C, depths from 50 - 350 meters, and a salinity range from 31 - 34‰. Redfish females are most often observed spawning (larvae) during the months from April through August.

The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

Essential Fish Habitat
Redfish (*Sebastes* spp.) Larvae

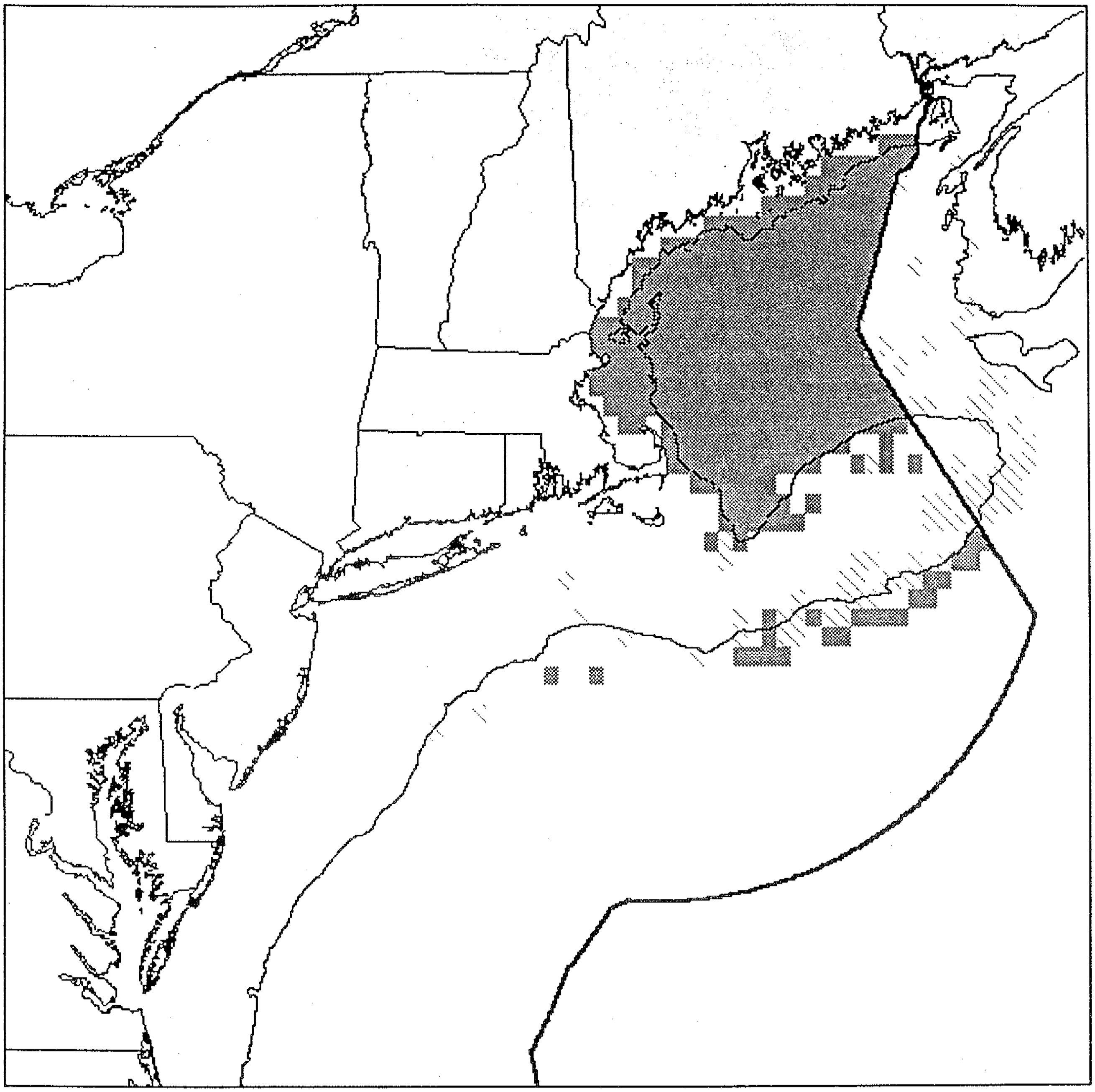


Figure 9.1: The EFH designation for redfish larvae is based upon alternative 4 for redfish adults. The larvae distribution was very patchy and does not point to areas of relatively high concentrations, so the adult distribution serves as a proxy to identify those areas where redfish larvae are most likely to be. This alternative was selected in order to include important areas in the historical range of redfish on the southeastern portion of Georges Bank, as well as to reflect that the entire Gulf of Maine is important redfish habitat. The light shading represents the entire observed range of redfish larvae.

Essential Fish Habitat
Redfish (*Sebastes* spp.) Juveniles

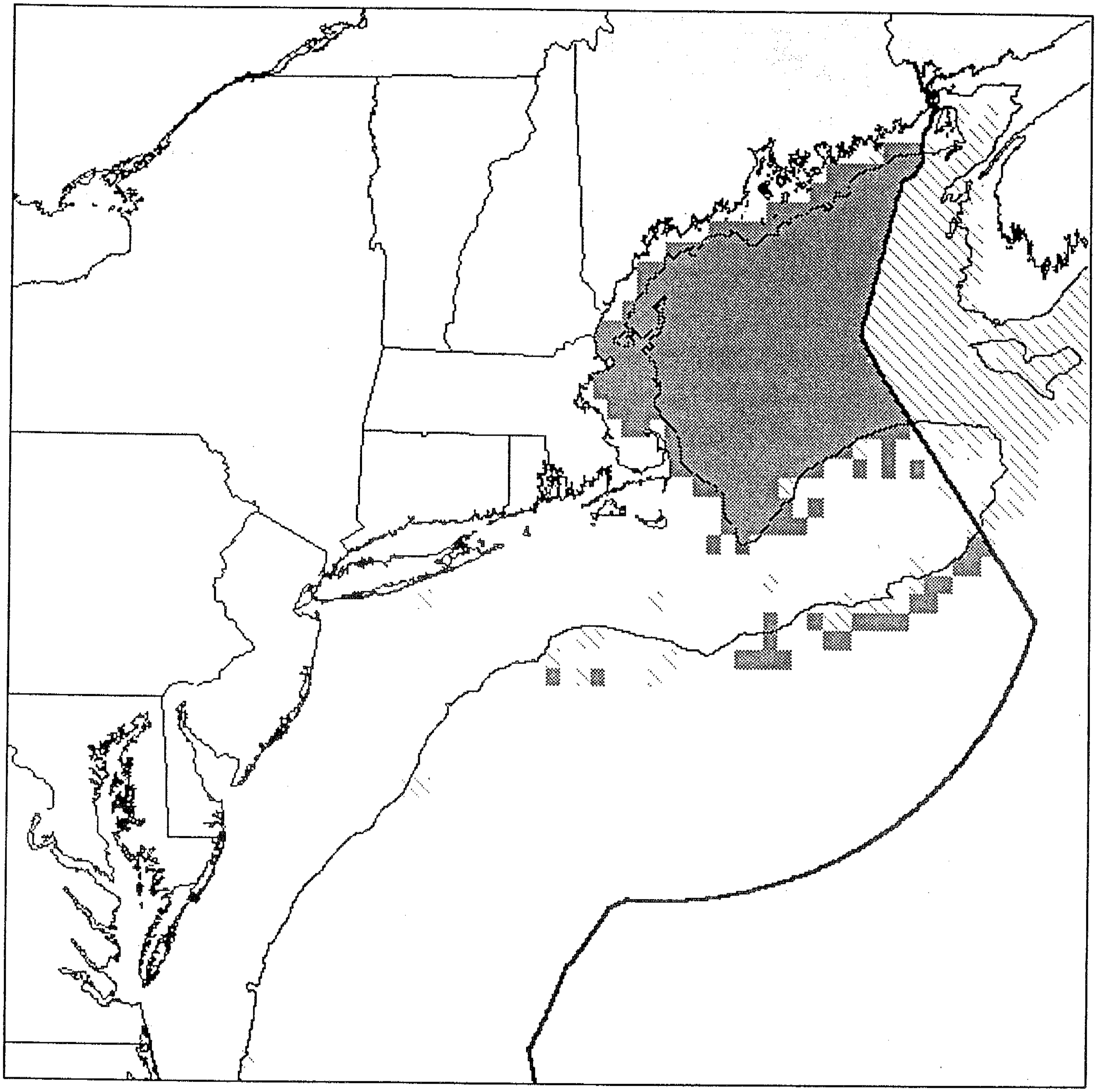


Figure 9.2: The EFH designation for juvenile redfish is based upon alternative 4 for redfish adults. This alternative was selected in order to include important areas in the historical range of redfish on the southeastern portion of Georges Bank, as well as to reflect that the entire Gulf of Maine is important redfish habitat. This species is very long lived and has tight habitat associations that are important to several life history stages, especially juveniles. The Council chose to be as conservative as possible in the EFH designation. The light shading represents the entire observed range of juvenile redfish.

Essential Fish Habitat
Redfish (*Sebastes* spp.) Adults

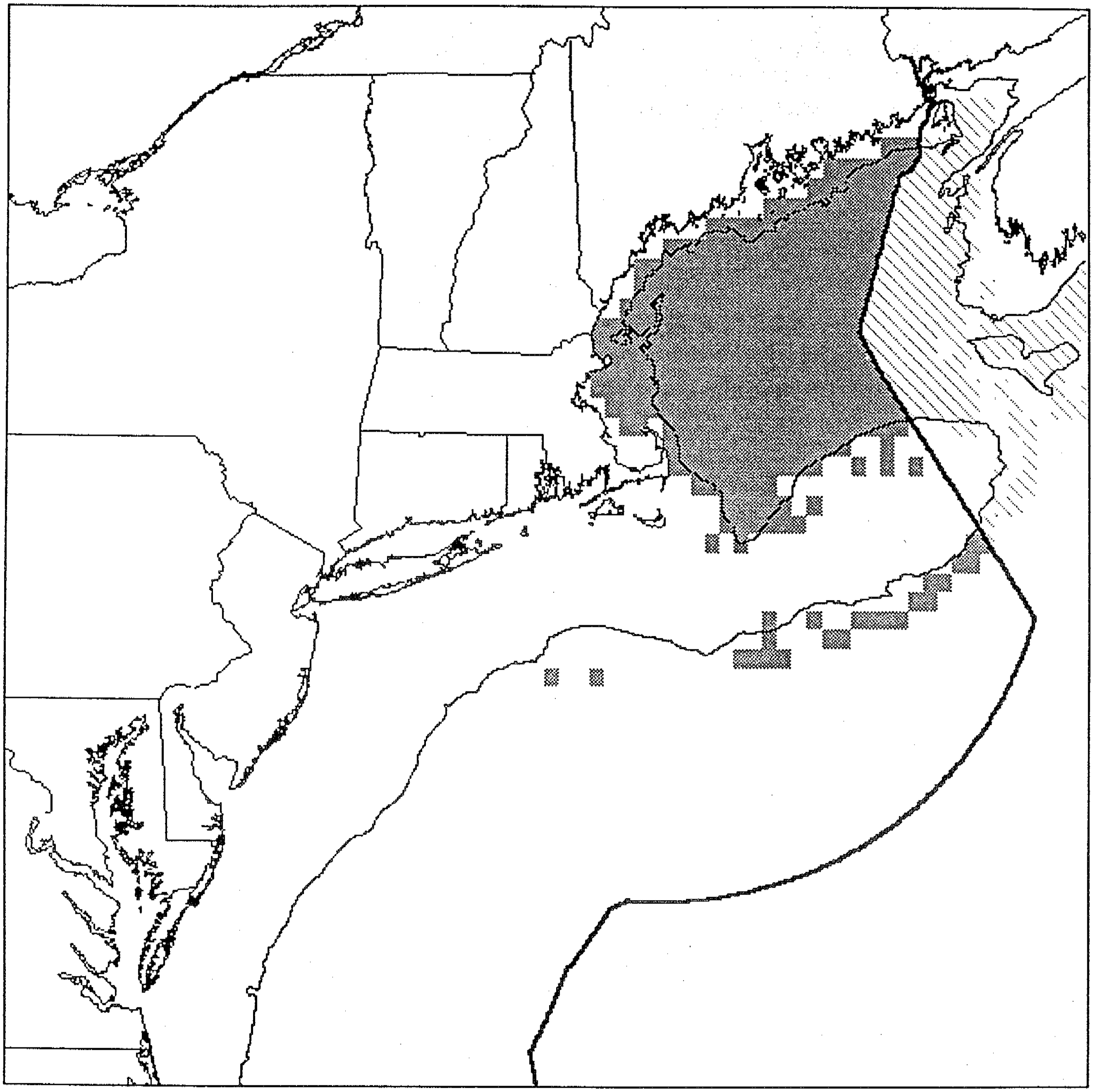


Figure 9.3: The EFH designation for adult redfish is based upon alternative 4 for redfish adults. This alternative was selected in order to include important areas in the historical range of redfish on the southeastern portion of Georges Bank, as well as to reflect that the entire Gulf of Maine is important redfish habitat. This species is very long lived and has tight habitat associations that are important to several life history stages. The Council chose to be as conservative as possible in the EFH designation. The light shading represents the entire observed range of adult redfish.

Essential Fish Habitat Description
White hake (*Urophycis tenuis*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined white hake is not currently overfished, but it is approaching an overfished condition. This determination is based on an assessment of stock level. Essential Fish Habitat for white hake is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 12.1 - 12.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters of the Gulf of Maine, Georges Bank, and southern New England as depicted in Figure 12.1. White hake eggs are most often observed in August and September.

Larvae: Pelagic waters of the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic as depicted in Figure 12.2. White hake larvae are most often observed in May in the mid-Atlantic area and August and September in the Gulf of Maine and Georges Bank.

Juveniles: *Pelagic stage* -- Pelagic waters of the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic as depicted in Figure 12.3. White hake juveniles in the pelagic stage are most often observed from May through September. *Demersal stage* -- Bottom habitats with seagrass beds or a substrate of mud or fine-grained sand in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic as depicted in Figure 12.3. Generally, the following conditions exist where white hake juveniles are found: water temperatures below 19° C and depths from 5 - 225 meters.

Adults: Bottom habitats with a substrate of mud or fine-grained sand in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic as depicted in Figure 12.4. Generally, the following conditions exist where white hake adults are found: water temperatures below 14° C and depths from 5 - 325 meters.

Spawning Adults: Bottom habitats with a substrate of mud or fine-grained sand in deep water in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic as depicted in Figure 12.4. Generally, the following conditions exist where white hake adults are found: water temperatures below 14° C and depths from 5 - 325 meters. White hake are most often observed spawning during the months April - May in the southern portion of their range and August - September in the northern portion of their range.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
White hake (*Urophycis tenuis*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay			m,s	m,s	
Englishman/Machias Bay			m,s	s	
Narraguagus Bay			m,s	s	
Blue Hill Bay			m,s	s	
Penobscot Bay			m,s	s	
Muscongus Bay			m,s	m,s	
Damariscotta River			m,s	m,s	
Sheepscot River			m,s	m,s	
Kennebec / Androscoggin Rivers			m,s	m,s	
Casco Bay			m,s	m,s	
Saco Bay			m,s	m,s	
Wells Harbor			m,s	m,s	
Great Bay	s		s	s	
Merrimack River	m				
Massachusetts Bay	s	s	s	s	
Boston Harbor	s	s	s	s	
Cape Cod Bay	s	s	m,s	m,s	
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
White hake (*Urophycis tenuis)* Eggs

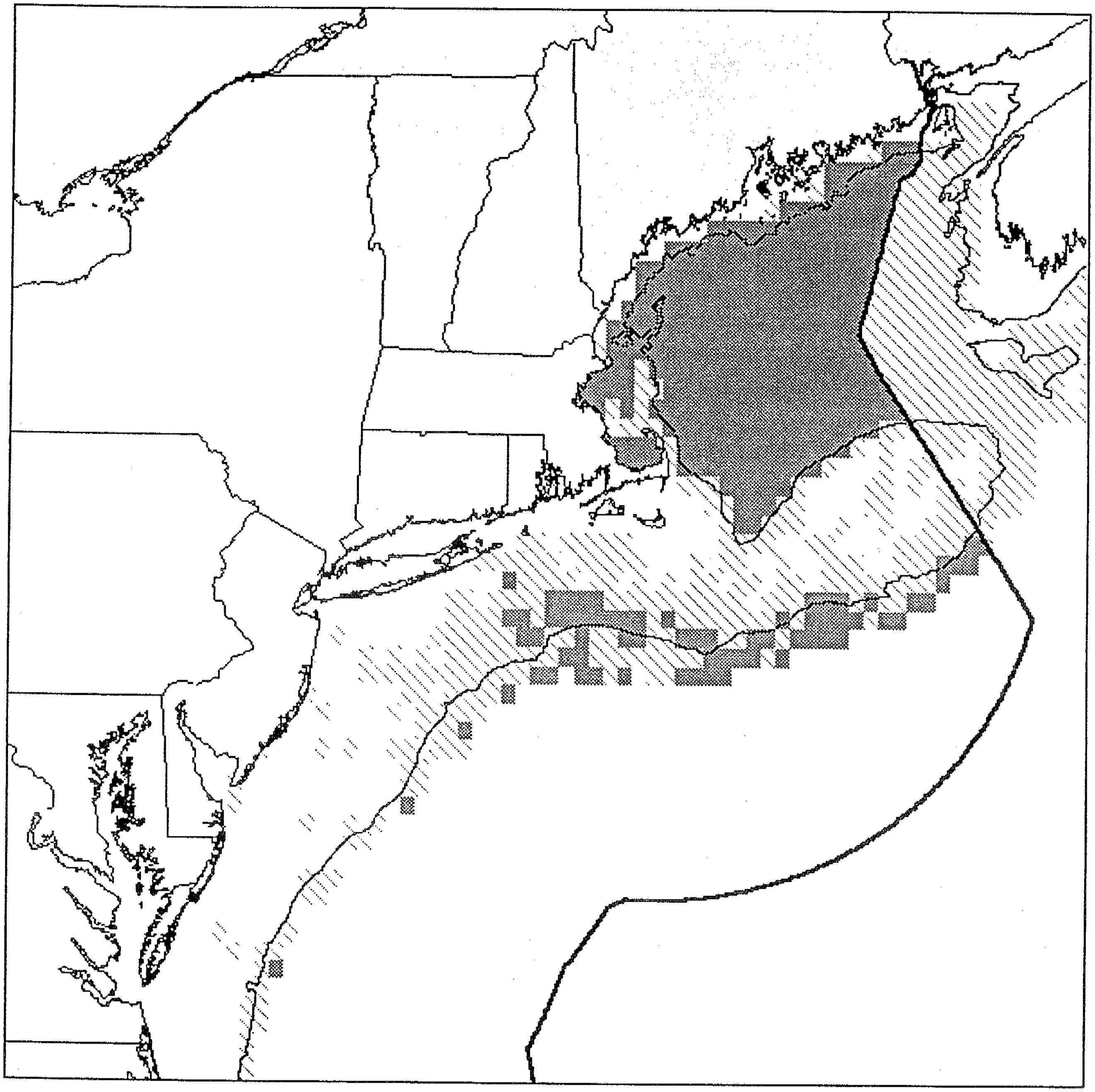


Figure 12.1: The EFH designation for white hake eggs is based upon alternative 3 for white hake adults. There are no data on white hake eggs, so the use of the adult distribution serves as a proxy to identify those areas where white hake eggs are most likely to be. Alternative 3 for adults includes all areas thought to be most important for eggs, including southern Georges Bank. The EFH designation includes those bays and estuaries identified by the NOAA ELMR program as supporting white hake eggs at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (not incorporating southern Georges Bank), or include areas where white hake occur in relatively low concentrations (throughout southern New England and the middle Atlantic). The light shading represents the entire observed range of adult white hake.

Essential Fish Habitat
White hake (*Urophycis tenuis)* Larvae

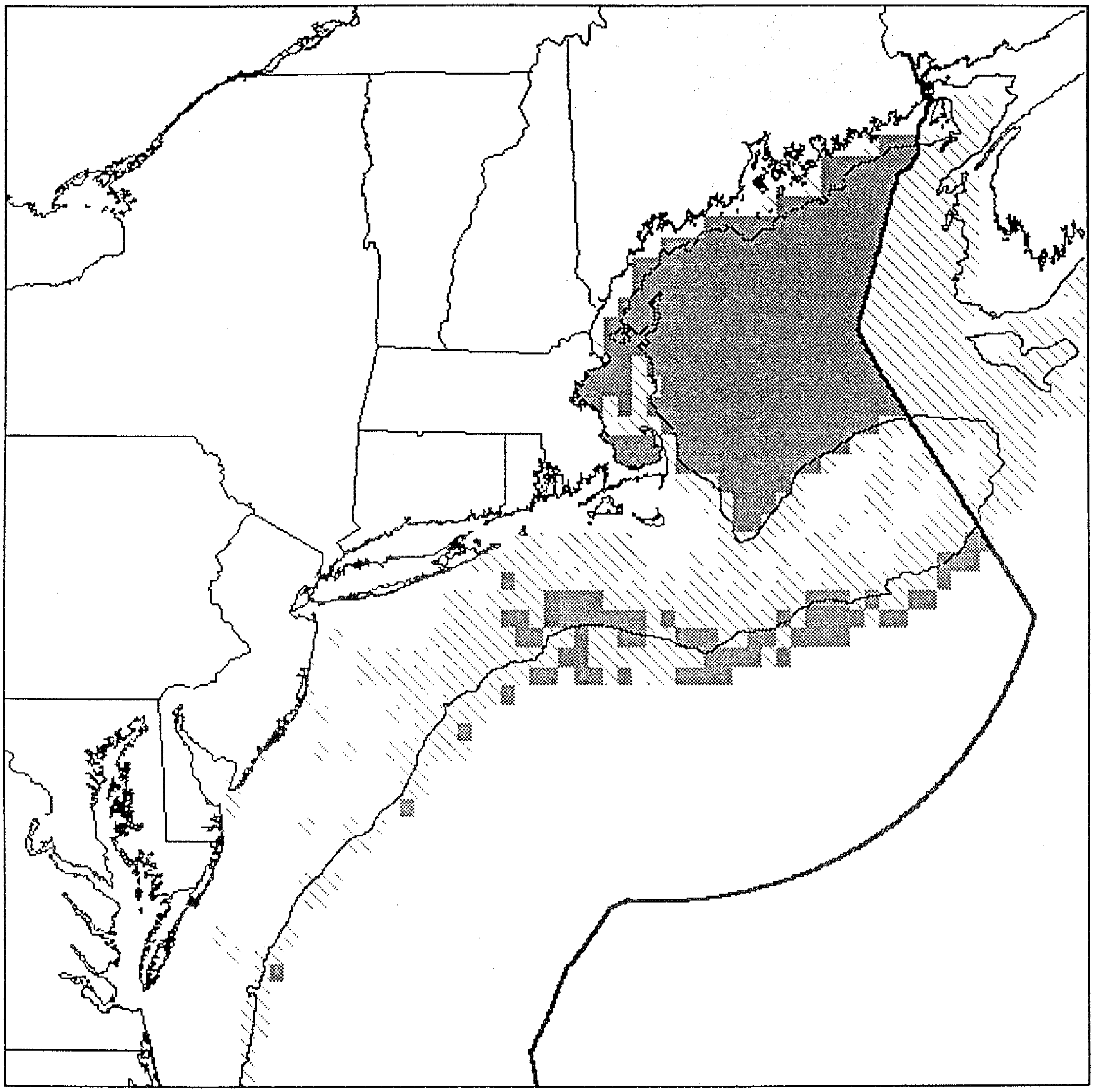


Figure 12.2: The EFH designation for white hake larvae is based upon alternative 3 for white hake adults. There are no data on white hake larvae, so the use of the adult distribution serves as a proxy to identify those areas where white hake larvae are most likely to be. Alternative 3 for adults includes all areas thought to be most important for larvae, including southern Georges Bank. The EFH designation includes those bays and estuaries identified by the NOAA ELMR program as supporting white hake larvae at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (not incorporating southern Georges Bank), or include areas where white hake occur in relatively low concentrations (throughout southern New England and the middle Atlantic). The light shading represents the entire observed range of adult white hake.

Essential Fish Habitat
White hake (*Urophycis tenuis*) Juveniles

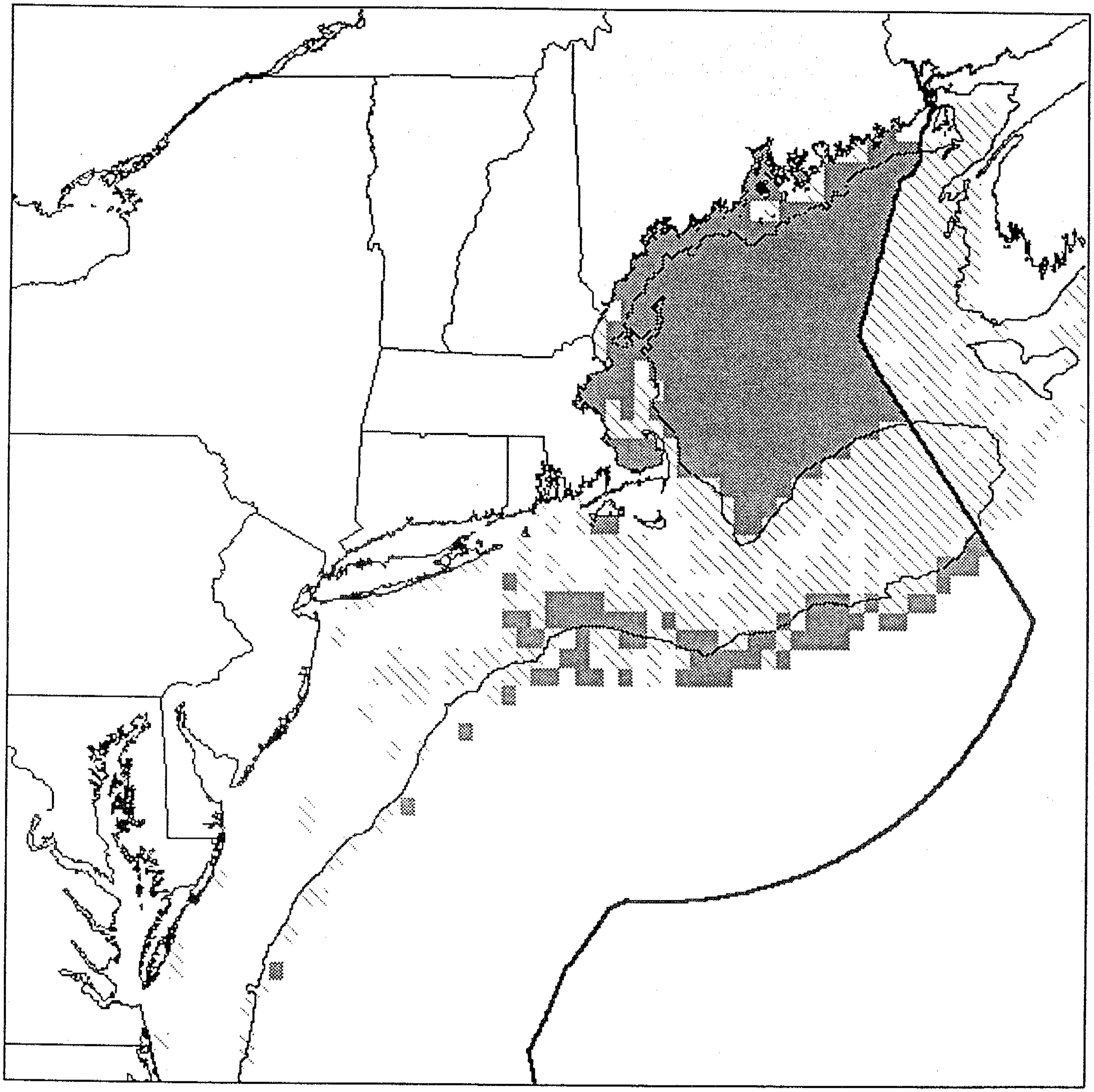


Figure 12.3: The EFH designation for juvenile white hake is based upon alternative 3 for white hake adults. Alternative 3 for adults includes all areas thought to be most important for juveniles, including southern Georges Bank. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for white hake, as well as those bays and estuaries identified by the NOAA ELMR program as supporting juvenile white hake at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (not incorporating southern Georges Bank), or include areas where white hake occur in relatively low concentrations (throughout southern New England and the middle Atlantic). The light shading represents the entire observed range of juvenile white hake.

Essential Fish Habitat
White hake (*Urophycis tenuis*) Adults

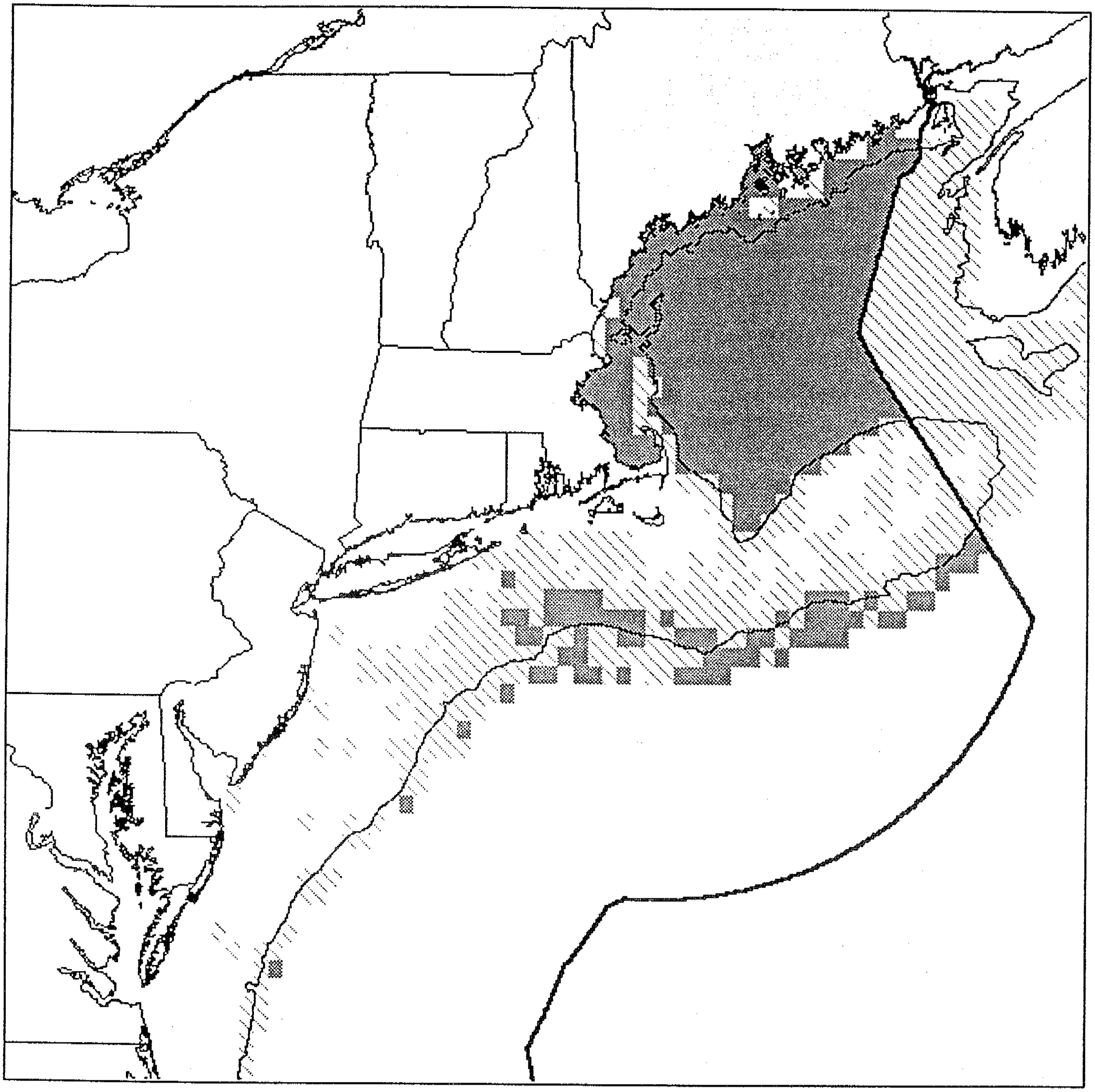


Figure 12.4: The EFH designation for adult white hake is based upon alternative 3 for white hake adults. Alternative 3 includes all areas thought to be most important to white hake, including southern Georges Bank. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for white hake, as well as those bays and estuaries identified by the NOAA ELMR program as supporting white hake at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (not incorporating southern Georges Bank), or include areas where white hake occur in relatively low concentrations (throughout southern New England and the middle Atlantic). The light shading represents the entire observed range of adult white hake.

Essential Fish Habitat Description
Whiting (*Merluccius bilinearis*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined the Southern Georges Bank / Middle Atlantic stock of whiting is considered overfished, based on an assessment of the stock level. The Gulf of Maine / Northern Georges Bank stock of whiting is not considered currently overfished but it is considered to be approaching an overfished condition, also based on the stock level associated with this stock. Essential Fish Habitat for whiting is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 13.1 - 13.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 13.1. Generally, the following conditions exist where most whiting eggs are found: sea surface temperatures below 20° C and water depths between 50 and 150 meters. Whiting eggs are observed all year, with peaks from June through October.

Larvae: Surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 13.2. Generally, the following conditions exist where most whiting larvae are found: sea surface temperatures below 20° C and water depths between 50 and 130 meters. Whiting larvae are observed all year, with peaks from July through September.

Juveniles: Bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 13.3. Generally, the following conditions exist where most whiting juveniles are found: water temperatures below 21° C, depths between 20 and 270 meters and salinities greater than 20‰.

Adults: Bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 13.4. Generally, the following conditions exist where most whiting adults are found: water temperatures below 22° C and depths between 30 and 325 meters.

Spawning Adults: Bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 13.4. Generally, the following conditions exist where most spawning whiting adults are found: water temperatures below 13° C and depths between 30 and 325 meters.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Whiting (*Merluccius bilinearis*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay			m,s	m,s	
Englishman/Machias Bay			m,s	m,s	
Narraguagus Bay			m,s	m,s	
Blue Hill Bay			m,s	m,s	
Penobscot Bay			m,s	m,s	
Muscongus Bay			m,s	m,s	
Damariscotta River			m,s	m,s	
Sheepscot River			m,s	m,s	
Kennebec / Androscoggin Rivers			m,s	m,s	
Casco Bay			m,s	m,s	
Saco Bay					
Wells Harbor					
Great Bay					
Merrimack River	m				
Massachusetts Bay	s	s	s	s	s
Boston Harbor	s	s	m,s	m,s	
Cape Cod Bay	s	s	m,s	m,s	s
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Whiting (*Merluccius bilinearis*) Eggs

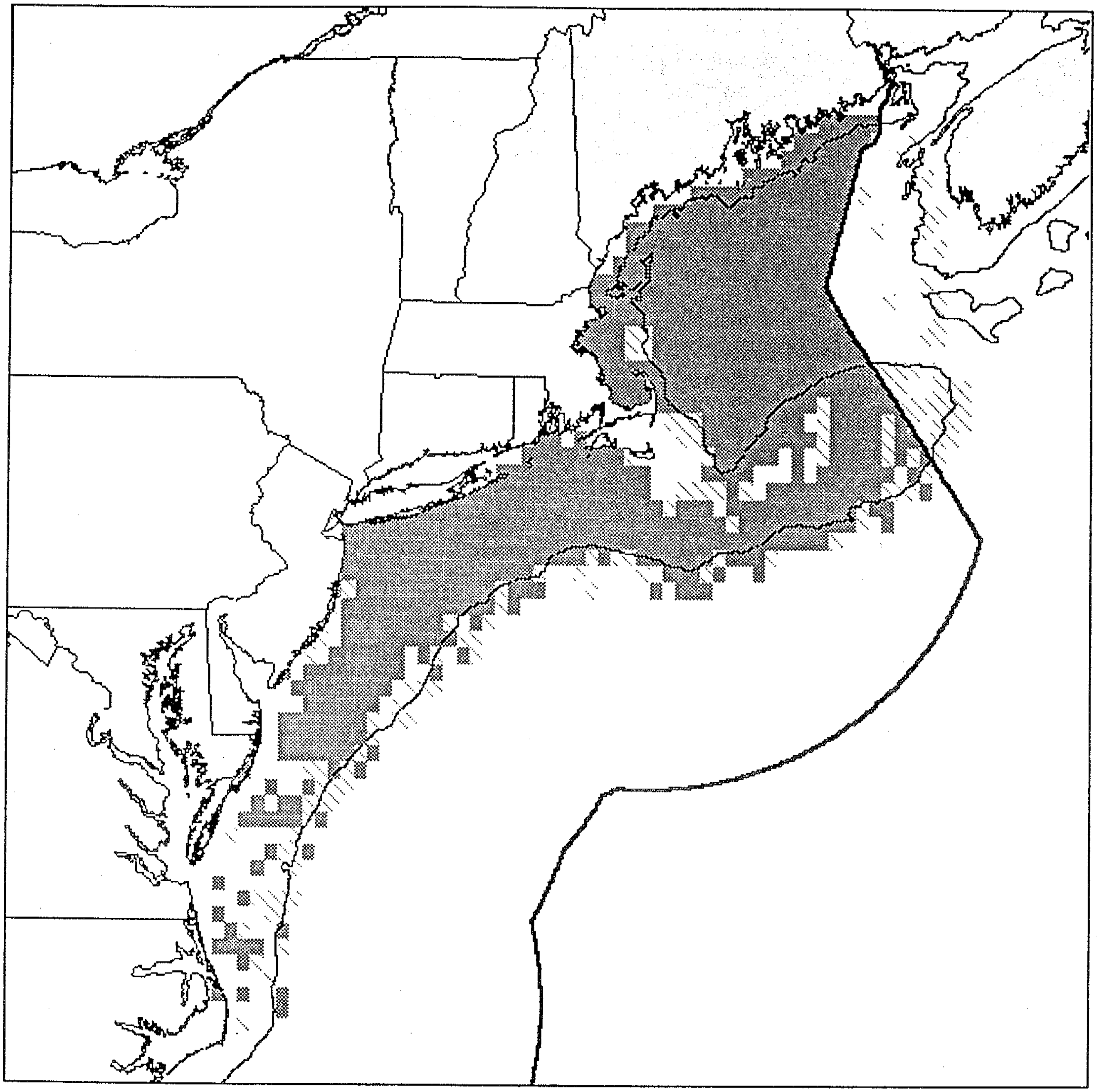


Figure 13.1: The EFH designation for whiting eggs is based upon alternative 3 for whiting juveniles. Whiting spawn in the summer months in the Gulf of Maine, but there has been very limited MARMAP sampling during this period. This is thought to explain why there have been few eggs observed in the Gulf of Maine despite the high concentrations of juveniles and adults. The use of the juvenile distribution serves as a proxy to identify those areas where whiting eggs are most likely to be. The EFH designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting whiting eggs at the "common" or "abundant" level. The light shading represents the entire observed range of whiting eggs.

Essential Fish Habitat
Whiting (*Merluccius bilinearis*) Larvae

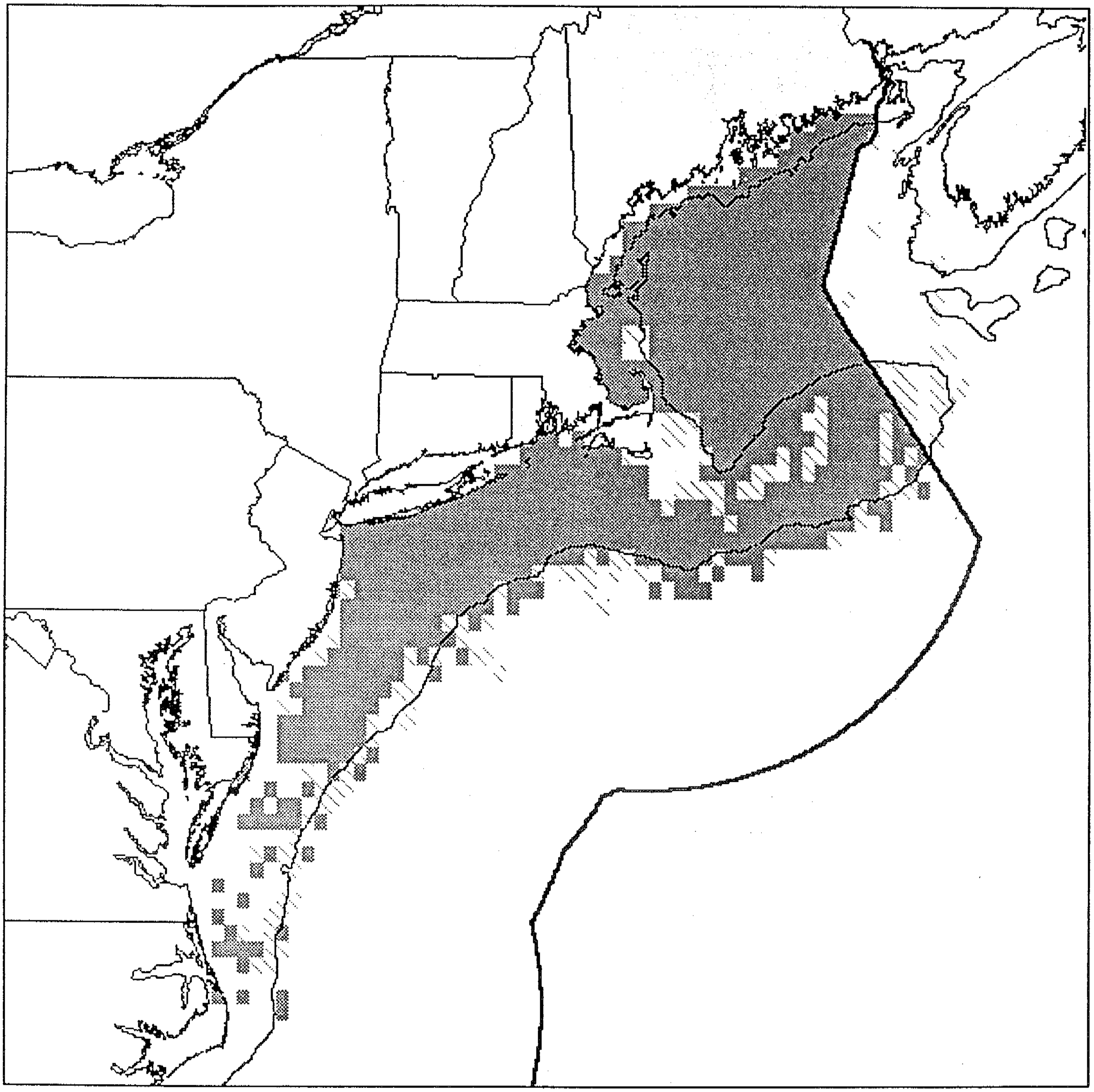


Figure 13.2: The EFH designation for whiting larvae is based upon alternative 3 for whiting juveniles. Whiting spawn in the summer months in the Gulf of Maine, but there has been very limited MARMAP sampling during this period. This is thought to explain why there have been very few larvae observed in the Gulf of Maine despite the high concentrations of juveniles and adults. The use of the juvenile distribution serves as a proxy to identify those areas where whiting larvae are most likely to be. The EFH designations also include those bays and estuaries identified by the NOAA ELMR program as supporting whiting larvae at the "common" or "abundant" level. The light shading represents the entire observed range of whiting larvae.

Essential Fish Habitat
Whiting (*Merluccius bilinearis*) Juveniles

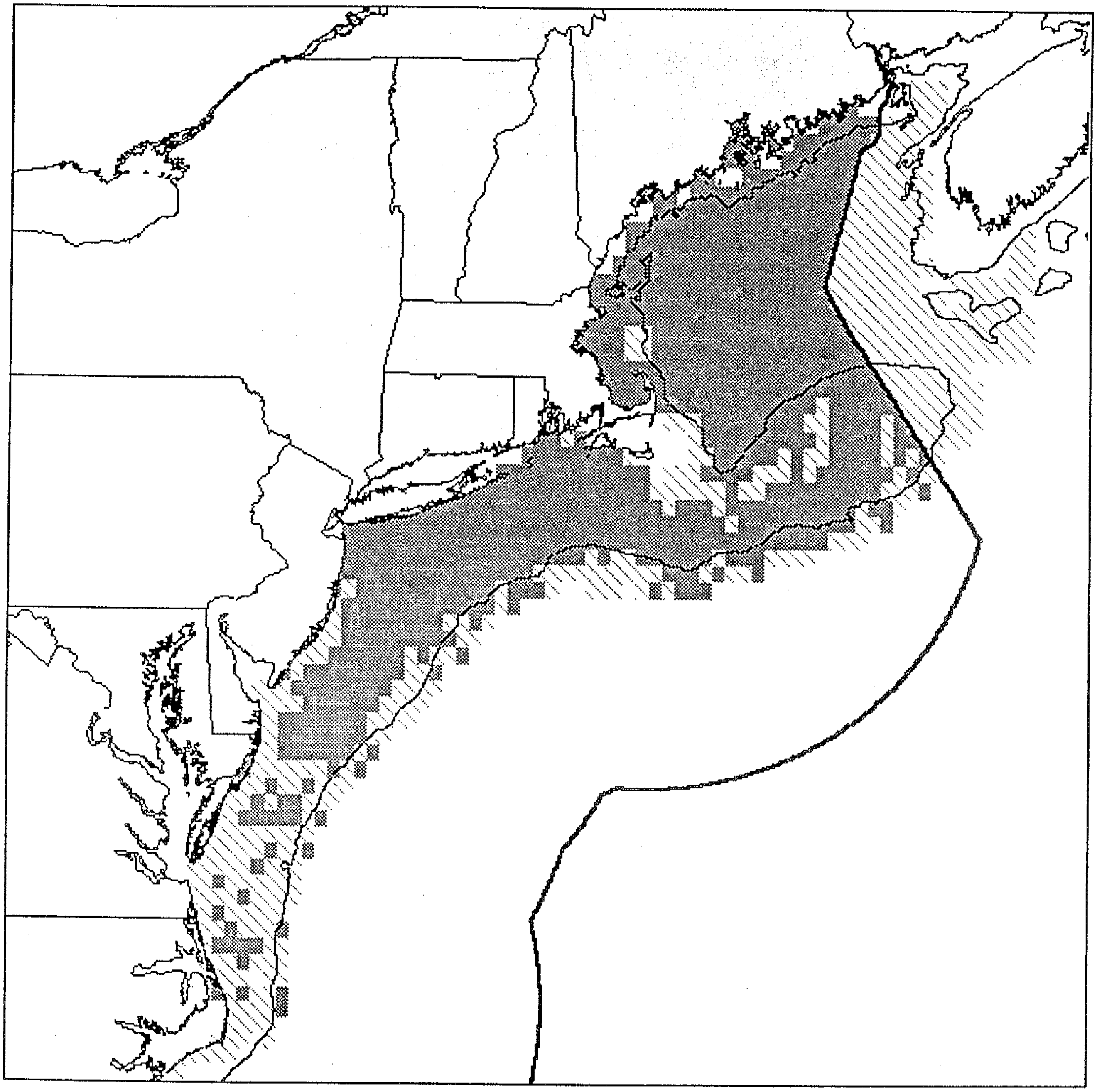


Figure 13.3: The EFH designation for juvenile whiting is based upon alternative 3 for whiting juveniles. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for whiting, as well as those bays and estuaries identified by the NOAA ELMR program as supporting juvenile whiting at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where whiting occur in relatively low concentrations. The light shading represents the entire observed range of juvenile whiting.

Essential Fish Habitat
Whiting (*Merluccius bilinearis*) Adults

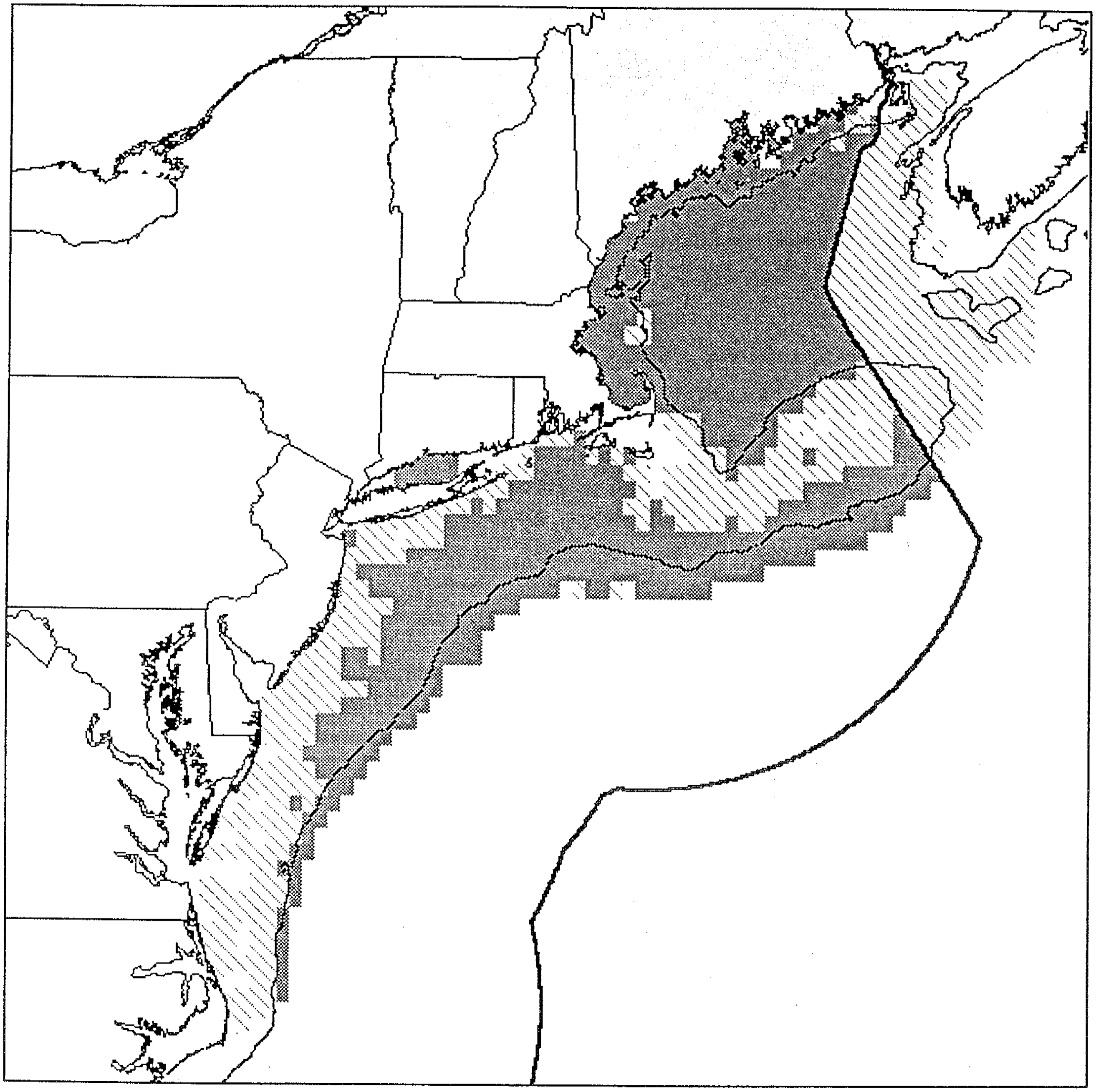


Figure 13.4: The EFH designation for adult whiting is based upon alternative 3 for whiting adults. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for whiting, as well as those bays and estuaries identified by the NOAA ELMR program as supporting adult whiting at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where whiting occur in relatively low concentrations. The light shading represents the entire observed range of adult whiting.

Essential Fish Habitat Description
Windowpane flounder (*Scophthalmus aquosus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined windowpane flounder is currently overfished. This determination is based on an assessment of stock level. Essential Fish Habitat for windowpane flounder is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 14.1 - 14.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 14.1. Generally, the following conditions exist where windowpane flounder eggs are found: sea surface temperatures less than 20° C and water depths less than 70 meters. Windowpane flounder eggs are often observed from February to November with peaks in May and October in the middle Atlantic and July - August on Georges Bank.

Larvae: Pelagic waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 14.2. Generally, the following conditions exist where windowpane flounder larvae are found: sea surface temperatures less than 20° C and water depths less than 70 meters. Windowpane flounder larvae are often observed from February to November with peaks in May and October in the middle Atlantic and July through August on Georges Bank.

Juveniles: Bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 14.3. Generally, the following conditions exist where windowpane flounder juveniles are found: water temperatures below 25° C, depths from 1 - 100 meters, and salinities between 5.5 - 36‰.

Adults: Bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border as depicted in Figure 14.4. Generally, the following conditions exist where windowpane flounder adults are found: water temperatures below 26.8° C, depths from 1 - 75 meters, and salinities between 5.5 - 36‰.

Spawning Adults: Bottom habitats with a substrate of mud or fine-grained sand in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to the Virginia-North Carolina border as depicted in Figure 14.4. Generally, the following conditions exist where windowpane flounder adults are found: water temperatures below 21° C, depths from 1 - 75 meters, and salinities between 5.5 - 36‰. Windowpane flounder are most often observed spawning during the months February - December with a peak in May in the middle Atlantic.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Windowpane flounder (*Scophthalmus aquosus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay	m,s	m,s	m,s	m,s	m,s
Englishman/Machias Bay	m,s	m,s	m,s	m,s	m,s
Narraguagus Bay	m,s	m,s	m,s	m,s	m,s
Blue Hill Bay	m,s	m,s	m,s	m,s	m,s
Penobscot Bay	m,s	m,s	m,s	m,s	m,s
Muscongus Bay	m,s	m,s	m,s	m,s	m,s
Damariscotta River	m,s	m,s	m,s	m,s	m,s
Sheepscot River	m,s	m,s	m,s	m,s	m,s
Kennebec / Androscoggin Rivers	m,s	m,s	m,s	m,s	m,s
Casco Bay	m,s	m,s	m,s	m,s	m,s
Saco Bay	m,s	m,s	m,s	m,s	m,s
Wells Harbor	m,s	m,s	m,s	m,s	m,s
Great Bay	s	s	s	s	s
Merrimack River					
Massachusetts Bay	s	s	s	s	s
Boston Harbor	m,s	m,s	m,s	m,s	m,s
Cape Cod Bay	m,s	m,s	m,s	m,s	m,s
Waquoit Bay	m,s	m,s	m,s	m,s	m,s
Buzzards Bay	m,s	m,s	m,s	m,s	m,s
Narragansett Bay	m,s	m,s	m,s	m,s	m,s
Long Island Sound	m,s	m,s	m,s	m,s	m,s
Connecticut River	m	m	m	m	m
Gardiners Bay	m,s	m,s	m,s	m,s	m,s
Great South Bay	m,s	m,s	m,s	m,s	m,s
Hudson River / Raritan Bay	s	m,s	m,s	m,s	s
Barnegat Bay	m,s	m,s	m,s	m,s	m,s
New Jersey Inland Bays	m,s	m,s	m,s	m,s	m,s
Delaware Bay	m,s	m,s	m,s	m,s	m,s
Delaware Inland Bays	m,s	m,s	m,s	m,s	m,s
Chincoteague Bay			s	s	
Chesapeake Bay			m,s	m,s	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Windowpane flounder (*Scophthalmus aquosus*) Eggs

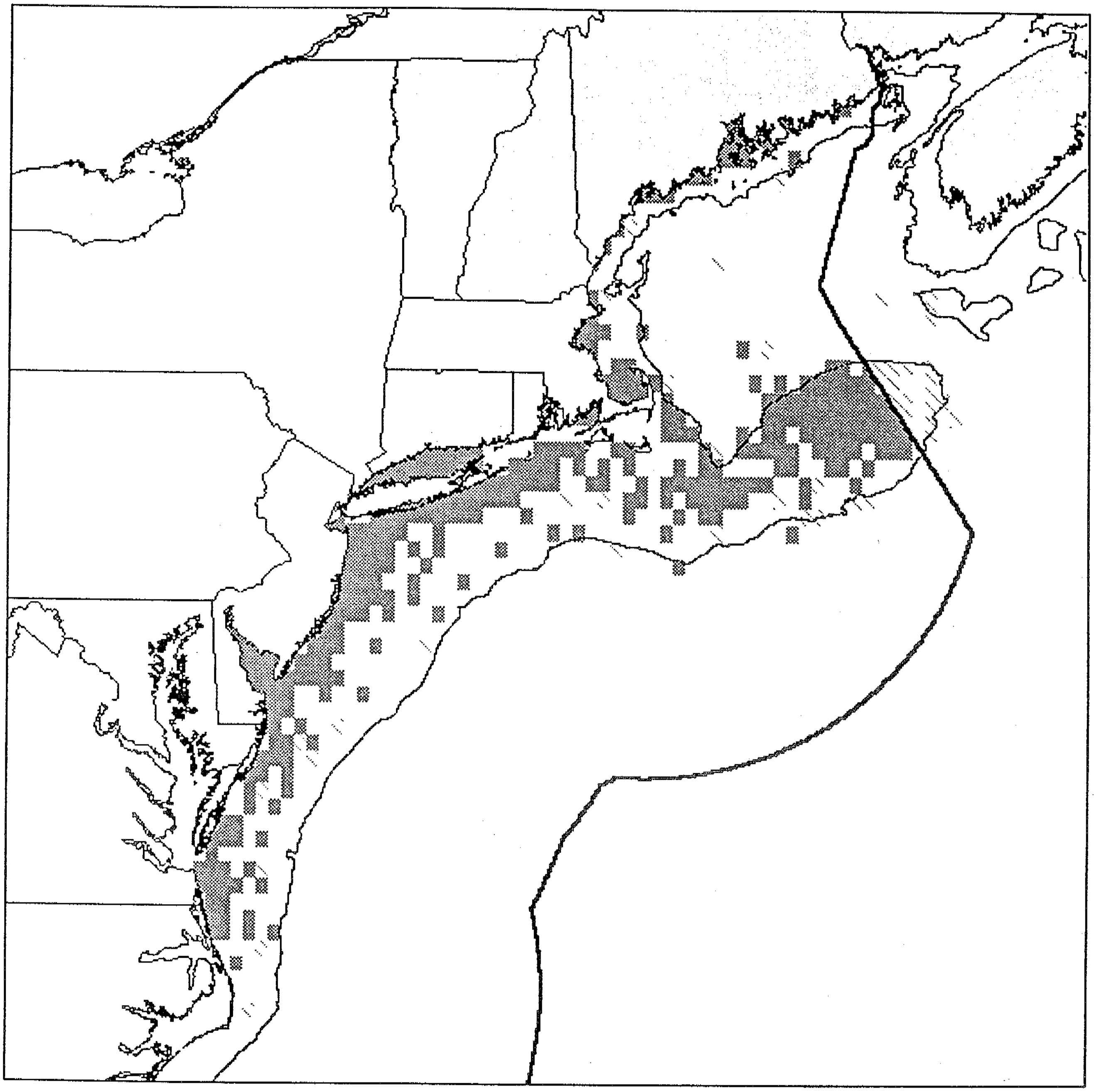


Figure 14.1: The EFH designation for windowpane flounder eggs is based upon alternative 3 for windowpane flounder eggs. The EFH designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting windowpane flounder eggs at the "common" or "abundant" level. This alternative was selected to be as inclusive as possible, given the generally patchy nature of egg distribution, while not including areas with relatively very low concentrations of windowpane flounder eggs. The light shading represents the entire observed range of windowpane flounder eggs.

Essential Fish Habitat
Windowpane flounder (*Scophthalmus aquosus*) Larvae

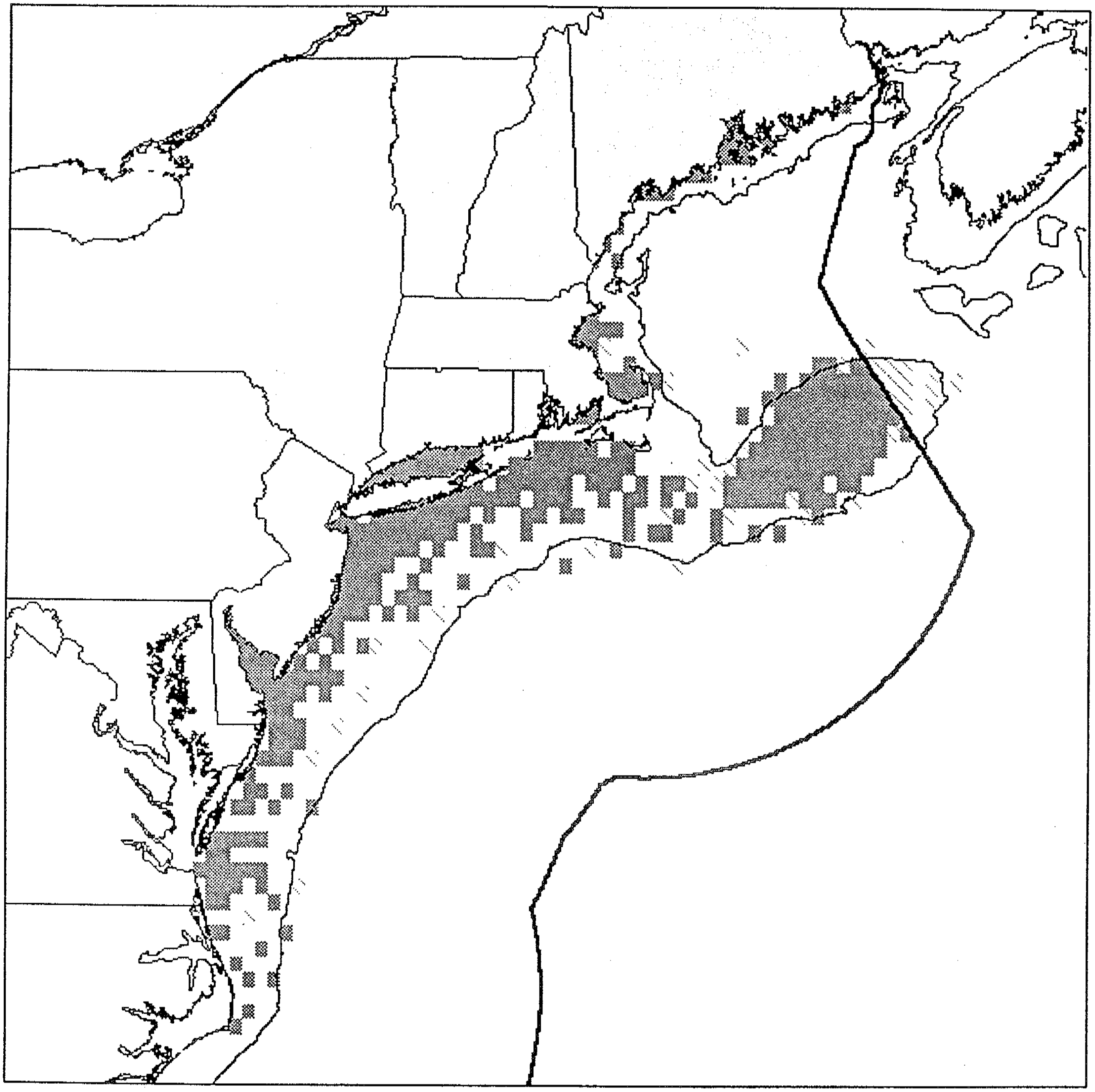


Figure 14.2: The EFH designation for windowpane flounder larvae is based upon alternative 3 for windowpane flounder larvae. The EFH designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting windowpane flounder larvae at the "common" or "abundant" level. This alternative was selected to be as inclusive as possible, given the generally patchy nature of larval distribution, while not including areas with relatively very low concentrations of windowpane flounder larvae. The light shading represents the entire observed range of windowpane flounder larvae.

Essential Fish Habitat
Windowpane flounder (*Scophthalmus aquosus*) Juveniles

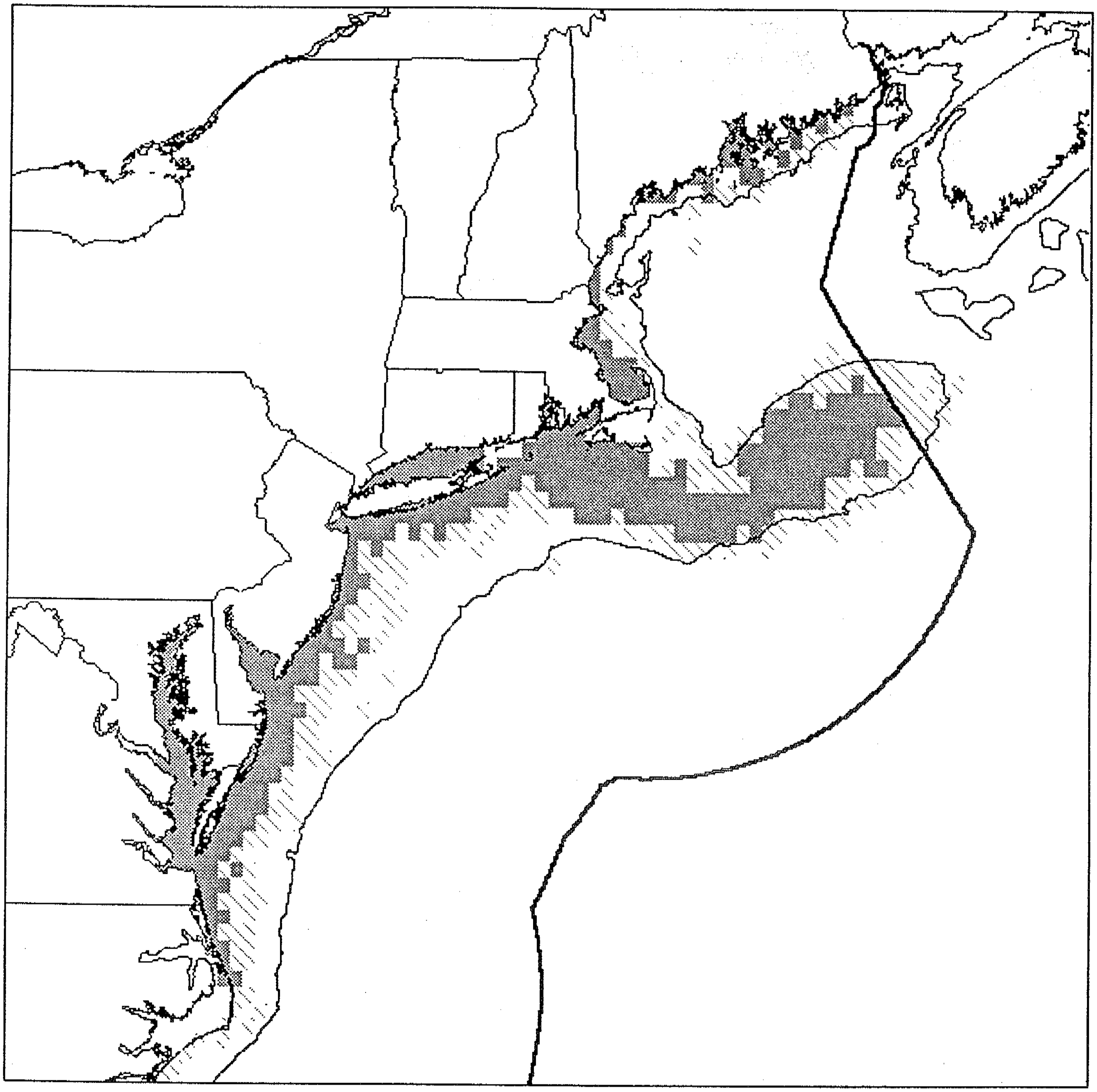


Figure 14.3: The EFH designation for juvenile windowpane flounder is based upon alternative 3 for windowpane flounder juveniles. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for windowpane flounder, as well as those bays and estuaries identified by the NOAA ELMR program as supporting juvenile windowpane flounder at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where windowpane flounder occur in relatively low concentrations. The light shading represents the entire observed range of juvenile windowpane flounder.

Essential Fish Habitat
Windowpane flounder (*Scophthalmus aquosus*) Adults

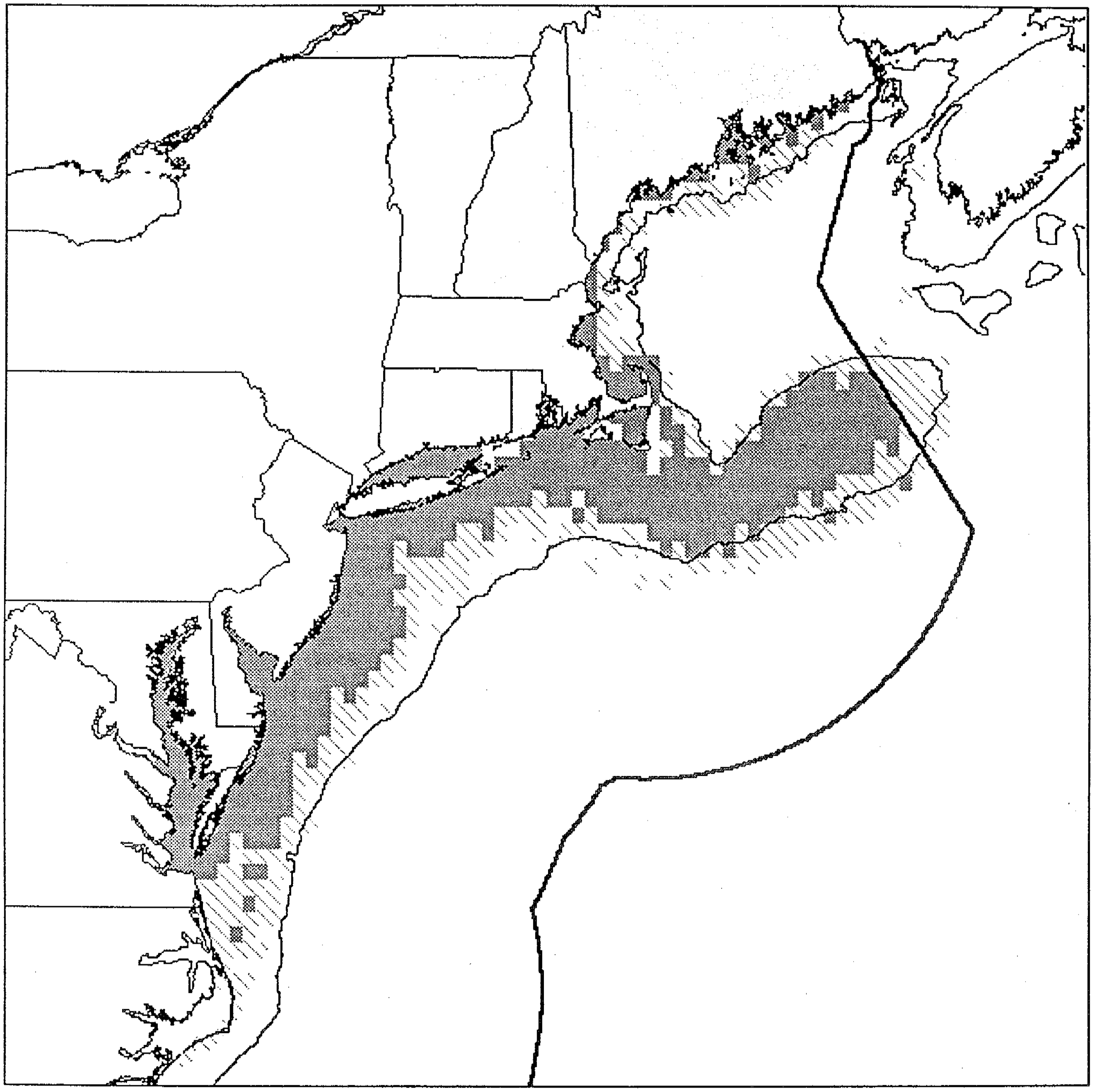


Figure 14.4: The EFH designation for adult windowpane flounder is based upon alternative 3 for windowpane flounder adults. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for windowpane flounder, as well as those bays and estuaries identified by the NOAA ELMR program as supporting adult windowpane flounder at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where windowpane flounder occur in relatively low concentrations. The light shading represents the entire observed range of adult windowpane flounder.

Essential Fish Habitat Description
Winter flounder (*Pleuronectes americanus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined the Gulf of Maine and Southern New England stocks of winter flounder are currently overfished. This determination is based on the fishing mortality rate. There is not enough information to determine if the Georges Bank stock is overfished or approaching an overfished condition. Essential Fish Habitat for winter flounder is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 15.1 - 15.4 and in the accompanying table and meet the following conditions:

Eggs: Bottom habitats with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay as depicted in Figure 15.1. Generally, the following conditions exist where winter flounder eggs are found: water temperatures less than 10° C, salinities between 10 - 30‰, and water depths less than 5 meters. On Georges Bank, winter flounder eggs are generally found in water less than 8°C and less than 90 meters deep. Winter flounder eggs are often observed from February to June with a peak in April on Georges Bank.

Larvae: Pelagic and bottom waters of Georges Bank, the inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to the Delaware Bay as depicted in Figure 15.2. Generally, the following conditions exist where winter flounder larvae are found: sea surface temperatures less than 15° C, salinities between 4 - 30‰, and water depths less than 6 meters. On Georges Bank, winter flounder larvae are generally found in water less than 8°C and less than 90 meters deep. Winter flounder larvae are often observed from March to July with peaks in April and May on Georges Bank.

Juveniles: *Young-of-the-Year*: Bottom habitats with a substrate of mud or fine grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay as depicted in Figure 15.3. Generally, the following conditions exist where winter flounder young-of-the-year are found: water temperatures below 28°C, depths from 0.1 - 10 meters, and salinities between 5 - 33‰. *Age 1+ Juveniles*: Bottom habitats with a substrate of mud or fine grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay as depicted in Figure 15.3. Generally, the following conditions exist where juvenile winter flounder are found: water temperatures below 25°C, depths from 1 - 50 meters, and salinities between 10 - 30‰.

Adults: Bottom habitats including estuaries with a substrate of mud, sand, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay as depicted in Figure 15.4. Generally, the following conditions exist where winter flounder adults are found: water temperatures below 25° C, depths from 1 - 100 meters, and salinities between 15 - 33‰.

Spawning Adults: Bottom habitats including estuaries with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to the Delaware Bay as depicted in Figure 15.4. Generally, the following conditions exist where winter flounder adults are found: water temperatures below 15° C, depths less than 6 meters, except on Georges Bank where they spawn as deep as 80 meters, and salinities between 5.5 - 36‰. Winter flounder are most often observed spawning during the months February - June.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Winter flounder (*Pleuronectes americanus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay	m,s	m,s	m,s	m,s	m,s
Englishman/Machias Bay	m,s	m,s	m,s	m,s	m,s
Narraguagus Bay	m,s	m,s	m,s	m,s	m,s
Blue Hill Bay	m,s	m,s	m,s	m,s	m,s
Penobscot Bay	m,s	m,s	m,s	m,s	m,s
Muscongus Bay	m,s	m,s	m,s	m,s	m,s
Damariscotta River	m,s	m,s	m,s	m,s	m,s
Sheepscot River	m,s	m,s	m,s	m,s	m,s
Kennebec / Androscoggin Rivers	m,s	m,s	m,s	m,s	m,s
Casco Bay	m,s	m,s	m,s	m,s	m,s
Saco Bay	m,s	m,s	m,s	m,s	m,s
Wells Harbor	m,s	m,s	m,s	m,s	m,s
Great Bay	m,s	m,s	m,s	m,s	m,s
Merrimack River	m	m	m	m	m
Massachusetts Bay	s	s	s	s	s
Boston Harbor	m,s	m,s	m,s	m,s	m,s
Cape Cod Bay	m,s	m,s	m,s	m,s	m,s
Waquoit Bay	m,s	m,s	m,s	m,s	m,s
Buzzards Bay	m,s	m,s	m,s	m,s	m,s
Narragansett Bay	m,s	m,s	m,s	m,s	m,s
Long Island Sound	m,s	m,s	m,s	m,s	m,s
Connecticut River	m	m	m	m	m
Gardiners Bay	m,s	m,s	m,s	m,s	m,s
Great South Bay	m,s	m,s	m,s	m,s	m,s
Hudson River / Raritan Bay	m,s	m,s	m,s	m,s	m,s
Barnegat Bay	m,s	m,s	m,s	m,s	m,s
New Jersey Inland Bays	m,s	m,s	m,s	m,s	m,s
Delaware Bay	m,s	m,s	m,s	m,s	m,s
Delaware Inland Bays	m,s	m,s	m,s	m,s	m,s
Chincoteague Bay			s	s	
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Winter flounder (*Pleuronectes americanus*) Eggs

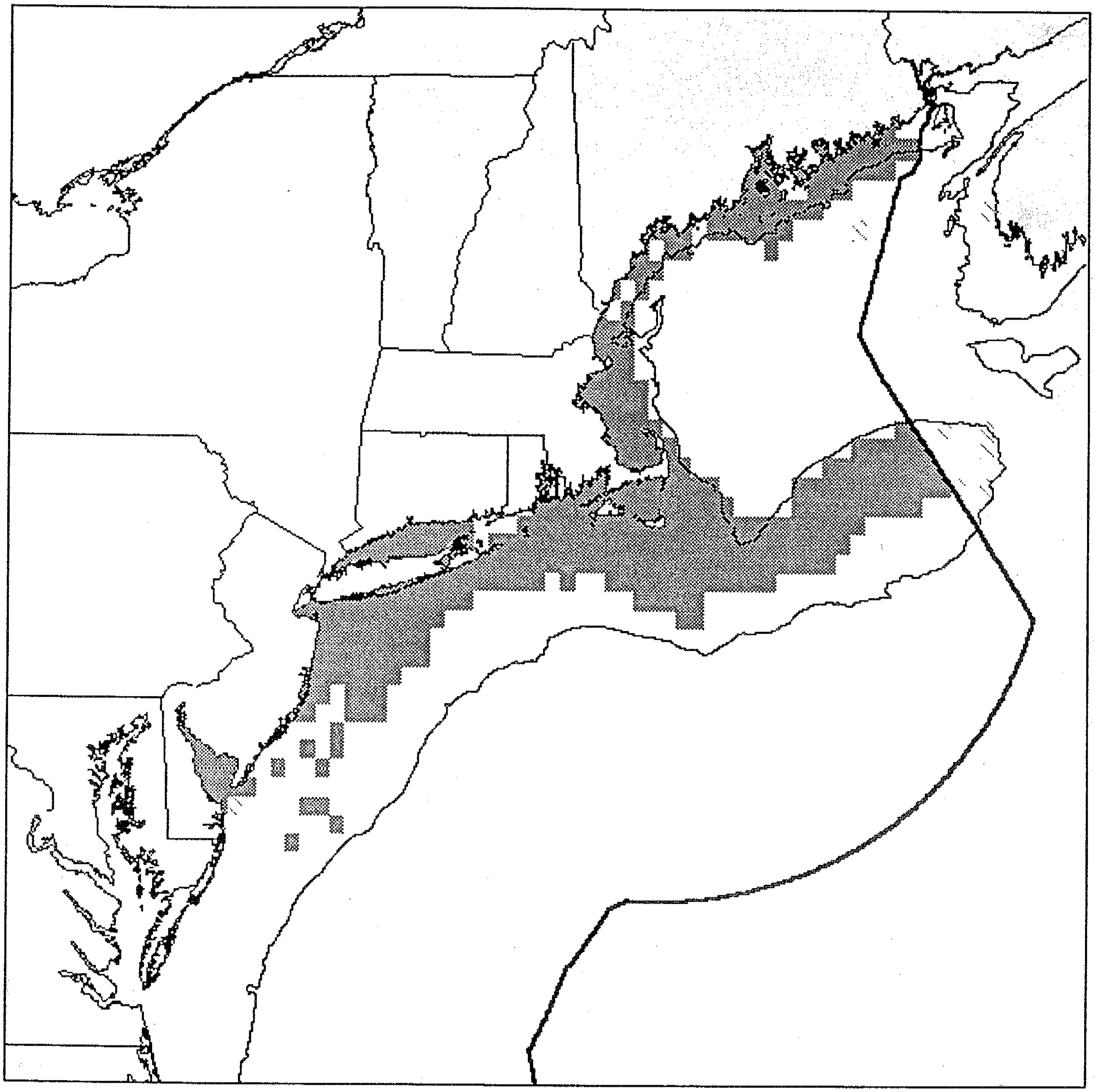


Figure 15.1: The EFH designation for winter flounder eggs is based upon alternative 3 for winter flounder adults. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting winter flounder eggs at the "common" or "abundant" level. The observed distribution of winter flounder eggs is very patchy with very few observations, thus the distribution of adults was used as a proxy. This alternative was selected as it appears to best identify that portion of the range of winter flounder most important to all life history stages. The light shading represents the entire observed range of winter flounder eggs.

Essential Fish Habitat
Winter flounder (*Pleuronectes americanus*) Larvae

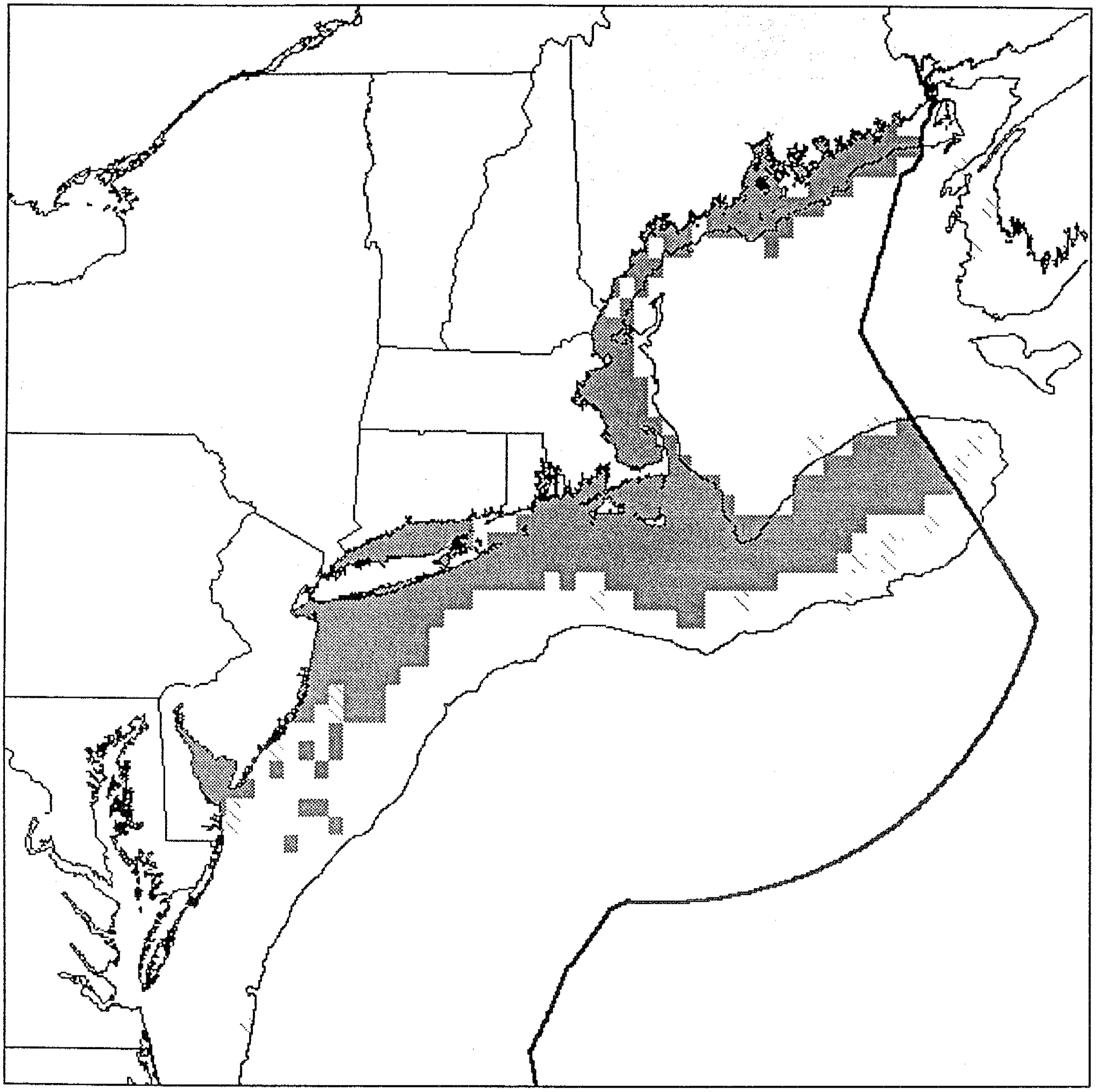


Figure 15.2: The EFH designation for winter flounder larvae is based upon alternative 3 for winter flounder adults. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting winter flounder larvae at the "common" or "abundant" level. The observed distribution of winter flounder larvae is very patchy with very few observations, thus the distribution of adults was used as a proxy. This alternative was selected as it appears to best identify that portion of the range of winter flounder most important to all life history stages. The light shading represents the entire observed range of winter flounder larvae.

Essential Fish Habitat
Winter flounder (*Pleuronectes americanus*) Juveniles

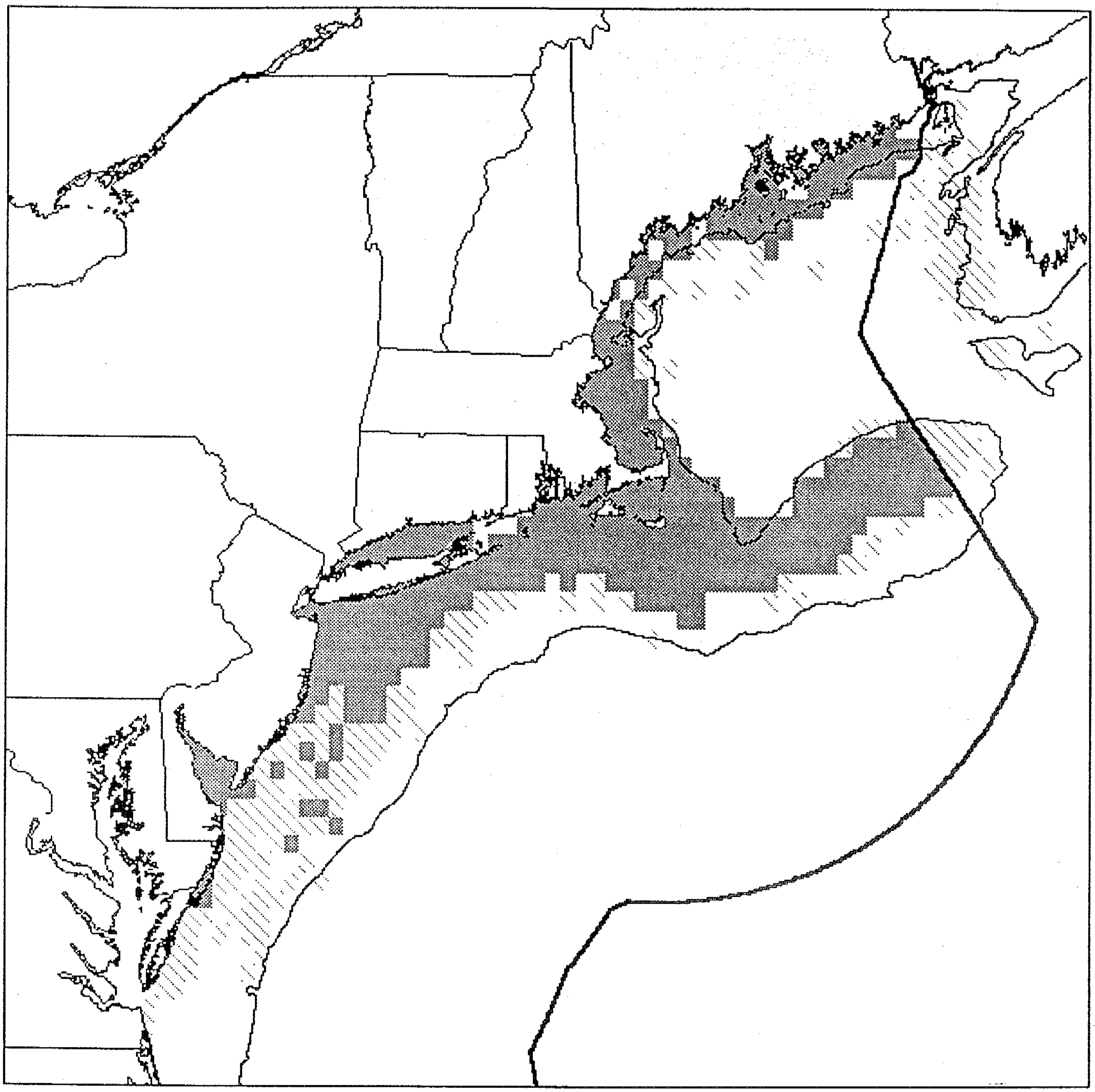


Figure 15.3: The EFH designation for winter flounder juveniles is based upon alternative 3 for winter flounder adults. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for winter flounder, as well as those bays and estuaries identified by the NOAA ELMR program as supporting winter flounder juveniles at the "common" or "abundant" level. This alternative was selected as it appears to best identify that portion of the range of winter flounder most important to all life history stages. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where winter flounder occur in relatively low concentrations. The light shading represents the entire observed range of winter flounder juveniles.

Essential Fish Habitat
Winter flounder (*Pleuronectes americanus*) Adults

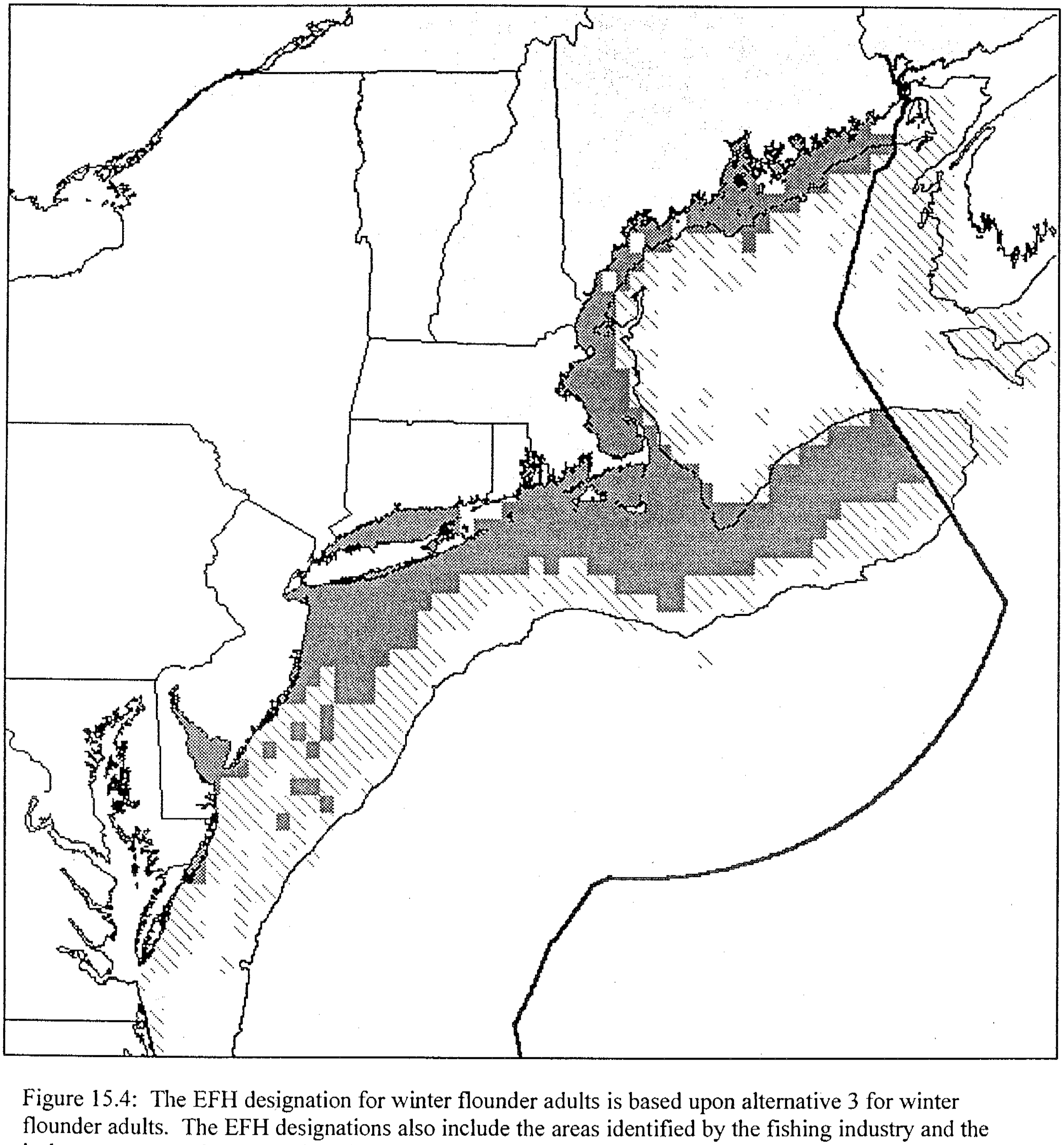


Figure 15.4: The EFH designation for winter flounder adults is based upon alternative 3 for winter flounder adults. The EFH designations also include the areas identified by the fishing industry and the inshore surveys as important for winter flounder, as well as those bays and estuaries identified by the NOAA ELMR program as supporting winter flounder adults at the "common" or "abundant" level. This alternative was selected as it appears to best identify that portion of the range of winter flounder most important to all life history stages. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where winter flounder occur in relatively low concentrations. The light shading represents the entire observed range of winter flounder adults.

Essential Fish Habitat Description
Witch flounder (*Glyptocephalus cynoglossus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined witch flounder is currently overfished. This determination is based on the fishing mortality rate. Essential Fish Habitat for witch flounder is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 16.1 - 16.4 and meet the following conditions:

Eggs: Surface waters of the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 16.1. Generally, the following conditions exist where witch flounder eggs are found: sea surface temperatures below 13° C over deep water with high salinities. Witch flounder eggs are most often observed during the months from March through October.

Larvae: Surface waters to 250 meters in the Gulf of Maine, Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras as depicted in Figure 16.2. Generally, the following conditions exist where witch flounder larvae are found: sea surface temperatures below 13° C over deep water with high salinities. Witch flounder larvae are most often observed from March through November, with peaks in May - July.

Juveniles: Bottom habitats with a fine-grained substrate in the Gulf of Maine and along the outer continental shelf from Georges Bank south to Cape Hatteras as depicted in Figure 16.3. Generally, the following conditions exist where witch flounder juveniles are found: water temperatures below 13° C, depths from 50 - 450 meters, although they have been observed as deep as 1500 meters, and a salinity range from 34 - 36‰.

Adults: Bottom habitats with a fine-grained substrate in the Gulf of Maine and along the outer continental shelf from Georges Bank south to Chesapeake Bay as depicted in Figure 16.4. Generally, the following conditions exist where witch flounder adults are found: water temperatures below 13° C, depths from 25 - 300 meters, and a salinity range from 32 - 36‰.

Spawning Adults: Bottom habitats with a fine-grained substrate in the Gulf of Maine and along the outer continental shelf from Georges Bank south to Chesapeake Bay as depicted in Figure 16.4. Generally, the following conditions exist where spawning witch flounder adults are found: water temperatures below 15° C, depths from 25 - 360 meters, and a salinity range from 32 - 36‰. Witch flounder are most often observed spawning during the months from March through November, with peaks in May - August.

The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

Essential Fish Habitat
Witch flounder (*Glyptocephalus cynoglossus*) Eggs

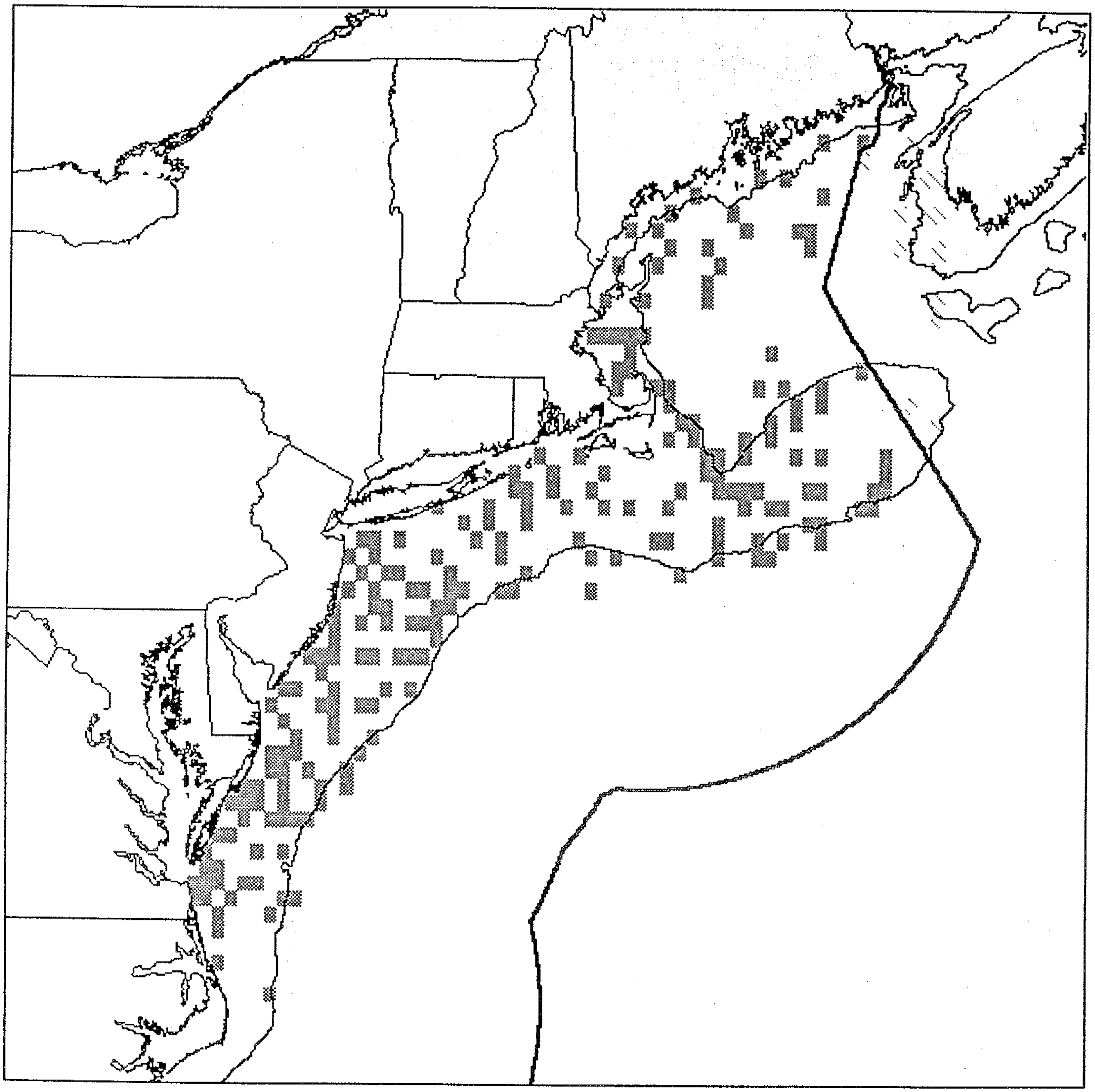


Figure 16.1: The EFH designation for witch flounder eggs is based upon alternative 4 for witch flounder eggs. This alternative was selected to be as inclusive as possible of areas likely to support witch flounder eggs. The light shading represents the entire observed range of witch flounder eggs.

Essential Fish Habitat
Witch flounder (*Glyptocephalus cynoglossus*) Larvae

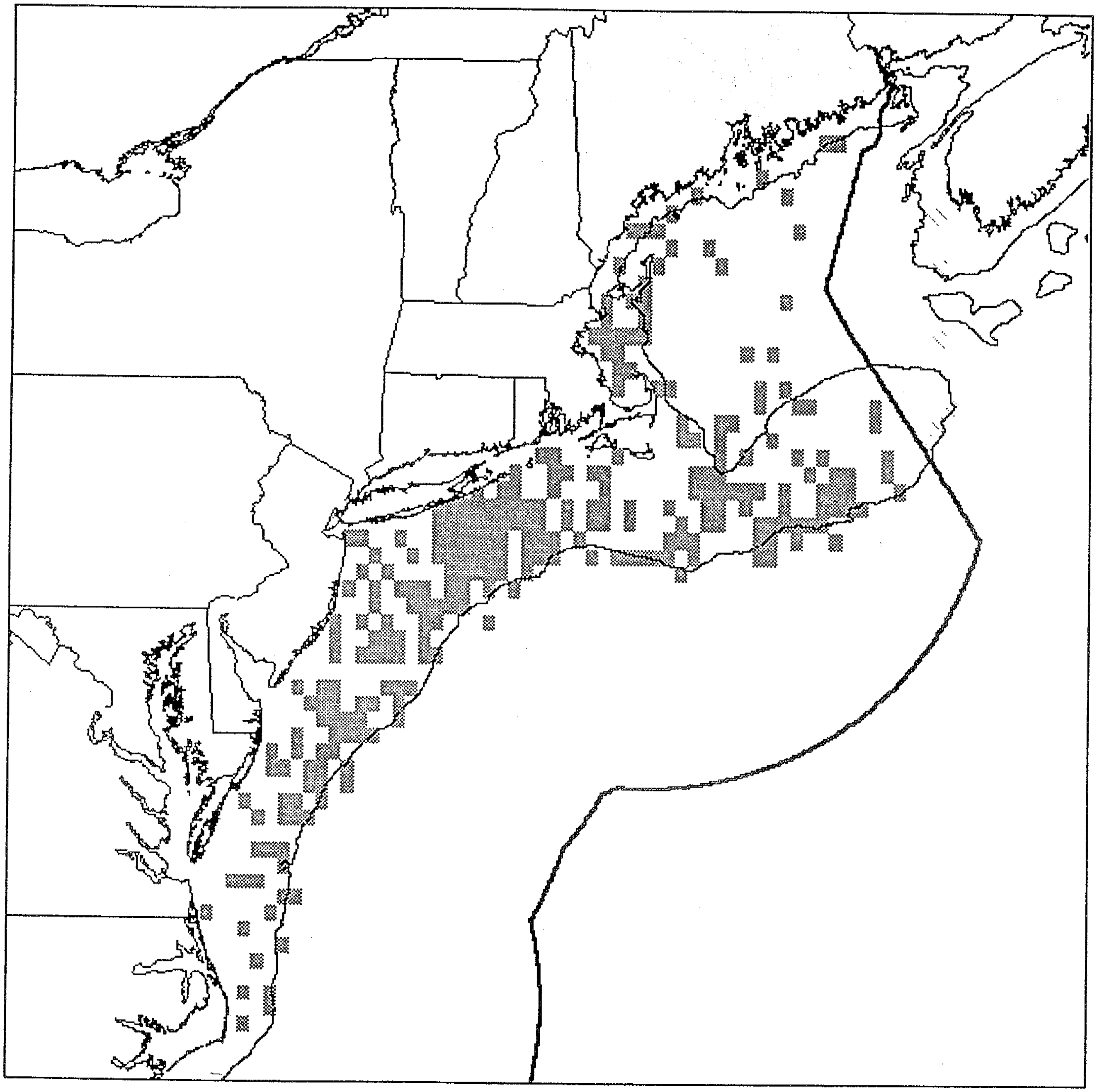


Figure 16.2: The EFH designation for witch flounder larvae is based upon alternative 4 for witch flounder larvae. This alternative was selected to be as inclusive as possible of areas likely to support witch flounder larvae. The light shading represents the entire observed range of witch flounder larvae.

Essential Fish Habitat
Witch flounder (*Glyptocephalus cynoglossus*) Juveniles

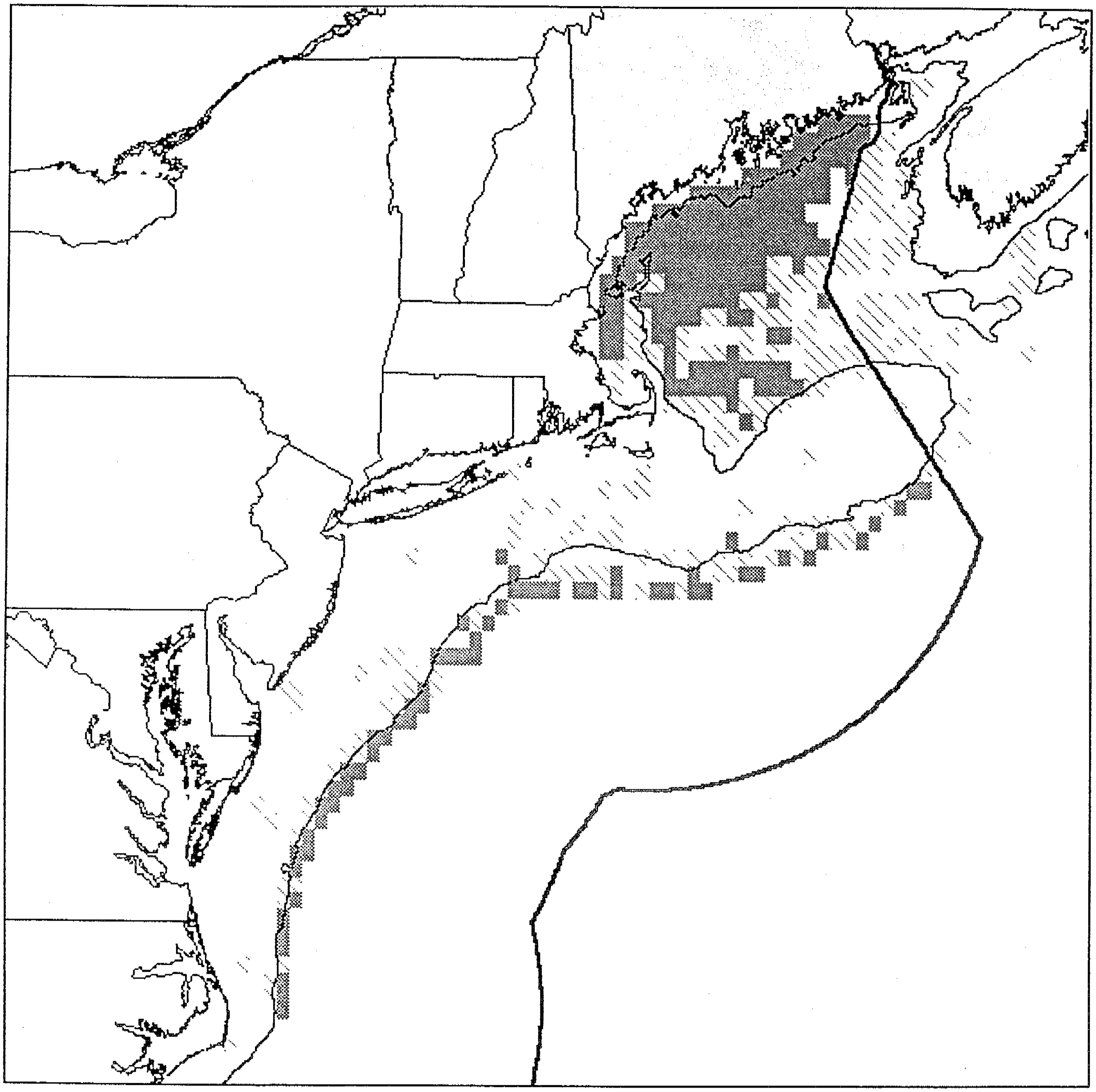


Figure 16.3: The EFH designation for juvenile witch flounder is based upon alternative 3 for witch flounder juveniles. This alternative was selected to include all areas where witch flounder occur in relatively high concentrations, but not areas where they occur in relatively low concentrations. The light shading represents the entire observed range of juvenile witch flounder.

Essential Fish Habitat
Witch flounder (*Glyptocephalus cynoglossus*) Adults

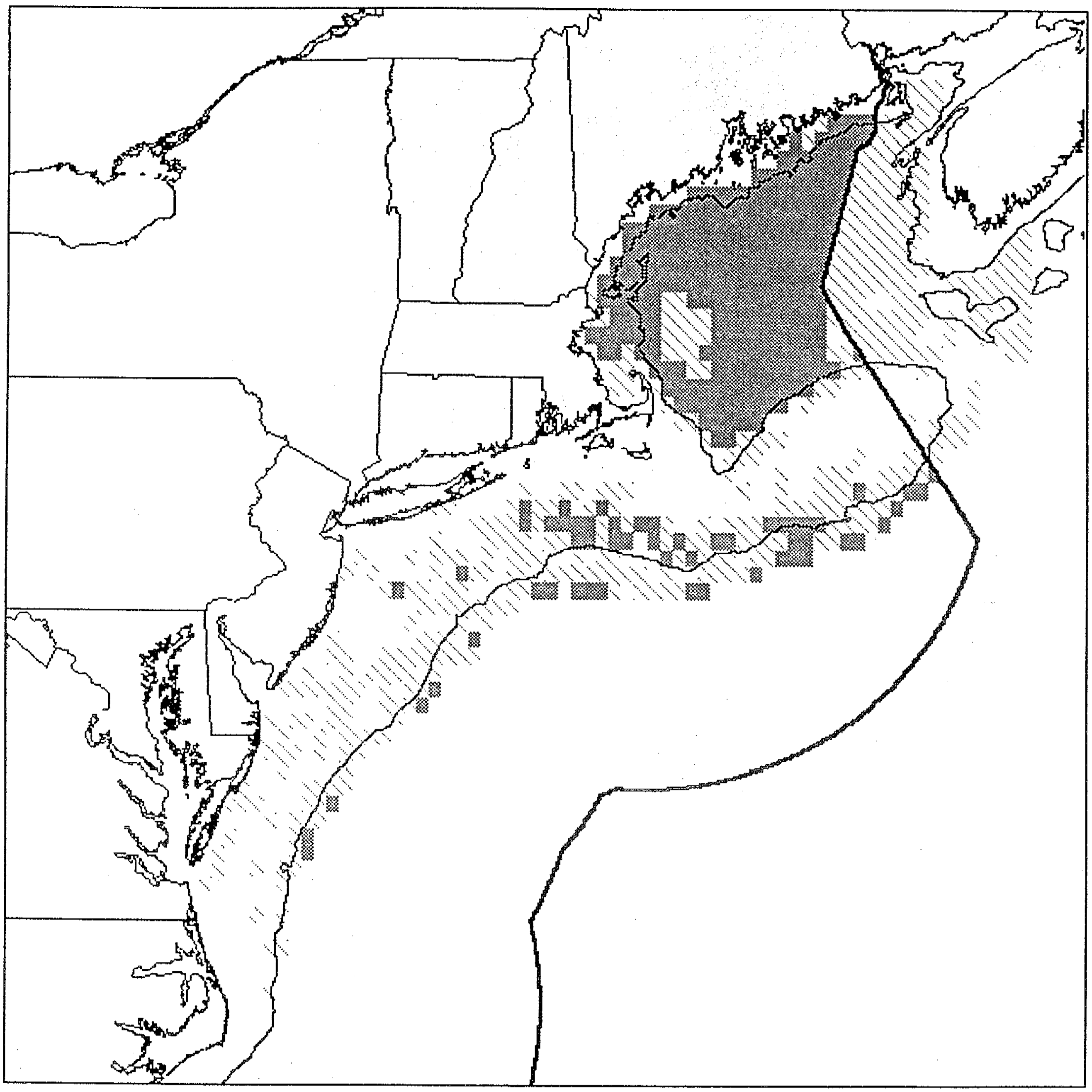


Figure 16.4: The EFH designation for adult witch flounder is based upon alternative 3 for witch flounder adults. This alternative was selected to include all areas where witch flounder occur in relatively high concentrations, but not areas where they occur in relatively low concentrations. The light shading represents the entire observed range of adult witch flounder.

Essential Fish Habitat Description
Yellowtail flounder (*Pleuronectes ferruginea*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined the Georges Bank and Southern New England stocks of yellowtail flounder are neither currently overfished nor approaching an overfished condition. There is not enough information to determine if the Cape Cod or Middle Atlantic stocks are overfished or approaching an overfished condition. For all four stocks of yellowtail flounder, essential fish habitat is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 17.1 - 17.4 and in the accompanying table and meet the following conditions:

Eggs: Surface waters of Georges Bank, Massachusetts Bay, Cape Cod Bay, and the southern New England continental shelf south to Delaware Bay as depicted in Figure 17.1. Generally, the following conditions exist where yellowtail eggs are found: sea surface temperatures below 15° C, water depths from 30 - 90 meters and a salinity range from 32.4 - 33.5‰. Yellowtail flounder eggs are most often observed during the months from mid-March to July, with peaks in April to June in southern New England.

Larvae: Surface waters of Georges Bank, Massachusetts Bay, Cape Cod Bay, the southern New England shelf and throughout the middle Atlantic south to the Chesapeake Bay as depicted in Figure 17.2. Generally, the following conditions exist where yellowtail larvae are found: sea surface temperatures below 17° C, water depths from 10 - 90 meters, and a salinity range from 32.4 - 33.5‰. Yellowtail flounder larvae are most often observed from March through April in the New York bight and from May through July in southern New England and southeastern Georges Bank.

Juveniles: Bottom habitats with a substrate of sand or sand and mud on Georges Bank, the Gulf of Maine, and the southern New England shelf south to Delaware Bay as depicted in Figure 17.3. Generally, the following conditions exist where yellowtail flounder juveniles are found: water temperatures below 15° C, depths from 20 - 50 meters and a salinity range from 32.4 - 33.5‰.

Adults: Bottom habitats with a substrate of sand or sand and mud on Georges Bank, the Gulf of Maine, and the southern New England shelf south to Delaware Bay as depicted in Figure 17.4. Generally, the following conditions exist where yellowtail flounder adults are found: water temperatures below 15° C, depths from 20 - 50 meters, and a salinity range from 32.4 - 33.5‰ .

Spawning Adults: Bottom habitats with a substrate of sand or sand and mud on Georges Bank, the Gulf of Maine, and the southern New England shelf south to Delaware Bay as depicted in Figure 17.4. Generally, the following conditions exist where spawning yellowtail flounder adults are found: water temperatures below 17° C, depths from 10 - 125 meters, and a salinity range from 32.4 - 33.5‰.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Yellowtail flounder (*Pleuronectes ferruginea*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay	S	S			
Englishman/Machias Bay	S	S			
Narraguagus Bay	S	S			
Blue Hill Bay	S	S			
Penobscot Bay	S	S			
Muscongus Bay	S	S			
Damariscotta River	S	S			
Sheepscot River	S	S	S	S	
Kennebec / Androscoggin Rivers	S	S			
Casco Bay	S	S	S	S	
Saco Bay	S	S			
Wells Harbor		S			
Great Bay	S	S			
Merrimack River	S	S			
Massachusetts Bay	S	S	S	S	S
Boston Harbor	S	S	S	S	S
Cape Cod Bay	S	S	S	S	S
Waquoit Bay					
Buzzards Bay					
Narragansett Bay					
Long Island Sound					
Connecticut River					
Gardiners Bay					
Great South Bay					
Hudson River / Raritan Bay					
Barnegat Bay					
Delaware Bay					
Chincoteague Bay					
Chesapeake Bay					

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).

M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Yellowtail flounder (*Pleuronectes ferruginea*) Eggs

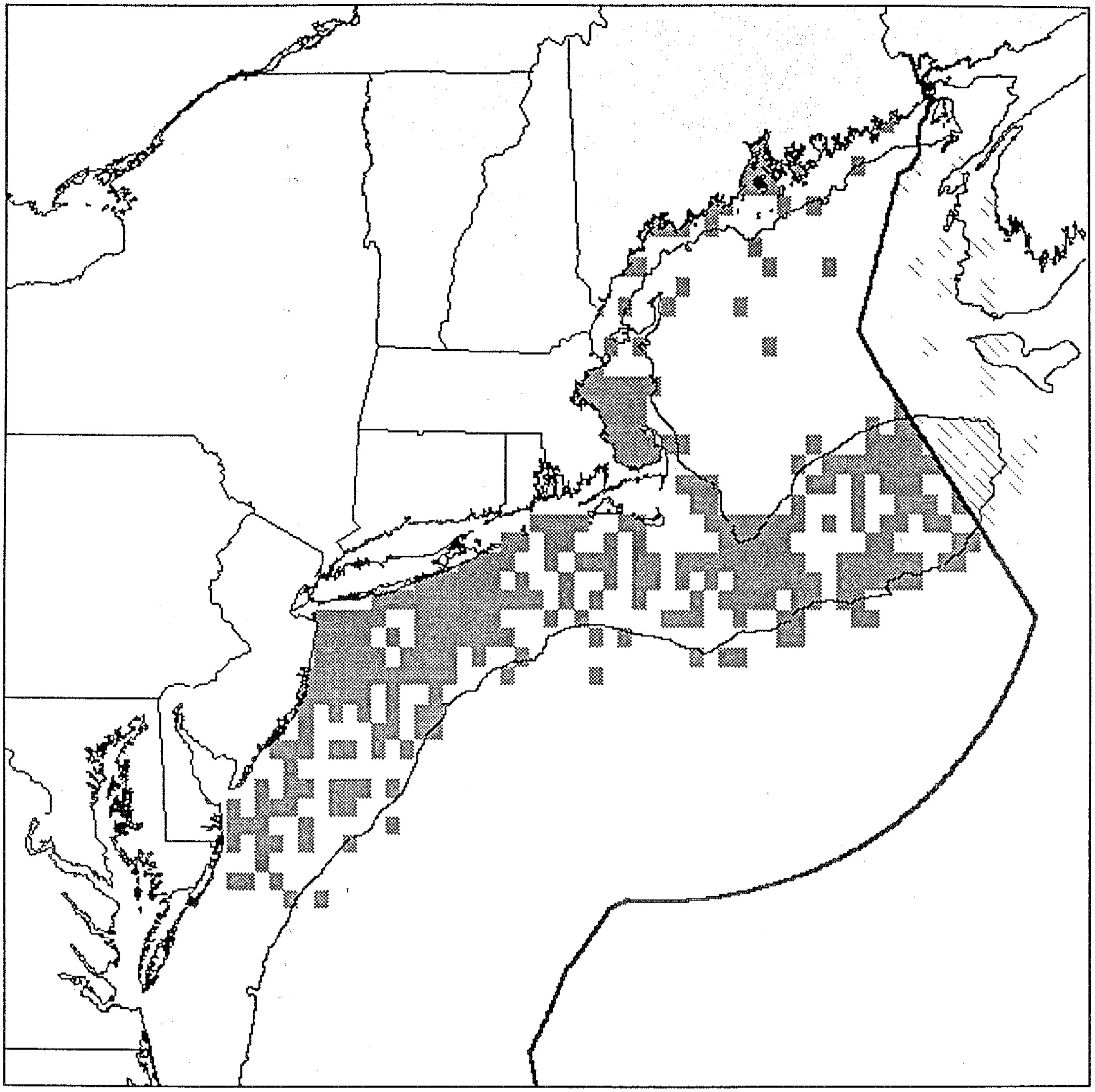


Figure 17.1: The EFH designation for yellowtail flounder eggs is based upon alternative 4 for yellowtail flounder eggs. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting yellowtail flounder eggs at the "rare", "common", or "abundant" level. This alternative was selected to be as inclusive as possible of areas likely to support yellowtail flounder eggs. The light shading represents the entire observed range of yellowtail flounder eggs.

Essential Fish Habitat
Yellowtail flounder (*Pleuronectes ferruginea*) Larvae

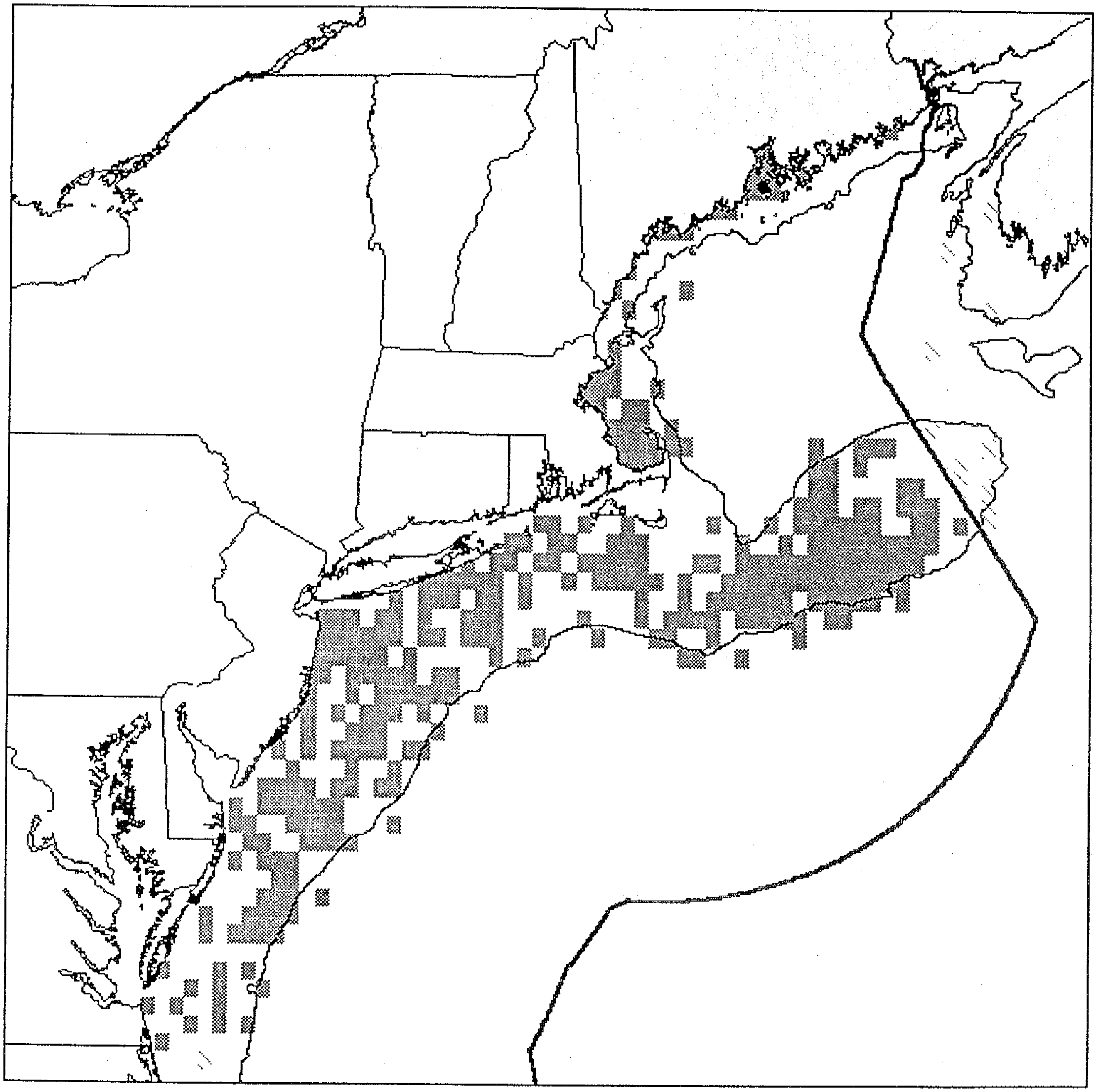


Figure 17.2: The EFH designation for yellowtail flounder larvae is based upon alternative 4 for yellowtail flounder larvae. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting yellowtail flounder larvae at the "rare", "common", or "abundant" level. This alternative was selected to be as inclusive as possible of areas likely to support yellowtail flounder larvae. The light shading represents the entire observed range of yellowtail flounder larvae.

Essential Fish Habitat
Yellowtail flounder (*Pleuronectes ferruginea*) Juveniles

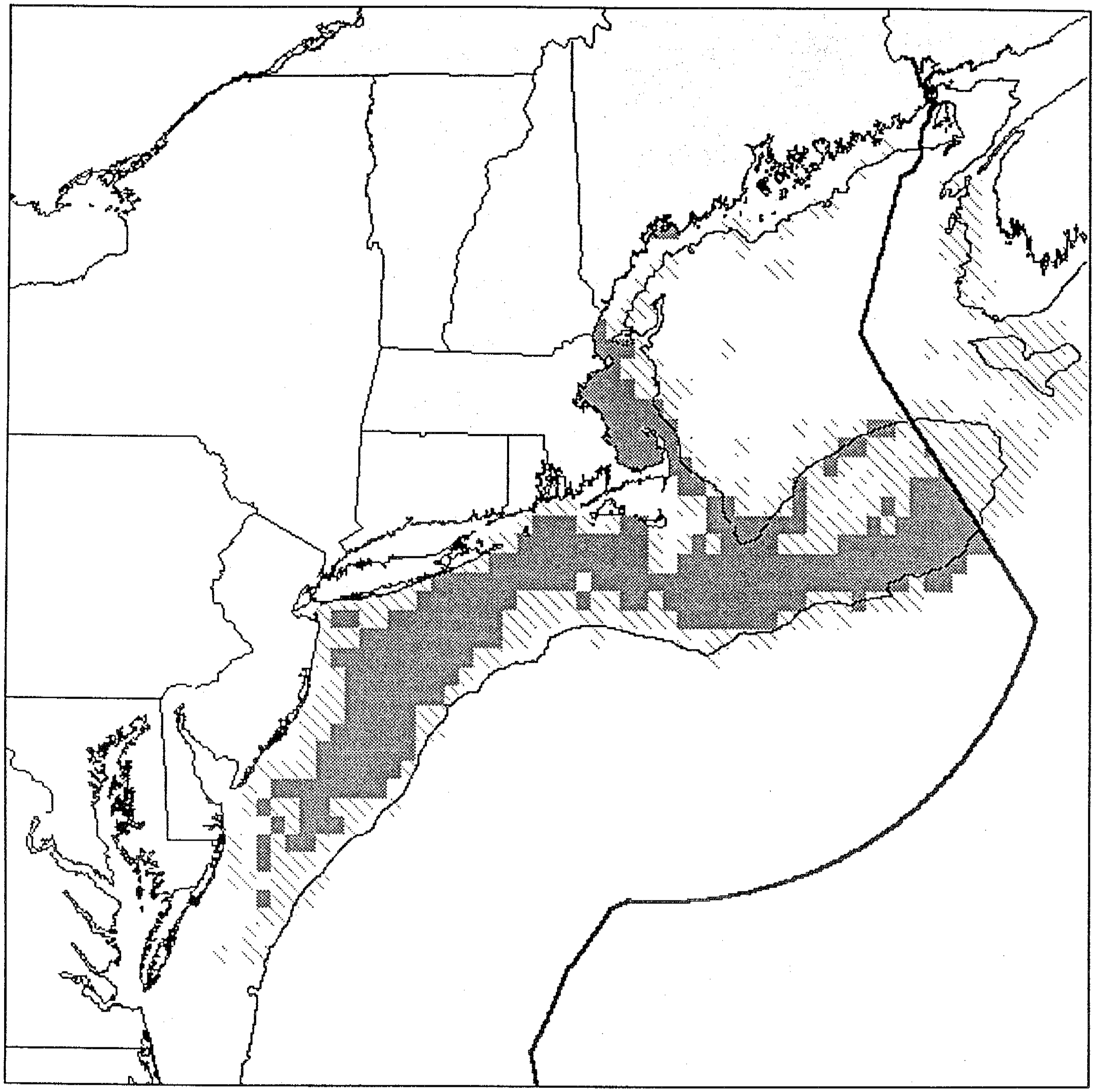


Figure 17.3: The EFH designation for juvenile yellowtail flounder is based upon alternative 3 for yellowtail flounder juveniles. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting yellowtail flounder juveniles at the "common" or "abundant" level. This alternative was selected because it included all areas where yellowtail flounder juveniles were observed in relatively high concentrations, but did not include areas where they occurred in low concentrations. The light shading represents the entire observed range of juvenile yellowtail flounder.

Essential Fish Habitat
Yellowtail flounder (*Pleuronectes ferruginea*) Adults

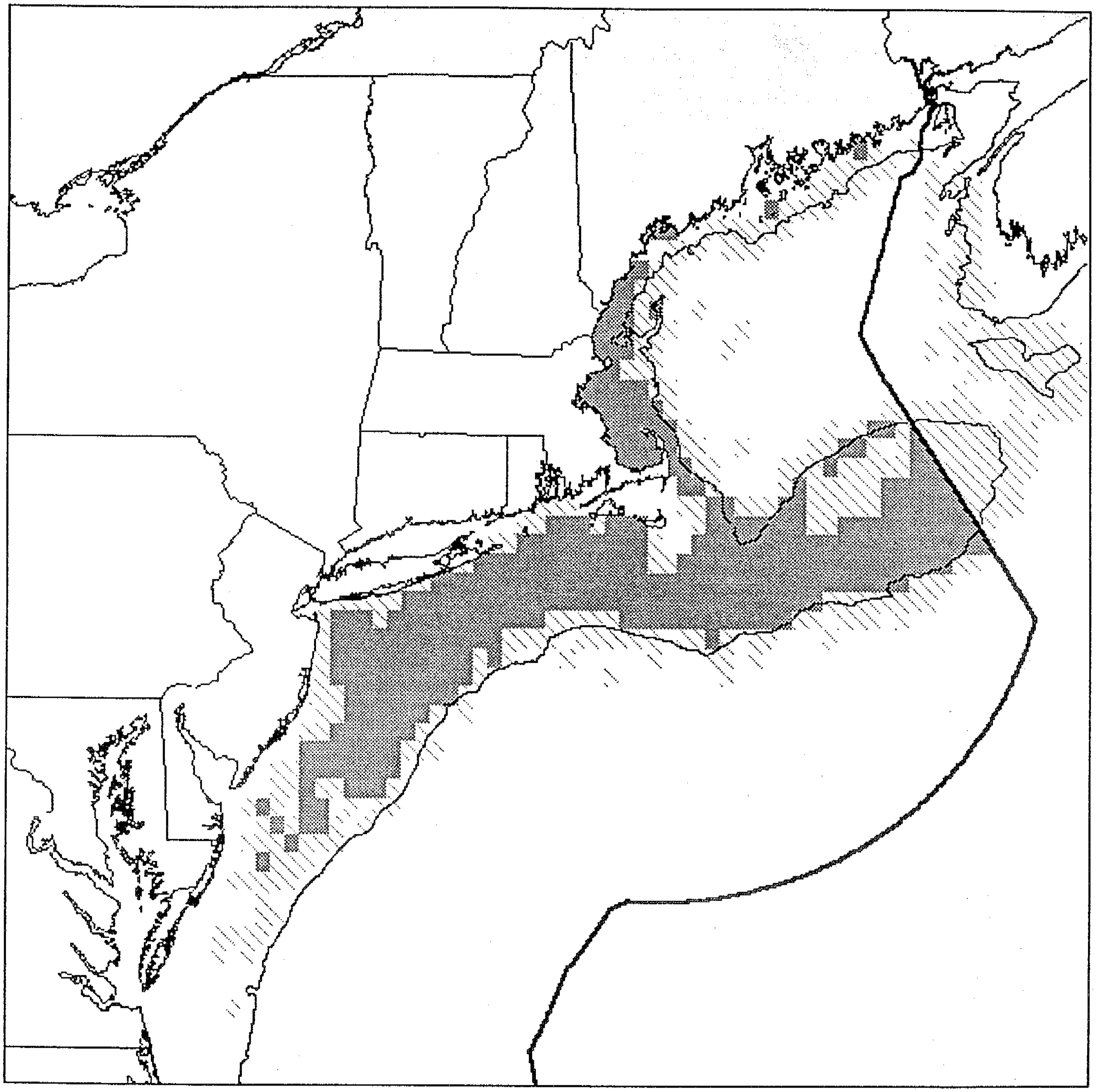


Figure 17.4: The EFH designation for adult yellowtail flounder is based upon alternative 3 for yellowtail flounder adults. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting yellowtail flounder adults at the "common" or "abundant" level, as well as areas identified by the fishing industry as important for spawning adults. This alternative was selected because it included all areas where yellowtail flounder adults were observed in relatively high concentrations, but did not include areas where they occurred in low concentrations. The light shading represents the entire observed range of adult yellowtail flounder.

HABITAT AREAS OF PARTICULAR CONCERN

3.3 HABITAT AREAS OF PARTICULAR CONCERN

According to the language of the Interim Final Rule, EFH that is judged to be particularly important to the long-term productivity of populations of one or more managed species, or to be particularly vulnerable to degradation, should be identified as "habitat areas of particular concern" (HAPC) to help provide additional focus for conservation efforts. The following provisions of the Interim Final Rule provide guidance for habitat areas of particular concern:

(6) (ii) Cumulative impacts from fishing. In addressing the impacts of fishing on EFH, Councils should also consider the cumulative impacts of multiple fishing practices and non-fishing activities on EFH, especially, on habitat areas of particular concern. Habitats that are particularly vulnerable to specific fishing equipment types should be identified for possible designation as habitat areas of particular concern.

(9) Identification of habitat areas of particular concern. FMPs should identify habitat areas of particular concern within EFH. In determining whether a type, or area of EFH is a habitat area of particular concern, one or more of the following criteria must be met:

- (i) The importance of the ecological function provided by the habitat.
- (ii) The extent to which the habitat is sensitive to human-induced environmental degradation.
- (iii) Whether, and to what extent, development activities are, or will be, stressing the habitat type.
- (iv) The rarity of the habitat type.

The intent of the habitat areas of particular concern designation is to identify those areas that are known to be important to species which are in need of additional levels of protection from adverse impacts. Management implications do result from their identification. Designation of habitat areas of particular concern is intended to determine what areas within EFH should receive more of the Council's and NMFS' attention when providing comments on federal and state actions, and in establishing higher standards to protect and/or restore such habitat. Certain activities should not be located in areas identified as habitat areas of particular concern due to the risk to the habitat. Habitats that are at greater risk to impacts, either individual or cumulative, including impacts from fishing, may be appropriate for this classification. Habitats that are limited in nature or those that provide critical refugia (such as sanctuaries or preserves) may also be appropriate. General concurrences may be granted for activities within habitat areas of particular concern; however, greater scrutiny is necessary prior to approval of the general concurrence.

Following a review of the scientific literature for information on areas deserving special attention or species with particular habitat associations, the Council has designated an area on Georges Bank as an HAPC for juvenile Atlantic cod (Figure 6). Considering the unique habitat associations and requirements of Atlantic salmon, the Council has designated the habitat of eleven rivers in Maine as HAPCs for Atlantic salmon (Figure 7). The Council may consider designating additional habitat areas of particular concern in the future. Additional designations may be based on existing or developing knowledge of species-habitat associations, the unique characteristics of a particular habitat type, the threats to sensitive habitats, or the importance of an area to multiple species.

3.3.1 Atlantic cod HAPC

Several sources document the importance of gravel/cobble substrate to the survival of newly settled juvenile cod (Lough *et al.* 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). A substrate of gravel or cobble allows sufficient space for newly settled juvenile cod to find shelter and avoid predation (Lough *et al.* 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). Particular life history stages or transitions are sometimes considered "ecological bottlenecks" if there are extremely high levels of mortality associated with the life history stage or transition. Extremely high mortality rates attendant to post-settlement juvenile cod are attributed to high levels of predation (Tupper and Boutilier 1995). Increasing the availability of suitable habitat for post-settlement juvenile cod could ease the bottleneck, increasing juvenile survivorship and recruitment into the fishery. For these reasons, areas with a gravel/cobble substrate meet the first criterion for habitat areas of particular concern.

Specific areas on the northern edge of Georges Bank have been extensively studied and identified as important areas for the survival of juvenile cod (Lough *et al.* 1989; Valentine and Lough 1991; Valentine and Schmuck 1995). These studies provide reliable information on the location of the areas most important to juvenile cod and the type of substrate found in those areas. These areas have also been studied to determine the effects of bottom fishing on the benthic megafauna (Collie *et al.* 1996; Collie *et al.* 1997). Gravel/cobble substrates not subject to fishing pressure support thick colonies of emergent epifauna, but bottom fishing, especially scallop dredging, reduces habitat complexity and removes much of the emergent epifauna (Collie *et al.* 1996; Collie *et al.* 1997). Acknowledging that a single tow of a dredge across pristine habitat will have few long-term effects, Collie *et al.* (1997) focus on the cumulative effects and intensity of trawling and dredging as responsible for potential long-term changes in benthic communities. For these reasons, the identified area on the northern edge of Georges Bank meets the second criterion, as well as the cumulative effects consideration, for designation as a habitat area of particular concern.

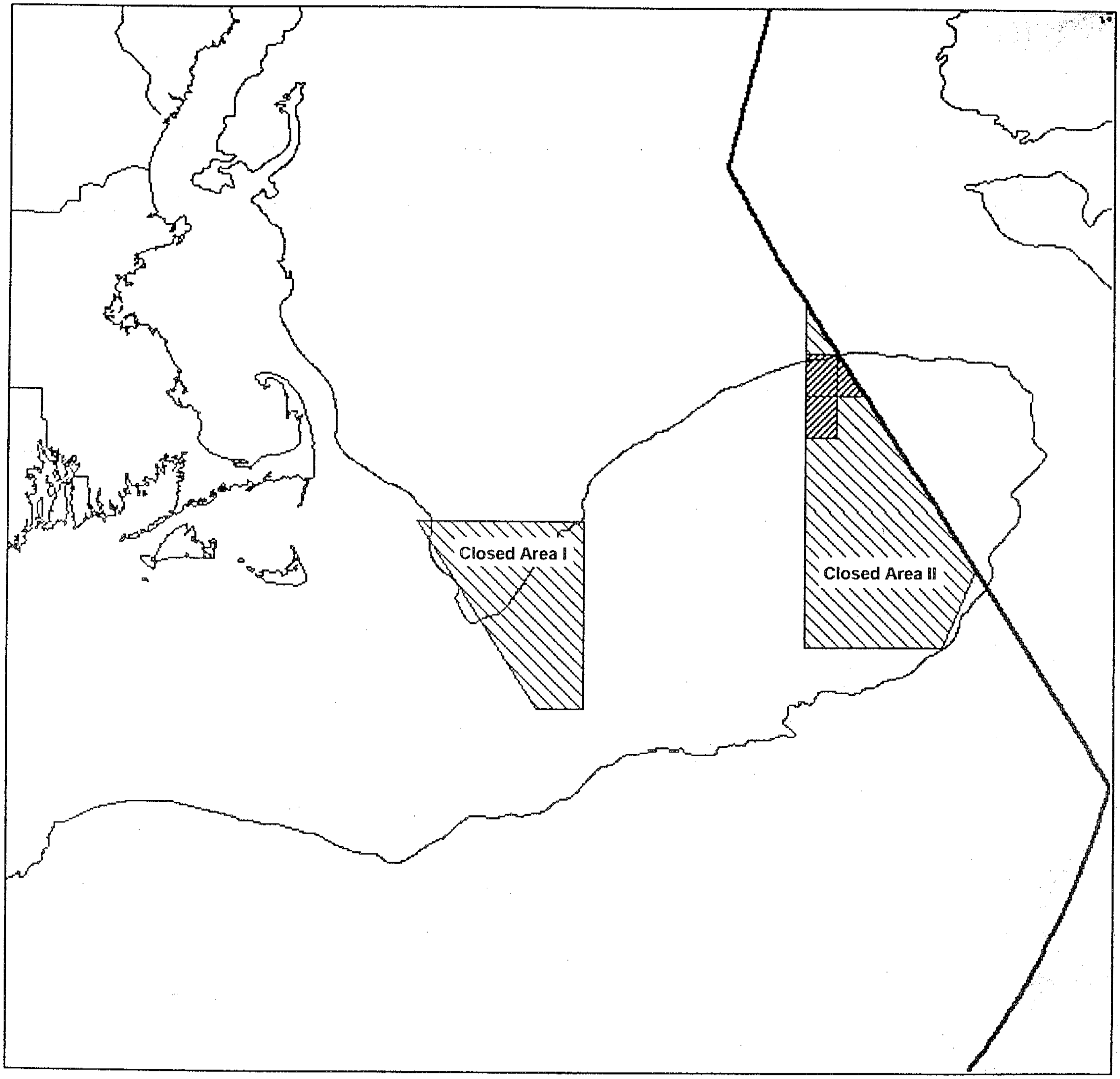
Collie *et al.* (1997) also describe the relative abundance of several other species such as shrimps, polychaetes, brittle stars, and mussels in the undisturbed sites. These species are found in association with the emergent epifauna (bryozoans, hydroids, worm tubes) prevalent in the undisturbed areas. Several studies of the food habits of juvenile cod identify these associated species as important prey items (Hacunda 1981; Lilly and Parsons 1991; Witman and Sebens 1992; Casas and Paz 1994; NEFSC 1998). These areas provide two important ecological functions for post-settlement juvenile cod relative to other areas: increased survivability and readily available prey. These areas are also particularly vulnerable to adverse impacts from mobile fishing gear.

3.3.2 Atlantic salmon HAPC

Seven small, coastal drainages located in the Downeast and midcoast sections of Maine hold the last remaining populations of native Atlantic salmon in the United States (MASA and USFWS 1996). These important rivers are the Dennys, Machias, East Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot. The U.S. Fish and Wildlife Service (USFWS) and NMFS have determined that these rivers represent one distinct population segment (DPS). A DPS is defined as a population of vertebrates that is discrete and ecologically significant. Four other rivers in Maine -- the Kennebec, Penobscot, St. Croix, and Tunk Stream -- are being considered for possible inclusion in the DPS.

By supporting the only remaining U.S. populations of naturally spawning Atlantic salmon that have historic river-specific characteristics, these rivers provide an important ecological function. These river populations harbor an important genetic legacy that is vital to the persistence of these populations and to the continued existence of the species in the United States. Unfortunately the habitat of these rivers is susceptible to a variety of human-induced threats, from dam construction and hydropower operations to logging, agriculture, and aquaculture activities. Human activities can threaten the ability of Atlantic salmon to migrate upriver to the spawning habitat, the quality and quantity of the spawning and rearing habitat, and also the genetic integrity of the native populations contained in the rivers. The habitat of these rivers serves two very important purposes in terms of being habitat areas of particular concern: (1) they provide a unique and important ecological function; and, (2) they are sensitive to human-induced environmental degradation. Accordingly, the rivers meet at least two criteria for designation as habitat areas of particular concern.

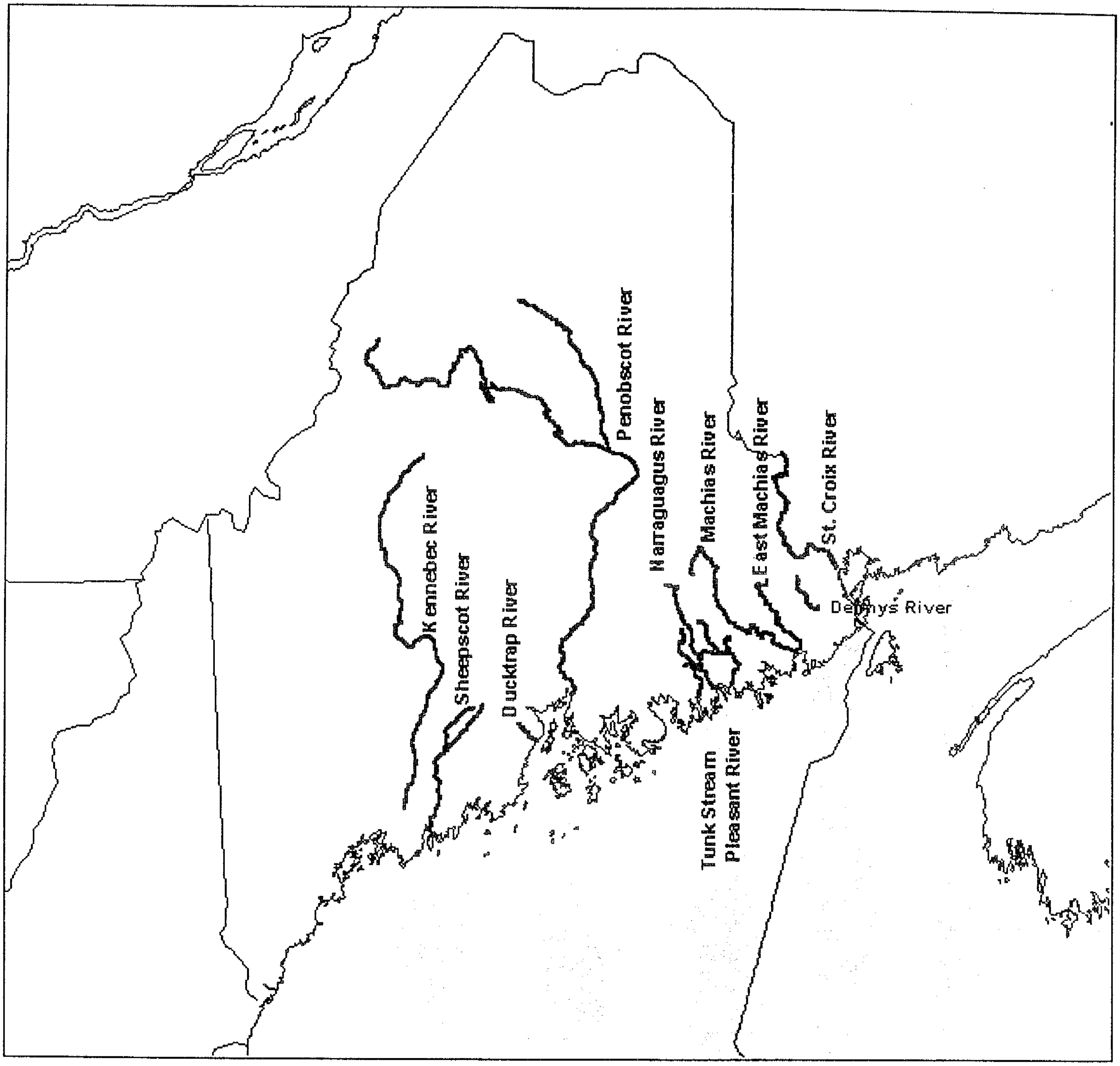
Figure 6: Habitat Area of Particular Concern for Juvenile Atlantic Cod



The shaded areas represent Closed Areas I and II, as indicated.

The darkened area within Closed Area II represents the Habitat Area of Particular Concern for juvenile Atlantic cod.

Figure 7: Habitat Areas of Particular Concern for Atlantic Salmon



These eleven rivers in Maine have been designated as "habitat areas of particular concern" for Atlantic salmon, based on the importance of the habitat of these rivers in supporting unique and important populations of Atlantic salmon in the United States.

SOUTH ATLANTIC SPECIES:

Cobia	Red drum
Golden crab	Spanish mackerel
King mackerel	

Red Drum (*Sciaenops ocellatus*)

Essential Fish Habitat (EFH) for Red Drum:

Essential fish habitat includes all of the following habitats to a depth of 50 meters offshore: tidal freshwater; estuarine emergent vegetated wetlands (flooded saltmarshes, brackish marsh, tidal creeks); estuarine scrub/shrub (mangrove fringe); submerged rooted vascular plants (sea grasses); oyster reefs and shell banks; unconsolidated bottom (soft sediments); ocean high salinity surf zones; and artificial reefs. The area covered includes Virginia through the Florida Keys.

Habitat Areas of Particular Concern (HAPC):

HAPC for red drum include all coastal inlets, all state-designated nursery habitats of particular importance to red drum; documented sites of spawning aggregations in North Carolina, South Carolina, Georgia and Florida; other identified spawning areas in the future; and habitats identified for submereged aquatic vegetation.

These habitats include the most important habitats required during the life cycle of the species, including the spawning areas and estuarine nursery grounds. Other areas of specific concern are barrier islands in each state, as these structures are vital to maintain estuarine conditions needed by larval and juvenile stages. Passes between barrier islands into estuaries also are very important, as the slow mixing of seawater and freshwater is generally regarded as being of prime importance in the productivity of the estuary. A rapid change may ause environmental stresses too great formany estuarine organisms to withstand.

Seagrass beds or submerged aquatic vegetation (SAV) prevelent in the Chesapeake Bay and the sounds and bays of North Carolina and Florida are also critical areas for red drum, particularly for 1 and 2 year old fish (>750mm or 29.5 in FL). Seagrass beds, shallow areas of estuarine rivers and mainland shorelines, are where many red drum reside during the summer.

The various inlets, adjoining channels, sounds, and outer bars of ocean inlets are critical areas for spawning activity as well as feeding and daily movements and may be affected by constant dredging, jettying or excessive boat traffic. Adult red drum spend a lot of time in these areas during spring and fall with large concentrations located near the least trafficked inlets.

Golden Crab (*Chaceon fenneri*)

Essential Fish Habitat (EFH) for Golden Crab:

Essential fish habitat for the Golden Crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straights (and into the Gulf of Mexico). In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The seven essential fish habitat types include: a flat foraminiferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat.

Golden crab maximum abundance occurs between 367 and 549 meters in the South Atlantic Bight. Information on sediment composition suggests that golden crab abundance is influenced by sediment type with the largest catches on substrates containing a mixture of silt-clay and foraminiferan shell.

Coastal Migratory Pelagics

King Mackerel (*Scomberomorus cavalla*)

Spanish Mackerel (*Scomberomorus maculatus*)

Cobia (*Rachycentron canadum*)

Essential Fish Habitat (EFH) for Coastal Migratory Pelagics:

Essential fish habitat for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum.* In addition, all coastal inlets, all state-designated nursery habitats of particular importance to coastal migratory pelagics.

For cobia, essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.

For king, Spanish mackerel and cobia, essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights.

HIGHLY MIGRATORY SPECIES AND BILLFISH:

Albacore tuna	Longfin mako
Atlantic angel shark	Porbeagle
Atlantic bigeye tuna	Sand tiger shark
Atlantic bluefin tuna	Sandbar shark
Atlantic sharpnose	Scalloped hammerhead
Atlantic skipjack	Shortfin mako
Atlantic swordfish	Silky shark
Atlantic yellowfin tuna	Thresher shark
Basking shark	Tiger shark
Blue marlin	**White marlin**
Blue shark	White shark
Dusky shark	

Atlantic Albacore (*Thunnus alalunga*)

Essential Fish Habitat (EFH) for Albacore Tuna :

- **Spawning, eggs and larvae:** At this time, available information is insufficient for the identification of EFH for this life stage within the U.S. EEZ.
- **Juveniles/subadults (<90 cm FL):** In surface waters with temperatures between 15.6° and 19.4° C, offshore the U.S. east coast in the Mid-Atlantic Bight from the 50 m isobath to the 2,000 m isobath with 71° W as the northeast boundary and 38° N as the southwest boundary.
- **Adults (>90 cm FL):** In surface waters with temperatures between 13.5° and 25.2° C, offshore the U.S. eastern seaboard between the 100 and 2,000 m isobaths from southeastern Georges Bank at 41.25° N, south to 36.5° N, offshore the Virginia/North Carolina border; also, in the Blake Plateau and Spur region, from 79° W east to the EEZ boundary and 29° N south to the EEZ boundary.

Longfin mako shark (*Isurus paucus*)

Essential Fish Habitat for Longfin Mako Shark :

Note: At this time, insufficient data is available to differentiate EFH by size classes, therefore EFH is the same for all life stages.

- **Neonate/early juveniles:** Off the northeast U.S. coast from the 100 m isobath out to the EEZ boundary, from south Georges Bank to 35° N; from 35° N south to 28.25° N off Cape Canaveral, FL, from the 100 m isobath to the 500 m isobath; from 28.25° N south around peninsular Florida and west to 92.5° W in the Gulf of Mexico, from the 200 m isobath to the EEZ boundary.
- **Late juveniles/subadults:** (Identical to neonate EFH): Off the northeast U.S. coast from the 100 m isobath out to the EEZ boundary, from south Georges Bank to 35° N; from 35° N south to 28.25° N off Cape Canaveral, FL, from the 100 m isobath to the 500 m isobath; from 28.25° N south around peninsular Florida and west to 92.5° W in the Gulf of Mexico, from the 200 m isobath to the EEZ boundary.
- **Adults:** (Identical to neonate EFH): Off the northeast U.S. coast from the 100 m isobath out to the EEZ boundary, from south Georges Bank to 35° N; from 35° N south to 28.25° N off Cape Canaveral, FL, from the 100 m isobath to the 500 m isobath; from 28.25° N south around peninsular Florida and west to 92.5° W in the Gulf of Mexico, from the 200 m isobath to the EEZ boundary.

Atlantic angel shark ***(Squatina dumerili)***

Essential Fish Habitat for Atlantic Angel Shark :

- **Neonate/early juveniles (50 cm TL):** Off the coast of southern New Jersey, Delaware, and Maryland from 39° N to 38° N, in shallow coastal waters out to the 25 m isobath, including the mouth of Delaware Bay.
- **Late juveniles/subadults (51 to 105 cm TL):** (Identical to neonate EFH): Off the coast of southern New Jersey, Delaware, and Maryland from 39° N to 38° N, in shallow coastal waters out to 25 m isobath, including the mouth of Delaware Bay.
- **Adults (106 cm TL):** (Identical to neonate EFH): Off the coast of southern New Jersey, Delaware, and Maryland from 39° N to 38° N, in shallow coastal waters out to the 25 m isobath, including the mouth of Delaware Bay.

Porbeagle (*Lamna nasus*)

Essential Fish Habitat (EFH) for Porbeagle Shark :

- **Neonate/early juveniles (100 cm TL):** From the 100 m isobath to the EEZ boundary from offshore Cape May, NJ, approximately 39° N to approximately 42° N (west of Georges Bank).
- **Late juveniles/subadults (101 to 224 cm TL):** From the 200 m isobath to the EEZ boundary; from offshore Great Bay, approximately 38° N to approximately 42° N (west of Georges Bank).
- **Adults (225 cm TL):** From offshore Portland, ME south to Cape Cod, MA along the 100 m isobath out to the EEZ boundary, and from Cape Cod south to the 2,000 m isobath out to the EEZ boundary.

Atlantic Bigeye Tuna (*Thunnus obesus*)

Essential Fish Habitat (EFH) for Bigeye Tuna :

- **Spawning, eggs and larvae:** At this time, available information is insufficient for the identification of EFH for this life stage within the U.S. EEZ; although it can not be identified as EFH under the Magnuson-Stevens Act because it is located outside the U.S. EEZ, the Gulf of Guinea, off the coast of Africa, is identified as important habitat for spawning adults, eggs and larvae.

- **Juveniles/Subadults (<100 cm FL):** In surface waters from southeastern Georges Bank to the boundary of the EEZ to Cape Hatteras, NC at 35° N from the 200 m isobath to the EEZ boundary; also, in the Blake Plateau region off Cape Canaveral, FL, from 29° N south to the EEZ boundary (28.25° N) and from 79° W east to the EEZ boundary (approximately 76.75° W).

- **Adults (100 cm FL):** In pelagic waters from the surface to a depth of 250 m: from southeastern Georges Bank at the EEZ boundary to offshore Delaware Bay at 38° N, from the 100 m isobath to the EEZ boundary; from offshore Delaware Bay south to Cape Lookout, NC (approximately the region off Cape Canaveral, FL), from 29° N south to the EEZ boundary (28.25° N), and from 79° W east to the EEZ boundary (76.75° W).

Sand tiger shark (*Carcharias taurus*)

Essential Fish Habitat for Sand Tiger Shark :

- **Neonate/early juveniles (125 cm TL):** Shallow coastal waters from Barnegat Inlet, NJ south to Cape Canaveral, FL to the 25 m isobath.
- **Late juveniles/subadults (126 to 220 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage.
- **Adults (221 cm TL):** Shallow coastal waters to the 25 m isobath from Barnegat Inlet, NJ to Cape Lookout; from St. Augustine to Cape Canaveral, FL.

Atlantic Bluefin Tuna (*Thunnus thynnus*)

Essential Fish Habitat for Atlantic Bluefin Tuna :

- **Spawning, eggs and larvae:** In pelagic and near coastal surface waters from the North Carolina/South Carolina border at 33.5° N, south to Cape Canaveral, FL from 15 miles from shore to the 200 m isobath; all waters from offshore Cape Canaveral at 28.25° N south around peninsular Florida to the U.S./Mexico border from 15 miles from shore to the EEZ boundary.
- **Juveniles/Subadults (<145 cm TL):** All inshore and pelagic surface waters warmer than 12° C of the Gulf of Maine and Cape Cod Bay, MA from Cape Ann, MA (~42.75° N) east to 69.75° W (including waters of the Great South Channel west of 69.75° W), continuing south to and including Nantucket Shoals at 70.5° W to off Cape Hatteras, NC (approximately 35.5° N), in pelagic surface waters warmer than 12° C, between the 25 and 200 m isobaths; also in the Florida Straits, from 27° N south around peninsular Florida to 81° W in surface waters from the 200 m isobath to the EEZ boundary.
- **Adults (>145 cm TL):** In pelagic waters of the Gulf of Maine from the 50 m isobath to the EEZ boundary, including the Great South Channel, then south of Georges Bank to 39° N from the 50 m isobath to the EEZ boundary; also, south of 39° N, from the 50 m isobath to the 2,000 m isobath to offshore Cape Lookout, NC at 34.5° N. In pelagic waters from offshore Daytona Beach, FL (29.5° N) south to Key West (82° W) from the 100 m isobath to the EEZ boundary; in the Gulf of Mexico from offshore Terrebonne Parish, LA (90° W) to offshore Galveston, TX (95° W) from the 200 m isobath to the EEZ boundary.

Sandbar shark (*Carcharhinus plumbeus*)

Essential Fish Habitat (EFH) for Sandbar Shark :

- **Neonates/early juveniles (90 cm):** Shallow coastal areas to the 25 m isobath from Montauk, Long Island, NY at 72° W, south to Cape Canaveral, FL at 80.5° W(all year); nursery areas in shallow coastal waters from Great Bay, NJ to Cape Canaveral, FL, especially Delaware and Chesapeake Bays (seasonal-summer); also shallow coastal waters to up to a depth of 50 m on the west coast of Florida and the Florida Keys from Key Largo at 80.5° W north to south of Cape San Blas, FL at 85.25° W. Typical parameters: salinity-greater than 22 ppt; temperatures-greater than 21° C.

- **Late juveniles/subadults (91 to 179 cm):** Offshore southern New England and Long Island, all waters, coastal and pelagic, north of 40° N and west of 70° W; also, south of 40° N at Barnegat Inlet, NJ, to Cape Canaveral, FL (27.5° N), shallow coastal areas to the 25 m isobath; also, in the winter, from 39° N to 36° N, in the Mid-Atlantic Bight, at the shelf break, benthic areas between the 100 and 200 m isobaths; also, on the west coast of Florida, from shallow coastal waters to the 50 m isobath, from Florida Bay and the Keys at Key Largo north to Cape San Blas, FL at 85.5° W.

- **Adults (180 cm):** On the east coast of the United States, shallow coastal areas from the coast to the 50 m isobath from Nantucket, MA, south to Miami, FL; also, shallow coastal areas from the coast to the 100 m isobath around peninsular Florida to the Florida panhandle at 85.5° W, near Cape San Blas, FL including the Keys and saline portions of Florida Bay.

- **Habitat Areas of Particular Concern:** Important nursery and pupping grounds have been identified in shallow areas and the mouth of Great Bay, NJ, lower and middle Delaware Bay, lower Chesapeake Bay, MD and near the Outer Banks, NC, in areas of Pamlico Sound adjacent to Hatteras and Ocracoke Islands and offshore those islands.

Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)

Essential Fish Habitat for Atlantic Sharpnose :

- **Neonate/early juveniles (55 cm TL):** Shallow coastal areas including bays and estuaries out to the 25 m isobath from Galveston Island south to the Rio Grande (Texas/Mexico border); from Daytona Beach north to Cape Hatteras, NC. Additionally, as displayed on Fig. 32e: shallow coastal bays and estuaries less than five meters deep, from Apalachee Bay to St. Andrews Bay, FL.
- **Late juveniles/subadults (56 to 84 cm TL):** Shallow coastal areas including bays and estuaries out to the 25 m isobath from Galveston Island south to the Rio Grande (Texas/Mexico border); off Louisiana from the Atchafalya River to Mississippi River Delta out to the 40 m isobath; from Daytona Beach, FL north to Cumberland Island, GA; Hilton Head Island, SC north to Cape Hatteras, NC out to the 25 m isobath (slightly deeper - to the 50 m isobath off North Carolina).
- **Adults (85 cm TL):** From Cape May, NJ south to the North Carolina/ South Carolina border; shallow coastal areas north of Cape Hatteras, NC to the 25 m isobath; south of Cape Hatteras between the 25 and 100 m isobaths; offshore St. Augustine, FL to Cape Canaveral, FL from inshore to the100 m isobath, Mississippi Sound from Perdido Key to the Mississippi River Delta to the 50 m isobath; coastal waters from Galveston to Laguna Madre, TX to the 50 m isobath.

Scalloped hammerhead (*Sphyrna lewini*)

Essential Fish Habitat for Scalloped Hammerhead :

- **Neonate/early juveniles (45 cm TL):** Shallow coastal waters of the South Atlantic Bight, off the coast of South Carolina, Georgia, and Florida, west of 79.5° W and north of 30° N, from the shoreline out to 25 miles offshore. Additionally, as displayed on Figure 6-10e: shallow coastal bays and estuaries less than 5 m deep, from Apalachee Bay to St. Andrews Bay, FL.

- **Late juveniles/subadults (46 to 249 cm TL):** All shallow coastal waters of the U.S. Atlantic seaboard from the shoreline to the 200 m isobath from 39° N, south to the vicinity of the Dry Tortugas and the Florida Keys at 82° W; also in the Gulf of Mexico, in the area of Mobile Bay, AL and Gulf Islands National Seashore, all shallow coastal waters from the shoreline out to the 50 m isobath.

- **Adults (250cm TL):** In the South Atlantic Bight from the 25 to 200 m isobath from 36.5° N to 33° N, then continuing south from the 50 m isobath offshore to the 200 m isobath to 30° N, then from the 25 m isobath to the 200 m isobath from 30° N south to 28° N; also, in the Florida Straights between the 25 and 200 m isobaths, from 81.5° W west to 82.25° W in the vicinity of Key West and the Dry Tortugas.

Atlantic Skipjack Tuna (*Katsuwonus pelamis*)

Essential Fish Habitat (EFH) for Skipjack Tuna :

- **Spawning, eggs and larvae:** In offshore waters, from the 200 m isobath out to the EEZ boundary, from 28.25° N south around peninsular Florida and the Gulf Coast to the U.S./Mexico border.
- **Juveniles/subadults (<45 cm FL):** In pelagic surface waters from 20° to 31° C in the Florida Straights off southeastern Florida, from the 25 m isobath to the 200 m isobath, from 27.25° N south to 24.75° N southwest of the coast of Key Largo, FL.
- **Adults (> 45 cm FL):** In pelagic surface waters from 20° to 31° C in the Mid-Atlantic Bight, from the 25 m isobath to the 200 m isobath, from 71° W, off the coast of Martha's Vineyard, MA, south and west to 35.5° N, offshore Oregon Inlet, NC.

Shortfin mako shark (*Isurus oxyrinchus*)

Essential Fish Habitat (EFH) for Shortfin Mako :

- **Neonate/early juveniles (95 cm TL):** Between the 50 and 2,000 m isobaths from Cape Lookout, NC, approximately 35° N, north to just southeast of Georges Bank (approximately 42° N and 66° W) to the EEZ boundary; and between the 25 and 50 m isobaths from offshore the Chesapeake Bay (James River) (North Carolina/Virginia border) to a line running west of Long Island, NY to just southwest of Georges Bank, approximately 67° W and 41° N.
- **Late juveniles/subadults (96 to 279 cm TL):** Between the 25 and 2,000 m isobaths from offshore Onslow Bay, NC north to Cape Cod, MA; and extending west between 38° N and 41.5° N to the EEZ boundary.
- **Adults (280 cm TL):** Between the 25 and 2,000 m isobaths from offshore Cape Lookout, NC north to Long Island, NY; and extending west between 38.5° N and 41° N to the EEZ boundary.

Swordfish (*Xiphias gladius*)

Essential Fish Habitat for Atlantic Swordfish :

- **Spawning, eggs and larvae:** From offshore Cape Hatteras, NC (approximately 35° N) extending south around peninsular Florida through the Gulf of Mexico to the U.S./Mexico border from the 200 m isobath to the EEZ boundary; associated with the Loop Current boundaries in the Gulf and the western edge of the Gulf Stream in the Atlantic; also, all U.S. waters of the Caribbean from the 200 m isobath to the EEZ boundary.

- **Juveniles/subadults (180 LJFL):** In pelagic waters warmer than 18° C from the surface to a depth of 500 m, from offshore Manasquan Inlet, NJ at 40° N, east to 73° N, and south to the waters off Georgia at 31.5° N, between the 25 and 2,000 m isobaths; offshore Cape Canaveral, FL (approximately 29° N) extending from the 100 m isobath to the EEZ boundary (south and east) around peninsular Florida; in the Gulf of Mexico from Key West to offshore Galveston, TX (95° W) from the 200 m isobath to the EEZ boundary, with the exception of the area between 86° W and 88.5° W, where the seaward boundary of EFH is the 2,000 m isobath.

- **Adults (>180 LJFL):** In pelagic waters warmer than 13° C from the surface to 500 m deep, offshore the U.S. east and Gulf coasts from the intersection of the 100 m isobath and the EEZ boundary southeast of Cape Cod, MA to south and offshore Biscayne Bay, FL at 25.5° N, from the 100 to 2,000 m isobath or the EEZ boundary, which ever is closer to land; from offshore Tampa Bay, FL at 85° N to offshore Mobile Bay, AL at 88° N between the 200 and 2,000 m isobaths; from offshore south of the Mississippi River delta, 89° N to offshore waters south of Galveston, TX, 95° N from the 200 m isobath to the EEZ boundary.

Silky shark (*Carcharhinus falciformis*)

Essential Fish Habitat for Silky Shark :

- **Neonate/early juveniles (97 cm TL):** Waters off Cape Hatteras, NC between the 100 and 2,000 m isobaths; plus shallow coastal waters just north and immediately west of Cape Hatteras; waters off St. Augustine, FL south to off Miami in depths 25 to 1,000 m, (likely along the west edge of the Gulf Stream); off northwest FL- De Soto Canyon area between the 200 and 2,000 m isobaths.

- **Late juveniles/subadults (98 to 231 cm TL):** Waters off the mouth of the Chesapeake Bay, MD south to waters offshore west of the North Carolina/ South Carolina border from the 50 to 2,000 m isobath; from the North Carolina/ South Carolina border south to Key West paralleling the 200 m isobath; the area northwest of Key West to west of Ten Thousand Islands between the 50 and 2,000 m isobaths.

- **Adults (232 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage.

Atlantic Yellowfin Tuna (*Thunnus albacares*)

Essential Fish Habitat (EFH) for Yellowfin Tuna :

- **Spawning, eggs and larvae:** In offshore waters, from the 200 m isobath out to the EEZ boundary, from 28.25° N south around peninsular Florida and the Gulf Coast to the U.S./Mexico border, especially associated with the Mississippi River plume and the Loop Current. Also, all U.S. waters in the Caribbean from the 200 m isobath to the EEZ boundary.
- **Juveniles/subadults (<110 cm FL):** Pelagic waters from the surface to 100 m deep between 18° and 31° C from offshore Cape Cod, MA (70° W) southward to Jekyll Island, GA (31° N), between 500 and 2,000 m; off Cape Canaveral, FL from 29° N south to the EEZ boundary (approximately 28.25° N) and from 79° W east to the EEZ boundary (approximately 76.75° W); in the Gulf of Mexico from the 200 m isobath to the EEZ boundary.
- **Adults (> 110 cm FL):** (Identical to juveniles/subadults EFH): Pelagic waters from the surface to 100 m deep between 18° and 31° C from offshore Cape Cod, MA (70° W) southward to Jekyll Island, GA (31° N), between 500 and 2,000 m; off Cape Canaveral, FL from 29° N south to the EEZ boundary (approximately 28.25° N) and from 79° W east to the EEZ boundary (approximately 76.75° W); in the Gulf of Mexico from the 200 m isobath to the EEZ boundary.

Thresher shark (*Alopias vulpinus*)

Essential Fish Habitat for Thresher Shark :

- **Neonate/early juveniles (200 cm TL):** Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N.
- **Late juveniles/subadults (200 to 319cm TL):** (Identical to neonate EFH): Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70 W and 73.5 W, south to 40 N.
- **Adults (320 cm TL):** (Identical to neonate EFH): Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N.

Basking shark (*Cetorhinus maximus*)

Essential Fish Habitat for Basking Shark :

- **Neonate/early juveniles (270 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage.
- **Late juveniles/subadults (271 to 810 cm TL):** Offshore the mid-Atlantic United States south of Nantucket Shoals at 70° W to the north edge of Cape Hatteras, NC at 35.5° N in waters 50 to 200 m deep; associated with boundary conditions created by the western edge of the Gulf Stream.
- **Adults (810 cm TL):** Offshore southern New England, west of Nantucket Shoals at 70° W to Montauk, Long Island, NY at 72° W, out to the continental shelf in waters 50 to 200 m deep, where water column physical conditions create high abundances of zooplankton.

Tiger shark (*Galeocerdo cuvieri*)

Essential Fish Habitat for Tiger Shark :

- **Neonate/early juveniles (120cm TL):** From shallow coastal areas to the 200 m isobath from Cape Canaveral, FL north to offshore Montauk, Long Island, NY (south of Rhode Island); and from offshore southwest of Cedar Key, FL north to the Florida/Alabama border from shallow coastal areas to the 50 m isobath.
- **Late juveniles/subadults (121 to 289cm TL):** Shallow coastal areas from Mississippi Sound (just west of Mississippi/Alabama border) to the 100 m isobath south to the Florida Keys; around the peninsula of Florida to the 100 m isobath to the Florida/Georgia border; north to Cape Lookout, NC from the 25 to100 m isobath; from Cape Lookout north to just south of the Chesapeake Bay, MD from inshore to the 100 m isobath; north of the mouth of Chesapeake Bay to offshore Montauk, Long Island, NY (to south of Rhode Island between the 25 and 100 m isobaths; south and southwest coasts of Puerto Rico from inshore to the 2,000 m isobath.
- **Adults (290 cm TL):** Offshore from Chesapeake Bay, MD south to Ft. Lauderdale, FL to the western edge of the Gulf Stream; from Cape San Blas, FL to Mississippi Sound between the 25 and 200 m isobaths; off the south and southwest coasts of Puerto Rico from inshore to the 2,000 m isobath.

White shark (*Carcharodon carcharias*)

Essential Fish Habitat (EFH) for White Shark :

- **Neonate/early juveniles (175 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage.
- **Late juveniles/subadults (175 to 479 cm TL):** Offshore northern New Jersey and Long Island, NY in pelagic waters from the 25 to 100 m isobath in the New York Bight area, bounded to the east at 71.5° W and to the south at 39.5° N; also, offshore Cape Canaveral, FL between the 25 and 100 m isobaths from 29.5° N south to 28° N.
- **Adults (480cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage.

Dusky shark (*Carcharhinus obscurus*)

Essential Fish Habitat for Dusky Shark :

- **Neonate/early juveniles (115 cm TL):** Shallow coastal waters, inlets and estuaries to the 25 m isobath from the eastern end of Long Island, NY at 72° W south to Cape Lookout, NC at 34.5° N; from Cape Lookout south to West Palm Beach, FL (27.5° N), shallow coastal waters, inlets and estuaries and offshore areas to the 100 m isobath.
- **Late juveniles/subadults (116 to 300 cm TL):** Off the coast of southern New England from 70° W west and south, coastal and pelagic waters between the 25 and 200 m isobaths; shallow coastal waters, inlets and estuaries to the 200 m isobath from Assateague Island at the Virginia/Maryland border (38° N) to Jacksonville, FL at 30° N; shallow coastal waters, inlets and estuaries to the 500 m isobath continuing south to the Dry Tortugas, FL at 83° W.
- **Adults (301 cm TL):** Pelagic waters offshore the Virginia/North Carolina border at 36.5° N south to Ft. Lauderdale, FL at 28° N between the 25 and 200 m isobaths.

APPENDIX F. "ECONOMIC IMPACTS AND PROTECTING ESSENTIAL FISH HABITAT: AMENDMENT 13 TO THE SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN" (HICKS *ET AL.* 2001)

August 19, 2002

Economic Impacts and Protecting Essential Fish Habitat: Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan

Rob Hicks
College of William and Mary
Virginia Institute of Marine Science
School of Marine Science
Gloucester Point, Virginia 23062

Dan Holland, Assistant Professor
University of Massachusetts Dartmouth
School for Marine Science and Technology
706 S. Rodney French Blvd.
New Bedford, MA 02744-1221

James E. Kirkley*
College of William and Mary
Virginia Institute of Marine Science
School of Marine Science
Gloucester Point, Virginia 23062

Ivar Strand
University of Maryland
College of Agriculture and Life Sciences
Department of Agricultural and Resource Economics
Symon's Hall
College Park, Maryland 02742

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*Contact: James E. Kirkley, College of William and Mary, Virginia Institute of Marine Science, School of Marine Science, Gloucester Point, Virginia 23062. Prepared for the Mid-Atlantic Fishery Management Council. August 2001.

Executive Summary

Protecting and restoring essential fish habitat (EFH) is of critical concern to the National Marine Fisheries Service (NMFS). The 1996 Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) directs NMFS and the eight regional fishery management councils, under authority of the Secretary of Commerce to do the following: (1) describe EFH and identify EFH in each fishery management plan; (2) minimize to the extent practical the adverse effects of fishing on EFH; and (3) identify other actions to encourage the conservation and enhancement of EFH. It is also the position of NMFS that the MSFCMA mandates that EFH requirements are incorporated into fishery management plans (FMPs).

Amendment 12 to the summer flounder (*Paralichthys dentatus*), scup (*Stenotomous chrysops*), and black sea bass (*Centropristis striata*) FMP was partially approved in concept, but subsequently rejected because of inadequacies in dealing with minimizing to the extent practical the adverse effects of fishing on EFH essential fish habitat. Failure to adequately address issues related to minimizing the adverse effects of fishing on EFH is a basis for disapproval of an amendment. The amendment described EFH at all life stages for the three species, but did not provide an assessment of the potential economic ramifications of regulatory actions designed to protect or restore EFH.

Since Amendment 12, the Mid-Atlantic Fishery Management Council (MAFMCA) has developed regulatory options for protecting EFH. Eleven options were proposed, and six of the proposed options were subsequently rejected for further analysis. The five remaining options are as follows: (a) take no action, which is the status quo (Alternative 1); (b) prohibit bottom tending mobile gear from the nearshore areas of Albemarle Sound, Chesapeake Bay, Delaware Bay, and New York Harbor, from 3.0 miles offshore extending to the 60-foot depth contour (Alternative four); (c) prohibit bottom tending mobile gear from the areas adjacent to the Hudson Canyon, between the 200-foot and 500-foot depth contour (Alternative five); (d) restrict the size of roller rig and rock hopper gear (Alternative 8); and (e) prohibit the use of street sweeper gear (Alternative 10).

This report provides a limited assessment of the potential economic ramifications of Alternatives 4 and 5 relative to the status quo. Although regulating the components of all bottom fishing gear might help protect EFH, it is not known how restricting the size of roller rig and rock hopper gear or prohibiting the use of street sweeper gear will affect or impact the commercial fisheries. Rock hoppers, roller rigs, and street sweeping gear are not used on dredge vessels. It also appears that there has not been any gear work done in the geographic areas associated with the two area closure alternatives. The Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center, NMFS, has conducted extensive gear research on the potential ramifications of bottom gear on EFH, but their work has focused mostly on determining how existing gear affects EFH. The research has not yet advanced to the stage in which results could be used to determine gear modifications necessary for protecting EFH. More important, the impacts of gear modifications designed to protect EFH are likely to be area specific, and no studies have been conducted in the areas associated with alternatives 4 and 5. Projections of potential changes in landings associated with the proposed gear restrictions would be, at best, speculative and highly imprecise. We would expect fixed costs to owners of trawl vessels to increase if the gear restrictions were adopted; we also would anticipate short-run reductions in landings and revenues.

The present work is also limited because it does not address completely the net national benefits. In order to assess completely the affects benefits to society from protection or restoration of EFH, it would be necessary to determine how improvements in EFH would affect future stock levels of the three regulated species, and subsequently, commercial and recreational harvesting activities. That is, the value to society, relative to the three regulated species, would be related to the benefits society derives from changes in commercial and recreational fishing activities. To fully assess the economic value of protecting EFH, it would be necessary to establish some baseline value of how EFH contributes to resource conditions and subsequent landings. It would then be necessary to assess how each specific EFH area contributes to the abundance, availability, recruitment, and growth of each of the three regulated species (i.e., summer flounder, scup, and black sea bass). The baseline information and potential biological responses to protecting EFH are not available. Information necessary for determining the economic value of protecting or restoring EFH for the three regulated species, therefore, is unavailable. We provide in a separate report a methodology, provided the baseline information was available, that could be used to assess the economic value or net benefit to society of restoring and protecting EFH (Strand et al. 2001). We also do not address fully address net national benefits because cost information necessary for estimating producer surplus is not available for each of the three gear types.

In lieu of an economic valuation study of protecting EFH, this study examines the potential ramifications of alternatives four and five on landings, prices, ex-vessel revenues, and consumer surplus associated with the three regulated species. The study also examines the impacts on landings and ex-vessel revenues of species jointly caught with the three regulated species and the three major bottom gears—fish otter trawl, other otter trawl, and sea scallop dredge--used in the areas associated with alternatives 4 and 5. Surfclam fishing by dredge is also conducted in the areas; problems with the existing data on surfclam dredge fishing activities, however, limited the scope of analysis relative to the surfclam dredge. The NEFSC logbook data had redundant observations and were incomplete.

Assessment of the potential revenue changes induced by alternatives four and five on the commercial fisheries required several mathematical and statistical models. One model was required to determine other areas and species that vessels might fish in response to alternatives 4 and 5. In addition, the model was also used to predict the quantities of other species that would be caught in the different areas by the different gear types. The estimation of changes in the areas and species fished was based on work done by John Walden of the Northeast Fisheries Science Center, NMFS. Walden had previously developed a mathematical programming model that permits an assessment of changes in areas and landings based on vessel operators maximizing revenues per month (Walden 2001). In addition, the effect of the changes in landings on the ex-vessel prices of summer flounder, scup and black sea bass was estimated. Because of the time limitations and the limited information on long-run biological effects of area closures, the analysis of the alternatives was based solely on the change in fishermen revenues and ex-vessel consumer surplus that result from changes in the areas fished and fish landed. The model and results cannot be used to predict or estimate the potential long-run impacts of protecting EFH. To do so would require a more complex model and different behavioral assumptions (e.g., the baseline information relating the important biological parameters to EFH and different behavioral assumptions, such as profit maximization).

Thus, the analysis is not meant to be a benefit-cost analysis of area closures. Even forgetting about including the long-run effects from the biological change, the economic short-run changes do not consider the change in costs associated with the closed areas, and thus, producer surplus is not calculated. The losses associated with alternative four are underestimated because the areas closed are nearshore, forcing the fishermen to spend more money and time traveling to the next best areas. The nature of this bias on alternative five is less clear because the area closed is offshore. The estimated changes in revenues must be taken simply as a partial assessment of the alternatives, awaiting information on fuel expenditures and the long-run biological effects of the closed areas.

The statistical models that were developed to estimate changes in landings, revenues, and consumer surplus of the species potentially affected by EFH alternatives used data from several sources. Three basic data sources were used for the analyses: (1) the NEFSC logbook data (1996-2000), (2) dealer or weight out data (1996-2000), and (3) the NMFS electronic monthly (1990-1999) database that contains information on total landings and values for all states. The NEFSC logbook data provides data on vessel activities between 1996 and 2000 and covers vessel activities between Maine and North Carolina. The logbook data does not contain price or revenue information, and thus, it was necessary to use the dealer data to estimate prices and revenues per trip and per vessel for the vessel activity contained in the logbook database. The NMFS electronic database provides information on landings and ex-vessel value and prices only for periods between 1990 and 1999. Three data sources were necessary. The logbook data and the dealer data contained the only information that could be used to predict changes in landings and areas. The NMFS electronic monthly database, however, contained the most appropriate data that could be used to estimate how prices and national ex-vessel revenues and consumer benefits would change in response to changes in landings.

Inverse demand or price dependent ex-vessel models were estimated for all species or species categories other than squid. We were unable to obtain statistically significant estimates of the relationship between ex-vessel prices and landings, regardless of the level of temporal aggregation or source of data. Monthly inverse demand models were estimated for the three regulated species—summer flounder, scup, and black sea bass—using the NMFS national electronic database. We were unable to estimate statistically acceptable monthly inverse demand models for monkfish and sea scallops; large quantities were often reported for no specific time period (i.e., NSP in the NMFS code). Annual inverse demand models, however, were estimated for sea scallops and monkfish or angler fish using the NMFS annual national electronic data base and observations between 1970 and 1999. For the other species category, the inverse demand was estimated using mean monthly prices and revenues obtained from the logbook and dealer data; the total number of observations used to estimate the other species category equaled 12. The inverse demand models were used to estimate changes in ex-vessel prices, ex-vessel revenues, and consumer surplus.

It is important to understand that the national database contains the more appropriate data for estimating ex-vessel demand. The three regulated species as well as the other species that might be affective by the EFH alternatives are landed in states other than those between Maine and North Carolina, and thus, prices are also influenced by landings in other states not covered by the logbook and dealer data. Moreover, FMPs require an assessment of national benefits and not only localized benefits (e.g., consumer surplus for the Mid-Atlantic region).

The use of the various databases, however, does present some problems for the analysis. Average ex-vessel prices at the national level do not equal the prices corresponding to the logbook and dealer data. Ex-vessel prices and revenues for the vessel activity available in the logbook database had to be calculated using dealer weight-out data or the port-specific data obtained by NMFS from dealers. There are, thus, differences between ex-vessel prices and revenues obtained from the data sources (e.g., the average annual price for summer flounder equaled $1.87 per pound when calculated using the national data; it equaled $1.09 when calculated using the dealer data). Because of the differences in the data sets, estimates of revenue changes based on the logbook data are different than estimates of revenue changes using the national data. If the dealer prices equaled the national prices, however, the estimated changes in revenues based on the logbook data would equal the estimated changes in revenues based on the national data.

Results of the analyses indicate substantial reductions in revenues and consumer surplus from adoption of either alternative, although alternative four would generate the largest loss (Table 1). Considering vessels operating between Maine and North Carolina (the logbook data), the overall loss in ex-vessel revenue from the adoption of alternative four is between $2.32 and $2.55 million per year; total landings of all species are projected to decline by 3.91 million pounds. Under alternative five, ex-vessel revenues are projected to decline between $2.16 (prices of all species are allowed to change in response in changes in landings) and $2.4 million per year (price is assumed to remain constant); landings are projected to decline by 2.33 million pounds under alternative five. Similarly, consumer surplus for all species is projected to decline by $789.0 thousand under alternative four and by $758.0 thousand under alternative five. A reason why the potential losses in consumer benefits are so close is that under alternative five there are large losses of sea scallops, which generally have a high consumer surplus value.

The lower bound projected revenue losses (i.e., $2.32 and $2.16 million) assume prices change in response to changes in landings; the higher projected revenue loss assumes no change in ex-vessel prices. It is important to remember that projected ex-vessel values, assuming no price changes, are lower than what would be expected when the projected landings are less than the status quo landings. A decrease in landings normally increases ex-vessel prices, and thus, projected revenues should actually be higher projected using the assumption that ex-vessel prices do not change. Similarly, projected losses in revenues, allowing prices to change in response to changes in landings, would be lower than revenues projected assuming no change in ex-vessel prices. Similar conclusions apply to the case of projected increases in landings. That is, the projected revenues, assuming no price changes, are higher than would be projected if price changes were considered. Higher landings would normally decrease ex-vessel prices. Projected gains, assuming no change in ex-vessel prices, would thus be higher than the gains that would occur if prices were allowed to change in the normal manner (i.e., prices would decline as landings increased). Alternatively, when landings are projected to increase, the projected revenues, assuming no change in prices, understates the ex-vessel value. The projected gains, assuming no changes in prices, therefore, overstate the potential increases in ex-vessel value. The converse applies to the case of landings decreasing relative to the status quo.

The bulk of the loss is imposed on fishermen using fish otter trawls and scallop dredges. The estimated loss in revenue to other gear type is less than $200.0 thousand. Projected losses in revenues to fish otter trawl gear, assuming no changes in ex-vessel prices, equal$2.27 million under alternative four and $1.15 million under alternative five. Projected losses to scallop dredge gear, assuming no changes in ex-vessel prices, equal $163.3 thousand under alternative four and $1.07 million under alternative five. Actual losses, however, would be less because of price increases relative to decreased landings. No attempt was made to calculate changes in ex-vessel prices by gear type or consumer surplus losses or changes by gear type. In terms of landings, the primary species affected by either alternative four or five is summer flounder. Under alternative four, revenue is projected to decline by nearly $600.0 thousand; under alternative five, the ex-vessel revenue of summer flounder is projected to decline by less than $160.0 thousand. In terms of revenue losses, however, the primary species affected by either alternative four or five is sea scallops. Under alternative five, the ex-vessel revenue of sea scallops is projected to decline by $1.28 million; under alternative four, the ex-vessel revenue of sea scallops is projected to decline by less than $208.0 thousand. Large reductions in revenues for either alternative also occur for the all other species category. Under alternative four, ex-vessel revenues for all other species are projected to decline between $1.48 and $1.66 million; under alternative five, ex-vessel revenues for all other species are projected to decline between $562.0 and $633.2 thousand.

On a per vessel basis, the potential losses are quite large. On an annual basis, an average of sixty-eight vessels fished the areas defined by alternatives four and five. Under alternative four, the average annual loss per vessel equals between $34.1 and $37.9 thousand. Under alternative five, the potential average annual loss is between $31.7 and $35.3 thousand. On a per gear basis, assuming no change in ex-vessel prices, the potential loss in revenue per scallop dredge vessel equals $10.9 thousand under alternative four and $39.7 thousand under alternative five. Revenues to fish otter trawl vessels, assuming no changes in ex-vessel prices, decrease by $48.3 thousand under alternative four and by $32.9 under alternative five. Revenues to other otter trawl vessels, also assuming no changes in ex-vessel prices, are projected to decline by $19.4 thousand per year under alternative four and by $29.4 thousand under alternative five.

If we consider potential changes in ex-vessel revenues on a per trip basis and assume no changes in ex-vessel prices, revenues are projected to decline by $898.3 and $6,204.5, respectively, under alternative four and five. Projected average losses per trip for affected vessels for the three major gear types are as follows: (1) fish otter trawl--$854.37 (alternative four) and $4,069.56 (alternative five); (2) sea scallop dredge--$1,081.26 (alternative four) and $12,771.62 (alternative five); (3) other otter trawl--$3,761.29 (alternative four) and $8,831.40 (alternative five);

Excluding the all other species category, consumers are most affected by the loss in the sea scallop harvest. The reader is again reminded that these revenue losses are underestimates of total loss to the fishermen because they do not include increased costs from having to fish further offshore. Under alternative four, consumer surplus declines by $52.8 thousand; under alternative five, consumer surplus declines by nearly $300.0 thousand. The largest reductions in consumer surplus occur for the all other species category: (1) $572.9 thousand for alternative four; and (2) $361.5 thousand for alternative five. If we consider the national level and only the three regulated species, total consumer surplus declines by $195.6 thousand under alternative four and by $131.7 thousand under alternative five.

Overall, we find that alternative four generates the largest losses in terms of product landed (3.91 million pounds), ex-vessel revenues ($2.32 to $2.55 million), and consumer surplus ($789.0 thousand). Alternative five generates lower losses in landings (2.33 million pounds) than alternative four, but nearly the same losses in ex-vessel revenues ($2.16 to $2.40 million) and consumer surplus ($758.0 thousand). This result is primarily associated with the fact that alternative five more adversely affects sea scallop landings, and the sea scallop is a high-valued product with high consumer surplus. On a per species basis, the largest losses in landings occur for summer flounder under alternative four (526.1 vs. 137.6 thousand pounds under alternative five). The largest reductions in scup occur under alternative five—323.2 vs. 62.89 thousand pounds). The largest potential reductions in landings of black sea bass occur under alternative four—15.3 vs. 8.9 thousand pounds). The largest losses in landings occur for the all other species category—3.03 under alternative four vs. 1.47 million pounds under alternative five). Relative to the three regulated species, landings are projected to decline by 604.1 and 469.7 thousand pounds, respectively, under alternatives four and five. On a per vessel basis, the highest average annual losses in revenue occurs for alternative four ($34.1 to $37.9 thousand per year vs. $31.7 and $35.3 thousand under alternative five). On a per trip basis, the largest annual losses in revenues are projected to occur under alternative five ($6,204.5 vs. $898.3 under alternative four).

Table 1. Projected Changes in Landings, Ex-vessel Revenues, and Consumer Surplus from Alternatives Four and Five

Region and Impact Variable	Goosefish[a]	Black Sea Bass	Sea Scallops[b]	Summer Flounder	Scup	Squid[c]	All Other[b]	Total
Logbook Data: Maine-North Carolina								
Alternative Four								
Change In Landings	49,287	-15,257	-41,112	-526,054	-62,782	-286,743	-3,029,610	-3,912,271
Change in Revenue-No Price Change	81,121	-13,966	-207,519	-570,250	-53,508	-122,575	-1,662,646	-2,549,343
Change in Revenue	80,726	-13,260	-187,846	-559,847	-40,960	-122,575	-1,475,384	-2,319,146
Change in Consumer Surplus	31,504	-3,340	-52,785	-178,742	-13,497	0	-572,934	-789,794
Alternative Five								
Change In Landings	25,722	-8,943	-255,644	-137,593	-323,156	-152,611	-1,473,605	-2,325,830
Change in Revenue-No Price Change	69,223	-8,104	-1,278,071	-158,209	-260,135	-132,609	-633,223	-2,401,128
Change in Revenue	68,906	-7,432	-1,175,825	-129,480	-218,617	-132,609	-561,976	-2,157,033
Change in Consumer Surplus	26,883	-2,150	-291,722	-64,887	-64,702	0	-361,464	-758,042
Alternative Four								
Change In Landings		-15,257		-526,054	-62,782			-604,093
Change in Revenue		-20,901		-788,461	-57,911			-867,273
Change in Consumer Surplus		-3,340		-178,742	-13,497			-195,579
Alternative Five								
Change In Landings		-8,944		-137,593	-323,156			-469,693
Change in Revenue		-11,777		-142,968	-343,427			-498,172
Change in Consumer Surplus		-2,150		-64,887	-64,702			-131,739

[a]Goosefish or angler fish projected values were based on a U.S. annual ex-vessel price model; annual data for the period 1970 through 1999 were used to estimate the inverse demand.
[b]The inverse demand models for sea scallops and the all other species category were estimated using average 1996-2000 average monthly landings and price data (N or the number of observations equaled 12).
[c]It was not possible to develop an ex-vessel price model for squid.

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Economic Impacts and Protecting Essential Fish Habitat: Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan

1.0 Introduction

In 1996, the U.S. Congress added new habitat conservation provisions to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The Findings section of the MSFCMA states "*One of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources in the United States.*" The Magnuson-Stevens Act mandates the identification of all essential fish habitat for managed species as well as measures to conserve and enhance the habitat necessary for fish to carry out their life cycles (nmfs.noaa.gov/essential fish habitat, 2001).

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802(10)). Waters include all aquatic areas and associated physical, chemical, and biological properties that are used by fish; areas historically important to fish may also be included. Substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities. The term necessary is perhaps the most important for understanding the definition of EFH. The National Marine Fisheries Service (NMFS) defines necessary to mean the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem.

The 1996 MSFCMA directs NMFS and the eight regional fishery management councils, under the authority of the Secretary of Commerce to do the following: (1) describe EFH and identify EFH in each fishery management plan (FMP); (2) minimize to the extent practicable the adverse effects of fishing on EFH; and (3) identify other actions to encourage the conservation and enhancement of EFH.

The NMFS has taken the position that the MSFCMA mandates that EFH requirements be incorporated into FMPs (Federal Register, 1997). NMFS also states that FMPs must achieve and maintain on a continuing basis, the optimum yield (OY) from each fishery. The OY should provide the greatest national benefit, which includes food production and recreational opportunities, and also takes into account protection of marine ecosystems.

As stated, the MSFCMA and position of NMFS mandates that FMPs should promote maximum benefits to the nation with respect to food production and recreational opportunities conditional on protecting the marine environment. Development of FMPs, therefore, should consider the corresponding benefits and costs of proposals for protecting EFH. Unfortunately, the determination of the economic net benefits from conserving and protecting EFH is likely to be extremely complicated, if not impossible.

For many fisheries and ecosystems, the biological and physical linkages necessary to determine the economic ramifications of protecting EFH are unknown. At the same time, many of the important parameters of EFH have no market. That is, one cannot go to the market and buy x units of submerged aquatic vegetation and two units of chemical properties important for sustaining fish populations. The economic values of the components of EFH cannot, therefore, be directly estimated in a manner similar to the economic value of fish commercially sold. Instead, the economic value of protecting EFH must be defined and measured within a non-market valuation (e.g., what value might society place on 1,000 acres of submerged aquatic vegetation—SAV?).

Special studies might be developed to determine society's value of EFH, but they would likely be extremely expensive, and of little practical use. The reason they would be of limited practical use is that it is doubtful that sufficient information is available to permit society to adequately assess the importance and economic value of EFH. In essence, the economic value of protecting EFH is the enhanced value society derives from the protection or conservation action. For example, increased SAV offers protection of juvenile fish and subsequently increases recruitment at some later date. In this case, the economic value of increasing or protecting SAV would be the economic value derived from the future recruitment of fish less the cost to society of protecting the resource, which would include present-day losses to commercial and recreational anglers because of EFH protection.

As an example of valuing EFH, consider the economic value of wetlands. Anderson and Rockel (1991) of the American Petroleum Institute conducted a review of numerous studies that attempted to measure the value of wetlands. These studies either focused on individual functions of wetlands or considered multiple functions. The studies relating to the economic value of wetlands considered the value in terms of the functions of wetlands (e.g., flood conveyance; erosion, wind, and wave barriers; flood storage, sediment replenishment; fish and shellfish habitat; waterfowl habitat; recreation; and so on). The economic valuation of protecting and restoring EFH required the determination of all the functions of EFH and their subsequent contributions to fish stocks.

Section 303(a)(7) of the Magnuson-Stevens Act requires that fishery management councils, to the extent practical, shall minimize adverse effects on essential fish habitat (EFH) caused by fishing. In addition, 50 CFR, part 600.815 (a)(3) requires councils to prevent, mitigate, or minimize adverse effects from fishing, to the extent practical, if there is any evidence indicating that a particular fishing practice is having an identifiable adverse effect on EFH. Section 600.815 (a)(4) permits a range of management options to protect EFH; management options available to councils include fishing equipment restrictions, time and area closures, and harvest limits.

Amendment number 12 to the summer flounder (*Paralichthys dentatus*), scup (*Stenotomous chrysops*), and black sea bass (*Centropristis striata*) fishery management plan was partially approved. Inadequacies in dealing with essential fish habitat were responsible for not securing a complete approval. More specifically, Amendment 12 did not adequately address the economic importance of protecting or restoring essential fish habitat. In response, the Mid-Atlantic Fishery Management Council (MAFMC) proposed 11 regulatory options for managing adverse effects of fishing gear (Table 2). Six of the regulatory options were rejected and five were considered: (1) a no action alternative; (2) the prohibition of bottom tending mobile gear from nearshore areas of Albemarle Sound, Chesapeake Bay, Delaware Bay, and New York Harbor, from 3 miles offshore extending to the 60-foot depth contour; (3) the prohibition of bottom tending mobile gear from areas adjacent to the Hudson Canyon, between the 200-foot and 500-foot depth contour; (4) restrictions on the size of roller rig and rock hopper gear; and (5) prohibit the use of street sweeper gear.

This document presents an analysis of the potential economic ramifications of the proposed area closures. No attempt is made to assess the economic value to society of protecting or restoring EFH. Information necessary to determine the economic value and importance of protecting or restoring EFH are unavailable. It also is not feasible to assess the economic impacts or changes in value to society that might be generated by the proposed gear restrictions. Data necessary for assessing the potential economic impacts of the proposed gear options are not available. A review of various web sites (e.g., NOAA Sea Grant, FAO, and various scientific institutions) revealed no existing work on roller rig or rock hopper gear; most gear conservation and engineering studies appear to have focused on mesh (net) and ring (dredge) sizes or on bycatch reduction devices. The Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center, NMFS, has conducted extensive gear research on the potential ramifications of bottom gear on EFH, but most of their work has focused on determining how conventional commercial gear has affected EFH. RACE has just begun research on determining how gear could be modified to prevent damaging EFH. Moreover, gear studies would have to be conducted in the proposed EFH areas in order to adequately assess the potential economic impacts of the proposed gear restrictions; changes in landings because of changes in gear are usually area specific (DuPaul et al. 1989).

2.0 Essential Fish Habitat, Mobile Bottom Gear, and the Fisheries

The following two sections provide an overview of issues related to essential fish habitat and the commercial fisheries potentially affected by EFH restoration and protection activities.

2.1 Essential Fish Habitat

Amendment 12 provides a listing of important habitat parameters (e.g., temperature, salinity, light, etc.) for summer flounder, scup, and black sea bass. Section 600.815 (a)(2)(i)(B)states that in order to identify EFH, basic information is needed on current and historic stock size, the geographic range of the managed species, the habitat requirements by life history stage, and the distribution and characteristics of those habitats (MAFMC 1998). Chapter 2 of Amendment 12 provides a description of selected habitat parameters for each of the three managed species. The selected parameters include temperature, salinity, dissolved oxygen, light, water currents, predation, substrate and shelter, and distribution and abundance of larvae. The parameters are summarized relative to the life history--eggs, larvae, juveniles, and adults.

The three regulated species—summer flounder, scup, and black sea bass—are demersal species that have associations with substrates, submerged aquatic vegetation (SAV), and structured habitat (Packer and Griesbach 1998; Steimle et al. 1998a,b). The primary gears likely to affect EFH for the three species are bottom otter trawl, clam dredge, scallop dredge, and other dredge. There is, thus, a potential that the use of mobile gear to capture the three species could have an adverse impact on important EFH. As noted by the MAFMC (1998), however, it is difficult to predict the impact that mobile gear in contact with the bottom will have on the habitat. Amendment 12 (page 75) states "Although there is no way to gauge the intensity and severity of mobile gear in contact with the bottom, these gears are characterized as having a "potential adverse impact" on EFH."

Amendment 12 also states that all mobile gear coming into contact with the seafloor within summer flounder, scup, and black sea bass EFH is characterized as having a potential impact on their EFH. Unfortunately, the fishing effort of the various bottom tending gears is not well quantified from data collected by the Northeast Fisheries Science Center (NEFSC). Given the existing data and information, it is not possible to quantify either the adverse impacts of mobile bottom gear or the positive effects on EFH of regulatory options designed to protect or restore EFH.

2.2 The Fisheries

At least one of the three regulated species (i.e., either summer flounder, sea bass, or scup) has been landed in all states between Maine and Florida. The same species, however, has not been landed in all states (e.g., summer flounder was landed in some states, scup was landed in other states, and black sea bass was landed in different states) In terms of total landings of the three species and except for Rhode Island, the Mid-Atlantic states have typically had higher landings than the New England states (Figure 1).

Between 1990 and 1999, the New England states of Maine through Connecticut accounted for 31.6 % of total average annual landings. The mid-Atlantic states were responsible for 67.0 % of total average annual landings; the southern states of South Carolina, Georgia, and Florida had less than 1.5 % of the total average annual landings of the three species. New Jersey had the highest average annual landings of the combination of the three species—22.6 percent per year. Rhode Island had the second highest average annual landings of the three species—19.8 percent per year. North Carolina and Virginia ranked third and fourth in terms of total average annual landings of the three species—16.8 and 15.5 percent, respectively. The four states collectively accounted for an average of 74.7 percent of total landings of the three species between 1990 and 1999.

In terms of landings of the three species between Maine and Florida, scup and black sea bass have typically been landed in all states, except New Hampshire and South Carolina. New Hampshire also had no reported landings of scup or black sea bass between 1990 and 1999, and South Carolina had no reported landings of scup between 1990 and 1999. Relative to summer flounder, all states, except New Hampshire, South Carolina, and Georgia, reported landings between 1990 and 1999. Rhode Island and New Jersey have traditionally had the highest average annual landings of scup; on average, Rhode Island and New Jersey, respectively, accounted for 32.3 and 30.8 percent of the total landings of scup (Figure 2). New Jersey and North Carolina have traditionally had the highest average annual landings of black sea bass; between 1990 and 1999, New Jersey and North Carolina accounted for 27.3 and 21.3 percent of the total annual landings of black sea bass. Virginia's average annual share of the total landings of black sea bass equaled 18.1 percent between 1990 and 1999. Maryland had the fourth highest share of the average annual landings of sea bass—11.6 percent. North Carolina leads all states in terms of average annual landings of summer flounder—25.6 percent. Virginia landings of summer flounder accounted for 23.8 % of the total U.S. landings of summer flounder between 1990 and 1999. New Jersey and Rhode Island ranked third and fourth in terms of percent of total average annual landings of summer flounder—16.9 and 15.4 percent, respectively.

All three of the regulated species exhibit some degree of seasonality in landings and ex-vessel prices (Figures 3-5).[1] The primary months of landings for the three species are as follows: (1) summer flounder—January and February; (2) Scup—March, April, and May; and (3) black sea bass—January, February, March, and May. Seasonality of prices (i.e., highest average monthly price) is almost opposite that of landings: (1) summer flounder—March through June; (2) scup—July through October; and (3) black sea bass—July through September. The highest monthly prices coincide with the minimum monthly landings. Alternatively, prices and quantities reflect traditional demand and supply responses.

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[1] Seasonality indices obtained by dividing average monthly landings in each month by total average monthly landings over all months. More sophisticated monthly indices could be developed.

Relative to the two area-gear prohibitions, alternative four had the highest average annual landings and value between 1996 and 2000 (Table 3).[2] The average annual value and landings of summer flounder from the areas, which would be closed to mobile bottom tending gear, equaled $1.6 million and 1.5 million pounds between 1996 and 2000. The average annual value and landings of scup from areas defined by alternative equaled $16.6 thousand and 18.9 thousand pounds; average annual value and landings of black sea bass equaled $10.6 thousand and 11.8 thousand pounds. In terms of landed value, summer flounder had the highest average annual value from four areas associated with alternative four. Sea scallops, croaker, squid (loligo, illex, and other), and hake had the next highest average annual values from the four areas. Atlantic mackerel ranked 10th in average annual landed value from the areas associated with alternative four.

The total average annual value and landings from the area associated with alternative five equaled $6.4 million and 5.2 million pounds between 1996 and 2000 (Table 4). Sea scallop was the primary catch in terms of average annual landed value between 1996 and 2000. The average annual value and landings of sea scallops for the area defined by alternative five equaled $3.4 million and 0.7 million pounds of scallop meats. Goosefish, monkfish, or angler fish ranked second in terms of average annual value. Squid, summer flounder, and scup were third, fourth, and fifth in terms of average annual landed value. Black sea bass had the 11th highest average annual landed value from the area associated with alternative five. Atlantic mackerel had the seventh highest average annual value from the area defined by alternative five.

There are four major bottom tending mobile gears operating in the mid-Atlantic region that could be affected by the proposed area closure alternatives: (1) fish otter trawl; (2) other otter trawl; (3) sea scallop dredge; and (4) clam dredge. Of the four gear types, fish otter trawl had the highest average annual landings and value in the four nearshore areas (i.e., areas delineated by alternative four) (Figure 6).[3] Scallop dredge gear had the highest average annual value for alternative five, which proposes to prohibit bottom tending mobile gear from areas adjacent to the Hudson Canyon, between the 200-foot and 500-foot depth contour. Clam dredge activity had the third highest average annual value and landings with respect to the four nearshore areas, and other otter trawl gear had the fourth highest average landings. For alternative five, other otter trawl had the third highest average annual landings and value, while clam dredge had the fourth highest average annual landings and value. Average annual landings and value for the four gear types combined and the two alternatives equaled the following: (1) alternative four—11.9 million pounds and $7.3 million, and (2) alternative five—5.2 million pounds and $6.4 million. Relative to total landings and value of all the four gear types and operations south of Cape Cod, average annual landings and value equaled 166.6 million pounds and $159.0 million. Alternative four accounts for approximately 4.6 % of total value by the four gear types operating south of Cape Cod, Ma. and 7.1 % of total

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[2] All values based on the 1996 to 2000 NMFS logbook data are expressed in terms of 1996 constant dollar values.

[3] The description and summaries of operations by gear type and area are based on logbook data obtained from the Northeast Fisheries Science Center, NMFS. Data were obtained under a confidentiality agreement.

landings. Alternative five accounts for approximately 4.0 % of total value and 3.2 % of total landings.

A breakdown of landings and value by states for the four gear types reveals that New Jersey and North Carolina had the highest average annual value and landings in the alternative four areas (Figure 7).[4] Virginia had the third highest annual average value and landings in alternative four areas. For the alternative five area, Massachusetts had the highest average annual landings and value. New Jersey and Virginia had the third highest average value. Excluding Georgia and South Carolina, which had no reported landings in the areas defined by alternative four or 5, Florida had the lowest average annual landings and value in the areas related to alternative four and no reported landings in the area defined by alternative five. The other New England states—Maine, New Hampshire, Rhode Island, and Connecticut—had relatively low landings from the areas associated with alternative four.

In terms of the three regulated species—summer flounder, scup, and black sea bass—and the four gear types, the fish otter trawl is responsible for the majority of landings in the areas delineated by the two EFH area alternatives (Table 5).[5] Average annual landings of summer flounder, scup, and black sea bass by otter trawl for the areas associated with the alternative four equaled 1.5 million pounds, 18.8 thousand pounds, and 11.8 thousand pounds, respectively. Average annual landings for other types of otter trawl in the four areas associated with alternative four, respectively equaled, 16.1 thousand pounds, 0.0 pounds, and 20 pounds. Only landings of summer flounder by scallop dredge were reported for the four areas associated with alternative four; average annual landings equaled 4.5 thousand pounds between 1996 and 2000. In terms of percent of total revenue by the three gear types and relative to the four areas associated with alternative four, summer flounder accounted for 1.8, 29.7, and 31.7 % of the total revenue realized by scallop dredge, fish otter trawl, and other otter trawl.

2.3 Economic Dependency: Alternatives Four and Five

Between 1996 and 2000, mobile bottom tending gear, excluding clam dredge vessels, made approximately 2,838 and 387 trips per year, respectively, to the areas associated with alternative four and five. The majority of trips in the areas were made by fish otter trawl gear (Table 6). Scallop dredge vessels made an average 151 trips per year into areas defined by alternative four; vessel using a fish otter trawl made an average 2,656 trips per year between 1996 and 2000. Vessels fishing with other otter trawl gear averages 31 trips per year into the areas associated with alternative four. Similarly, vessels using a fish otter trawl had the highest average annual number of trips in the area defined by alternative five.

Approximately 68 vessels, on average, exploited the areas associated with alternative four between 1996 and 2000 (Figure 8). The major gear type was fish otter

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[4] Landings and landed value of clam dredge activity is not available by state. In addition, there were no landings by the four gear types reported for Delaware.

[5] Data obtained from the Northeast Fisheries Science Center, NMFS, indicate no landings of species other than surfclam or ocean quahog.

trawl; approximately 47 fish otter trawl vessels, on average, derived a portion of their total vessel earnings from areas associated with alternative four. In general, the 68 vessels realized, on average per year, approximately 11 percent of their total earnings and 12 percent of their total quantity landed (Figures 9 and 10). Relative to alternative five, 68 vessels (not the same 68 vessels that exploited the areas delineated under alternative four) derived a smaller portion of their total revenue from the area delineated by alternative five. Sea scallop dredge vessels realized approximately 5.4 percent of their total earnings and 4.6 percent of their total landings from the area delineated by alternative five; scallop dredge vessels realized less than 4.0 and 3.0 percent of their total revenue and landings from the areas characterized by alternative four. Both fish and other otter trawl had relatively high dependencies on the areas delineated by alternative four. Fish otter trawls vessels, on average, received approximately 12.0 percent of their total annual income from areas associated with alternative four; other otter trawl vessels received approximately 17.1 percent of their average annual revenue from the areas associated with alternative four.

3.0 Economic Impacts of Proposed Alternatives

This section examines the potential economic impacts of the proposed alternatives. The impacts are assessed in terms of changes in landings, ex-vessel prices, revenues, and consumer surplus associated with the three primary FMP species—summer flounder, scup, and black sea bass. Although amendment 13 is specific to summer flounder, black sea bass, and scup, the commercial fisheries for numerous other species could be affected by the two EFH alternatives. The potential changes in revenues, landings, and consumer surplus that could result for the two EFH alternatives are, thus, also examined.

3.1 Methodology

Measuring the economic effects from essential fish habitat designations requires data that will characterize current fishing activity on at least two spatial dimensions. First, it is important to know for each vessel where fishing activity took place, and secondly, it is important to know where the vessel landed its catch. Adapting the data collected in the Northeast United States to meet the needs of this type of analysis was a challenging task. The Northeast System tracks vessels as follows:

1) Vessels are required to fill out reports that describe date landed, date sailed, crew, latitude and longitude fished, as well as estimated catch for each species encountered, and other data elements. It also should be noted that vessels are required to fill out additional reports if they change gear or make a significant area change, so there is not necessarily a unique trip record.
2) Dealers are required to fill out reports indicating the landings and value by species for vessels and include information about the vessels permit number, where the dealer is located, and other information. It should be noted that this data is based upon actual measurements of catch and is considered to be much more accurate than fishermen's at-sea estimates of catch.
3) Observers are present on some trips taken in the Northeast. This data was too sparse to be of much use to us, and there is some question about sample selectivity issues since program participation is somewhat voluntary.

Given the data structure described above, it was determined that the trip report data, while an imperfect estimate of catch, was the only information that provided the necessary geographic detail so that a determination of the effects of area closures could be made. The vessel trip report data only contains quantities caught. We used the dealer data to generate prices for each species- required to calculate the value of the catch. Prices were generated by calculating the average price using dealer data (value/quantity) for each species by year, month, gear, and state of landing, and then converting to constant dollars using the implicit price deflator. Price data could then be merged with the trip report data by the reported state landed in the trip report files. Because of limitations of trip report data prior to 1996, we included only records for 1996 through 2000.

We downloaded data directly from the Northeast mainframes the latest data as of July 10, 2000. The data were placed into an access database. The next step was to calculate for each trip (and for those trips that had multiple gear records) where fishing activity was taking place relative to the proposed closures. To accomplish this, the trip report data was put into ARCVIEW 3.2a, a standard GIS (Geographical Information System) software package. Next we created a coverage of polygons representing the closed areas (based upon points given to us from the Mid Atlantic Council). The GIS system allowed us to overlay the closure polygons on the vessel trip report data (point data using latitude and longitudes).

Plotting fishing activity for the years 1996-2000 revealed that roughly 2% of the observations reported a latitude/longitude pair placing them directly on the US mainland. For these records, we assumed that they were fishing in other Mid Atlantic areas. By necessity, we assumed that all other records had accurate latitude and longitude and we did not conduct any further error checking of the data with regard to spatial integrity (for example, analyzing if any other spatial information in the trip records, such as the reported Northeast Statistical Area coincided with reported location). For many records, only degrees and minutes were reported. This has an important impact on visualizing data (but not in determining if trips were effected by the closure) since many observations are potentially stacked on a single degree and minute point. Where missing, we randomly generated seconds from uniform distribution. This allowed us to view the data in a meaningful way.

Using Arcview's geoprocessing tool, we assigned variables to each unique trip and geared record indicating if the activity occurred within one of the closed areas and if so, which one. Additionally, we used Arcview's spatial analyst tool to create density plots of catch for each gear type used in the analysis.[6] This was a very useful way of very quickly visualizing the likely impacts of spatial closures on the different gear. Once records were assigned indicators for each of the proposed polygons, we exported the information to SAS so that summary runs could be generated.

In order to assess the potential impacts of regulatory alternatives, it was necessary to develop several analytical models. Inverse demand models were needed to estimate changes in prices, revenues, and consumer surplus or consumer benefits. Area choice models had to be developed to estimate changes in areas fished and landings, on a per species basis, the might be occur by closing areas associated with alternatives four and five.

Inverse demand or price-dependent models were developed using national monthly data for three regulated species—summer flounder, scup, and black sea bass; these were all monthly models. Monthly inverse demand models for monkfish and sea scallops could not be estimated because of data inadequacies (large quantities of landings in numerous years were associated with no specific period or month). The inverse demand models for monkfish and sea scallops were, therefore, estimated using annual

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[6] Scallop Dredge:NE gearcode DRS, Surfclam Dredge: used records from surfclam ITQ data, Otter Trawl Fish: NE gearcode OTF, and Otter Trawl Other: NE gearcodes OTC OTO OTS

data for the years 1970 through 1999. Regardless of the temporal level of data available, we were unable to estimate an inverse demand for squid (loligo, illex, and other). We also were unable to estimate an inverse demand model for the all other species category using the NMFS national data; this was likely because of aggregation problems (aggregating over different species to develop a composite output) and large landings being reported for no specific period. Subsequently, an inverse demand model for all other species was estimated using 1996-2000 mean monthly landings and price data (i.e., the logbook and dealer data).

The area selection or choice models were developed for sea scallop dredge, fish otter trawl, and other types of otter trawl. Species examined with the area choice models were angler or monkfish (also called goosefish), black sea bass, scup, summer flounder, sea scallops, squid (loligo, illex, and other), and all remaining or other species (total less sum of species examined). The area-selection analysis was based on monthly activity by individual vessel. Average annual and monthly landings and values for 1996 through 2000 were selected as the reference or status quo levels (i.e., levels upon which estimated landings and value are compared to status quo landings and value). All prices and values in the analysis were in terms of 1996 constant dollar values. The final impacts, however, are in terms of year 2000 constant dollar values.

The monthly inverse demand models specified the nominal monthly ex-vessel price to be a linear function of monthly landings, time trends, and monthly dummy interaction variables (monthly dummy multiplied by monthly landings) and intercepts (monthly dummy equals 1.0 if observation is specific to a given month and zero otherwise). Monthly models were developed for the three regulated species—summer flounder, scup, and black sea bass using the NMFS national electronic database. More complicated and theoretically consistent models could be developed; it was decided, however, that the more complicated models generally yield less precise predictions of changes in price. Moreover, future use of the more complicated models would require predicting the values of several other variables (e.g., disposable income or food expenditures, population, and the rate of inflation on a monthly basis). In actuality, the theoretically correct specification of the ex-vessel demand would require specification of dual profit function for firms that purchase fish directly from the ex-vessel sector. Subsequently, it would be possible to specify a derived demand for fish at the ex-vessel level. Unfortunately, the information necessary for estimating the derived demand is not available (e.g., profit and input and output prices and quantities).

The annual inverse demand models for sea scallops and monkfish specified nominal ex-vessel price to be a linear function of landings and a time trend (i.e., year=1970,...,1999). These models were used to estimate changes in the annual ex-vessel prices, revenues, and consumer surplus that would be generated by the two EFH alternatives. An inverse demand model for the all other category was estimated using only 1996-2000 monthly mean prices and landings obtained from the logbook and dealer data. The inverse demand model for the all other category specified ex-vessel price as a linear function of an intercept and landings. In this case, we actually estimate only the demand schedule and not the demand function; we do not allow the demand curve to shift upwards or downwards.

The inverse demand models were used to estimate changes in prices, ex-vessel revenues, and consumer surplus. It would be preferred, however, to also estimate changes in net benefits (the sum of consumer and producer surplus). As illustrated by Edwards (1990), net benefits should equal the sum of producer surplus at all market levels plus consumer surplus at the final consumer level. Data necessary for estimating either producer surplus at all market levels or consumer surplus at the final market level (i.e., retail) are not available.

All inverse demand models were estimated by either ordinary least squares (OLS), generalized least squares (GLS), or maximum likelihood methods. Results were examined for stability and the presence of various error problems (e.g., autocorrelation, autoregressive-conditional-heteroscedasticity, structural trends, outliers, and recursive residuals). Final estimates are presented in Tables 7-12. There were a total of 120 monthly observations for the three regulated species; 30 observations for monkfish and sea scallops; and 12 observations for the all other species category. Dummy variables for years were included to accommodate structural change, which was identified by an examination of the recursive residuals and cusum and cusum-squared statistics. Estimates were fairly robust and the adjusted R-squared values were indicative of adequate explanatory power of the models. Testing for 12^{th} order autocorrelation indicated no problems in the monthly models; first-order autocorrelation was corrected when found (first-order autocorrelation characterize only the summer flounder relationship). The inverse models provide the basis for estimating changes in prices, ex-vessel revenues, and consumer surplus; consumer surplus equals the mathematical value of the integration of the inverse demand models with respect to quantity minus expenditures or revenues (ex-vessel price times quantity).

Area selections associated with prohibitions on trawls and dredges in the areas defined by alternatives four and five were determined using a non-linear programming model developed by Walden (2001) of the Northeast Fisheries Science Center (NEFSC), National Marine Fisheries Service (NMFS). The model developed by Walden is a generalized area selection model, which was developed to assist in the assessment of the impacts of area closures. The model is nonlinear and solves a positive mathematical programming problem. The model selects areas based on maximization of revenue per vessel per month. It is thus a temporal-spatial model. The basic structure of the model is to maximize total revenue of a vessel (TR_a) by allocating a number of days in a month to a specific area (i) and species (j). Effort is limited or constrained by the number of days available in a given month. The model may accommodate single or multi-species fisheries. Production is estimated as part of the model using catch per unit effort (CPUE). The model is run one time for each vessel. Additional details of the model are available in Walden (2001).

Data were provided to Walden of the NEFSC and the model was solved for all vessels fishing in the areas associated with the two alternatives and using either fish otter trawl, other otter trawl, or sea scallop dredge. The species or groupings of species included in the analysis were as follows: (1) angler or monkfish, (2) black sea bass, (3) sea scallops, (4) scup, (5) summer flounder, (6) squid (loligo, illex, and other), and (7) all other (total less sum of species/groups 1-6. Surfclam and quahog dredge activity was excluded from the model.

The impacts assessed in this analysis are primarily short-run and void of the future ramifications. By short-run, it is implied that operators would not have sufficient time to make gear changes to possibly mitigate the negative impacts of the EFH alternatives. We also do not consider possible changes in crew sizes or relocation of vessels to other homeports. Average landings and value data were used, however, to smooth the influences of outliers and unusual years and to attempt to mimic fishers behavioral patterns in the intermediate to medium run time period. The area choice model used revenue maximization to determine the areas vessels would likely fish in response to the proposed area closures. Revenue maximization in the short to intermediate-run is not an unrealistic behavioral objective of fishers (Kirkley and Strand 1988). In the long run, however, vessel owners must cover their costs. If vessels are not at least breaking even (i.e., total revenue equals total cost—fixed plus variable), they will not be able to continue fishing. The analysis also did not consider the potential effects of the area closures on future harvest levels, recruitment, and growth. At the present time, it is unknown how the area closures will affect future stock abundance, reproductive and spawning activities, growth, mortality, and recruitment. Estimated impacts are, therefore, principally short-run values related only to commercial fishing activities. Potential changes in the economic value to recreational anglers and society of the two EFH alternatives are not estimated. Last, the assessment of EFH relative to society should be done in terms of economic value or net social benefit (i.e., what is the value to society of an acre of EFH). These values would be in part determined by commercial and recreational activity and the value society derives from knowing that EFH is being protected or restored. Data necessary for an economic valuation analysis, however, were not available. Specifically, one would need the baseline biological information relating future biological conditions to the areas delineated by the two EFH alternatives. It is doubtful that such data will be available in the near future.

3.2 The Potential Economic Impacts

The potential percentage change in landings of each species or grouping of species relative to the two area alternatives are summarized in Tables 13-19. Although in some cases, the percentage changes appear to be quite high, they are misleading because they are based on extremely small quantities. For example, the percentage change in landings of black sea bass by scallop dredge equals -63.9 % for March; in actually, the base line or status quo level of average monthly March landings equaled less than one pound. In terms of the regulated species, the landings of all three regulated species--black sea bass, summer flounder, and scup--are projected to decrease with either alternative. The projected decreases of all three species applies mostly to fish and other otter trawl. Landings of summer flounder and black sea bass are projected to decline for dredge gear, but the projected changes in landings of scup by dredge equal zero at the annual level. Under alternatives four and five, landings of summer flounder by trawl or dredge are projected to decline: (1) fish and other otter trawl---7.69 (alternative four) and –1.98 % (alternative five); (2) scallop dredge---2.45 (alternative four) and –3.47 % (alternative five). Under alternative four, the total annual the landings of summer flounder, scup, and black sea bass are projected to decline by 7.63, 2.67, and 2.24 percent. Under alternative five, annual landings of summer flounder, scup, and black sea bass are also projected to decline---3.47, 13.76, and 1.31%, respectively. In fact, the landings of all species and relative to all gear, except scup caught by dredge, are projected to decline under both EFH alternatives.

The economic impacts of the various alternatives are examined in terms of changes in landings, ex-vessel prices, revenues, and consumer surplus associated with the three regulated species. Average monthly landings in the U.S. between 1996 and 1999, however, provide the reference levels for assessing total changes in prices, revenues, and consumer surplus of the three regulated species. All dollar value estimates and observations are presented in terms of year 2000 constant dollar values. The area choice model of Walden uses 1996-2000 average monthly data per vessel, which is obtained from logbooks; data on U.S. activity for the year 2000, which are necessary to assess changes in prices, revenues, and consumer surplus, are not available from the National Marine Fisheries Service. The period 1996 through 1999 is, therefore, used as the reference or status quo period for the analysis of changes in prices, revenues, and consumer surplus of the three regulated species. The period 1996 through 2000, however, is used to assess changes in landings and potential changes in revenues, assuming no changes in ex-vessel prices. All estimated impacts are assessed relative to 1996 through 2000 activity. We use, however, the results of Walden's model, which covers vessel activity, but not necessarily total activity, between 1996 and 2000. The use of 1996 through 2000 better accommodates the potential and stochastic nature of commercial fishing.

There are numerous other limitations of the analysis. Analytical results are, therefore, presented using several different formats. First, impacts on species, species groupings, and total associated with the three major bottom gear are presented. These impacts were based on analyses using the logbook data. It is important to stress that the logbook data provides an incomplete set of data on all fishing activity in the region. Impacts based on the logbook data, therefore, understate the likely impacts. The initial analysis considers probable changes in landings associated with alternatives four and five and relative to the following species: (1) angler or monkfish, (2) black sea bass, (3) scallops, (4) summer flounder, (5) scup, (6) squid (loligo, illex, and other), and (7) all other species, except surfclam and ocean quahog. The data available for the surfclam and quahog dredge vessels are very limiting. Potential impacts for the clam dredge are presented, but subject to the assumptions of no changes in area fished or price levels. Predicted changes in revenues, assuming no change in ex-vessel prices, for either alternative likely overstate the potential losses in revenues if one of the alternatives causes landings of given species to decline. Similarly, predicted changes in revenues, assuming no change in prices, given one of the alternative EFH area closures that causes vessels to increase their landings of a given species, which might happen when a vessel changes area fished, are also overstated. The potential impacts on the selected species, given the logbook data, are presented in Tables 20-27. Results are presented in terms of average monthly and annual values for the period 1996-2000. The potential impacts of the two alternative EFH proposals on the surfclam fishery are presented in Table 28.

The next level of analysis, again based on the logbook data, focuses on total activity by the four mobile bottom tending gear: (1) sea scallop dredge, (2) fish otter trawl, (3) other otter trawl, and (4) surfclam dredge. The surfclam dredge analysis is contained in Table 28, and the impacts for the other three gear types are presented in Tables 29-31. The surfclam analysis, however, is likely to be in error because of inadequate logbook data. Results are presented in terms of average monthly and annual values for the period 1996-2000.

The analysis then focuses on the changes in U.S. ex-vessel landings, revenues, and consumer surplus for the three regulated species—summer flounder, black sea bass, and scup. The analysis of changes in U.S. activity was based on data obtained from the NMFS electronic database. Ex-vessel demand models were estimated and used to predict changes in prices, revenues, and consumer surplus. Changes in landings were based on changes predicted in landings using the logbook data and the results of Walden's model. Results are presented in terms of average monthly and values for the period 1996-1999; these results are presented in Tables 32-34.

The last level of analysis permits prices of all species to change in response to landings, and emphasizes annual changes in revenues and consumer surplus of the six species and the all other species category. This analysis, however, is confined only to the logbook data, which provided the basis for predicting changes in landings and ex-vessel revenues that might occur because of imposing either alternative four or alternative five.

3.2.1 Species Impacts and No Changes in Ex-vessel Prices

3.2.1.1 Angler or Goosefish

Analyses indicated that either alternative four or five would actually result in increased landings of angler fish. Under alternative four, landings and revenues would decrease in January, March, and May; the average monthly reduction in those three months equaled, respectively, 3,685, 4,102, and 2,424 pounds (Table 20). On an annual basis, the change in landings associated with alternative four increased by 49,287 pounds per year; the initial average annual landings equaled 6.975 million pounds. After switching to other areas in response to areas closed under alternative four, landings were predicted to increase to 7.0 million pounds. Under alternative five, landings increase by 25,722 pounds per year; predicted average annual landings equaled 7.0 million pounds. It is important to stress that the reason landings increase is because of the probable abundance of angler fish in other areas. Similarly, ex-vessel revenues are predicted to increase for both EFH alternatives.

3.2.1.2 Black Sea Bass

Under alternatives four and five, average annual landings of black sea bass are predicted, respectively, to decrease (Table 21). With alternative four, landings are predicted to decrease in January, February, March, June, July, August, and September. With alternative five, landings increase in all months except February, March, April, and December. The predicted annual changes for either alternative, however, are quite small—-15,257 pound decrease for alternative four and 8,943 pound decrease for alternative five. Similarly, revenues are predicted to decrease for alternative four and alternative five.

3.2.1.3 Sea Scallops

Of the selected species, the likely impacts on landings and ex-vessel value of sea scallops are the most significant. Under alternative four, landings are predicted to decrease by 41,112 pounds per year (Table 18); again, this is post area change by fishing vessels. Under alternative five, landings are predicted to decrease by 255,644 pounds per year. Ex-vessel revenues are predicted to decrease by $207.5 thousand under alternative four and by $1.28 million under alternative five. It is stressed that projected losses are overstated; decreases in landings would be expected to increase the ex-vessel price and thus, losses in revenues calculated using constant prices would be higher than losses calculated allowing ex-vessel price levels to change. Alternatively, prices would increase from the previous level if landings decreased. Thus, the product of pounds landed times the price level associated with the new level of landings would be higher than the product of quantity and price associated with the original price level.

3.2.1.4 Summer Flounder

Under alternative four or five, the ex-vessel landings and revenue of summer flounder are also predicted to decline (Table 22). The declines, however, are highly seasonal. With alternative four, 70% of the decline in landings occurs in September. Under alternative five, most of the decline occurs in January. Landings are predicted to decline by 526,054 pounds per year under alternative four, and by 137.593 pounds under alternative five. Ex-vessel revenues are predicted to decrease by slightly more than $0.5 million per year with alternative four, and by $158.2 thousand under alternative five.

3.2.1.5 Scup

The landings of scup are predicted to decrease under both EFH alternatives. (Table 24). Ex-vessel revenues are also predicted to decline under both EFH alternatives. Under alternative five, landings are projected to decrease by 323,156 pounds per year. Under four, landings are projected to decrease by 62,782 pounds per year. The majority of the losses under alternative five occur between January and April and in December. Under alternatives four and five, average annual ex-vessel revenue (constant 2000 dollar value) are predicted to decline by $53.5 thousand and $260.1 thousand, respectively.

3.2.1.6 Squid

Landings and ex-vessel revenues are predicted to decrease under either EFH alternative (Table 25). Average annual landings are predicted to decrease by 286.7 thousand and 152.6 thousand pounds, respectively, under alternatives four and five. On a percentage basis, however, the predicted declines are quite small—1.88% per year for alternative four and 1.00% for alternative five. Under alternative four, landings are predicted to decrease in March, May, July, August, October, November, and December.

Under alternative five, landings and ex-vessel revenues are projected to decline in February, March, April, October, and November. Oddly, the projected annual loss in vessel revenue is larger under alternative five than it is under alternative four. On an annual basis, landings under alternatives four and five are projected to decline by 286.7 and 152.6 thousand pounds, respectively. The largest losses in landings are projected for alternative four. It would be expected, then, that the largest losses in revenues would be projected for alternative four. Landings under alternative four, however, are projected to increase during periods of high abundance and relatively high prices (e.g., February and June). Concurrently, landings of squid are projected to decrease in February under alternative five.

3.2.1.7 Other Species

The other species is all species other than the previously discussed species and harvest by scallop dredge, fish otter trawl, or other otter trawl. The status Quo average annual landings, based on logbook data, equaled 106.7 million pounds between 1996 and 2000 (Table 26). The status quo average annual value equaled \$51.3 million. Under alternative four, landings and value are predicted to decline by 3.0 million pounds and \$1.7 million. Under alternative five, landings and value are predicted to decrease by 1.5 million pounds and \$0.6 million. With alternative four, landings are predicted to decline in all months except August. In contrast, landings, under alternative five, are predicted to decrease in all months except November, December, and January.

3.2.1.8 Total Over All Species

Total landings and value equal the sum of landings and value for all species, but only with respect to scallop dredge, fish otter trawl, and other otter trawl. In addition, the changes in value overstate the potential losses and gains. Alternatively, ex-vessel values are understated given losses in landings and overstated given gains in landings. This is because prices increase (decrease) as landings decrease (increase). There are combinations of prices and landings, however, that could result in revenues being overstated given losses and understated given increases.

The predicted average annual landings, under alternatives four and five, equal, respectively, 156.7 and 158.2 million pounds (Table 27). The status Quo average annual landings equaled 160.5 million pounds. Total landings are predicted to decline under both EFH alternatives. With alternative four, the ex-vessel revenue is predicted to decline by \$2.55 million per year; with alternative five, the average annual ex-vessel revenue is predicted to decline by \$2.40 million per year. The two alternatives also induce different seasonality patterns. For alternative four, losses occur in January, March, May, July, and all other months through December. For alternative five, losses occur in all months between January and May and between august and November.

3.2.1.9 Surfclam and Ocean Quahog Fishery

The surfclam and quahog fishery was not modeled. It is, thus, possible to provide only a very limited assessment of the potential impacts of alternatives four and five. In this case, it assumed that losses in landings equal the landing status Quo for alternatives four and five. Under alternative four, there is a potential loss of 600.0 thousand pounds of landings and $329.7 thousand. With five, there is a potential loss of 26.9 thousand pounds and $11.9 thousand Table 28).

3.3.1 Impacts on Bottom Tending Mobile Gear

3.3.1.1 Scallop Dredge

The two alternatives are predicted to negatively affect landings and ex-vessel values for sea scallop dredge vessels (Table 29). Of the two alternatives, alternative five generate the most negative impact in terms of average annual landings and ex-vessel revenues. Under four, landings are projected to decline by approximately 42,200 pounds per year, and ex-vessel revenue is projected to decline by $163.3 thousand per year. Under five, landings and value are projected to decline by 215,8 thousand pounds and $1,073 thousand per year. Under four, the major change or loss in landings occurs in January and July. Under five, major losses occur in March, April, May, and August. Losses in March and April are particularly troublesome because this is the period when abundance and price are typically high.

3.3.1.2 Fish Otter Trawl

The impacts of alternative four on landings and revenues by fish otter trawl vessels are quite high and negative. Alternative four could cause landings to decline by 3.8 million pounds per year (Table 30); revenues are predicted to decline by $2.27 million per year. Under alternative five, landings are projected to decrease by 2.07 million pounds a year. Ex-vessel revenue is predicted to decline by $1.15 million per year under alternative five. Major losses in landings are predicted to occur in January, May, and all months between September and December given alternative four. With alternative five, otter trawl vessels are predicted to experience losses in all months except November and December.

3.3.1.3 Other Otter Trawl

Predicted changes in landings and revenues are quite small for other otter trawl vessels, regardless of the alternative. For alternative four, landings are predicted to decrease by 37,611 pounds per year (Table 31); under alternative five, landings are predicted to decrease by 37,210 pounds per year. Ex-vessel revenues for four and five, respectively, are predicted to decrease by $116.6 and $176.6 thousand per year. Under both alternatives, landings are predicted to decline in most months. Under alternative four, landings are predicted to decline in all months except June and August. Under alternative five, landings are projected to decline in all months except June, July, and December. These different seasonal changes are related to the inshore/offshore differences between the two alternatives.

The projected losses in landings are nearly equal for the two alternatives. Yet, the projected losses in ex-vessel revenues are considerably higher under alternative five. The differences in losses are related to the composition of species caught in the two areas, and the periods when other otter trawl vessels experience losses or gains. For example, vessels increase revenues under alternative four in August, but lose revenues under alternative five in August.

3.4.1 Changes In U.S. Landings, Revenues, and Consumer Surplus

In this section, the impacts of alternatives four and five on U.S. landings, revenues, and consumer surplus of the regulated species—summer flounder, black sea bass, and scup—are presented. In order to estimate the impacts, the changes in landings predicted by Walden's model using logbook data were added to status quo monthly landings of the three species between 1996 and 1999. Price or inverse demand models developed to assess changes in prices associated with changes in landings were used to predict ex-vessel prices, revenues, and consumer surplus. All dollar values were converted to year 2000 dollar values. Subsequently, landings,, revenues, and consumer surplus estimates were averaged over the four year period of 1996-1999.

3.4.1.1 Summer Flounder

Under alternatives four and five, landings and ex-vessel revenues are projected to decrease (Table 32). The status quo average annual landings and ex-vessel revenue between 1996 and 1999 equaled, respectively, 11.5 million pounds and $21.6 million. If the four areas associated with alternative four are closed, landings and revenue are projected to decline to 11.0 million pounds and $20.8 million. With alternative five, landings and revenue are projected to decline to 11.4 million pounds and to $21.4 million dollars. Similar consumer surplus is projected to decrease under both alternatives. Of the two alternatives, alternative four generates the most negative or detrimental impact on industry and society. Under four, ex-vessel revenues are projected to decline by $788.5 thousand; consumer surplus is projected to decline by $178.7 thousand. Under five, revenues are projected to decline by $143.0 thousand, while consumer surplus is projected to decline to 64.9 thousand.

3.4.1.2 Scup

Landings, revenues, and consumer surplus are projected to decrease under alternatives four and five. Under alternative four, landings and revenues are projected to decrease by 62.8 thousand pounds and $57.9 thousand dollars (Table 33). Given alternative five, it is predicted that landings and revenues will decrease by 323.2 thousand pounds and $343.4 thousand. Average annual consumer surplus is predicted to decrease by $13.5 thousand with alternative four; and by 64.7 thousand with alternative five. Major losses under five occur between January and April and in December. All losses under alternative four occur between January and May.

3.4.1.3 Black Sea Bass

The impacts of the two alternatives on black sea bass reflect the distribution and availability of sea bass. Under alternative four, the nearshore areas being closed, landings of black sea bass are projected to decrease as vessels move further offshore. Under alternative five, landings are projected to decrease as vessels move into areas with lower concentrations of black sea bass. Average annual revenues are projected to decrease by $20.9 thousand per year under four and $11.8 thousand per year under five. Consumer surplus is projected to decrease by $3.3 thousand under four and by $2.2 thousand under five (Table 34). In actuality, the predicted changes in landings, revenues, and consumer surplus are quite small, and thus, the actual differences in landings, revenues, consumer benefits associated with the status Quo and alternative EFH proposals may be close to zero.

3.5.1 Economic Impacts When Prices Change

As previously stated, when landings change, prices are expected to change. This is simply normal demand and supply behavior. The results presented in the previous sections, except those pertaining to section 3.4 and national impacts, were based on the assumption that ex-vessel prices did not change. As a consequence, losses in revenues were overstated, and gains in ex-vessel revenues were understated. In this next section, we present a summary of the potential annual changes in revenues and consumer surplus when prices are allowed to change in accordance with changes in landings. The analysis, however, is only with respect to changes in landings estimated using the logbook data. The results are not applicable to the national level. The consumer surplus estimates, however, are applicable to the national level. The changes in national revenues are different than the changes in revenues for the data corresponding to the logbook data because the ex-vessel prices are different. We, therefore, consider changes in landings and their ramifications only with respect to the changes identified with the area choice models. Consider that the average annual landings of monkfish or angler fish in Atlantic states between 196 and 1999 equaled 58.3 million pounds; the logbook data indicate total landings of 6.98 million pounds.

In the executive summary section, potential total impacts were presented in Table 1. If we consider losses allowing the ex-vessel price to change, we predict that the total losses in ex-vessel revenues would equal $2.3 and $2.2 million, respectively, under alternatives four and five. Similarly, consumer surplus for the complex of the species considered in the analysis are projected to decline by $789.0 and $758.1 thousand, respectively, under alternatives four and five. The largest losses under alternative four occur for summer flounder and all other species. Under alternative five, the largest losses are associated with sea scallops. Losses in revenue because of declines in landings of sea scallops under alternative five account for 53.2 percent of the total losses in revenue.

4.0 Overall Summary of Alternatives

If the three gear types and all species landed by scallop dredge, fish otter trawl, and other trawl are considered, it appears that alternative four would have the most detrimental impact on the fishing industry. Under alternative four, landings and value are projected to decline relative to the status quo by approximately 2.4 and 1.5 % per year. Moreover, industry is more adversely affected in more months under alternative four than it would be under alternative five. Alternatively, if consumer surplus and revenues for the three regulated species at the national level are major concerns for determining the two alternatives, alternative four generates the largest detrimental impacts. Under four, the predicted average annual revenues and consumer surplus are lower than the status Quo values (i.e., the status Quo). Landings and revenues are also lower under alternative five, but higher than they would be under alternative four.

It is stressed that the analytical results presented in this report, at best, reflect short-run impacts. Of the two area options, it is clear that alternative four would generate the largest negative impact in terms of the change in total quantity landed, total ex-vessel revenue, and consumer surplus. In terms of the three regulated species, however, alternative five has the largest negative impacts (reduced landings) in terms of the changes in the landings of scup. Alternative four results in the largest decrease in landings of summer flounder and black sea bass. Based on the results of the area choice model, landings of all species, except angler fish or monkfish, are projected to decline relative to the status quo levels. The all other category generates the largest losses for alternative four. Under alternative four, the ex-vessel value is projected to decline between $2.3 and $2.5 million per year. Losses this high are quite substantial, particularly when considered on a per vessel basis. Under alternative four, average annual losses per vessel are projected to equal approximately $34.1 thousand per year; losses per vessel under alternative five are projected to equal $31.7 thousand per year.

In terms of overall consumer surplus associated with the three regulated species, alternative four generates the largest loss in benefits or consumer surplus. Under alternative four, total consumer surplus associated with the three regulated species declines by $195.6 thousand. Under alternative five, overall consumer surplus declines by $131.7 thousand. The majority of the decline in consumer surplus under alternative five is associated with scup and summer flounder. If we consider consumer surplus for all the species, alternative four results in a decline of $789.0 thousand; alternative five results in a decline of $758.1 thousand per year.

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Table 2. Options for Managing Adverse Effects from Fishing Gear

Alternative	Description of Alternative
1	No action alternative, which would result in no additional management measures to minimize the effects of fishing
2*	Prohibit all bottom tending mobile gear. This is the extreme end of the range of alternatives, although it is not very practicable
3*	Prohibit bottom tending mobile gear from the nearshore corridor (from Long Island Sound, New York extending south to Cape Fear, North Carolina) from the shore extending to 22 miles offshore
4	Prohibit bottom tending mobile gear from the nearshore areas of Albemarle Sound, Chesapeake Bay, Delaware Bay, and New York Harbor, from 3 miles offshore extending to the 60-foot depth contour
5	Prohibit bottom tending mobile gear from the areas adjacent to the Hudson Canyon, between the 200-foot and 500-foot depth contour
6*	Prohibit bottom tending mobile gear from offshore ovewintering areas from Lydonia Canyon east of Cape Cod, MA to Cape Hatteras, NC between 200-foot and 500-foot depth contour
7*	Prohibit bottom tending mobile gear from SAV beds (summer flounder HAPC)
8	Restrict the size of roller rig and rock hopper gear—roller rig: 18, 12, or 8 inch maximum size; rock hopper gear: cap at current maximum size or restrict to 18, 12, or 8 inch maximum size
9*	Modify otter trawl footropes to raise the net off the bottom, using a 42 inch long chain connecting the sweep to the footrope, which results in the trawl fishing about 18-24 inches above the bottom
10	Prohibit the use of street-sweeper gear
11*	Decrease fishing effort to minimize the impact on bottom habitats

*Indicates that alternatives were considered but rejected for further analysis.

Table 3. Average Annual Value and Landings in Areas Associated with Alternative four, 1996-2000 Annual Averages

SPECIES	TOTAL AVERAGE VALUE	TOTAL AVERAGE LBS
FLOUNDER, SUMMER	1,659,337	1,503,047
SCALLOP, SEA	1,049,204	199,371
CROAKER, ATLANTIC	990,951	2,933,779
SQUID (LOLIGO)	458,660	784,501
HAKE, SILVER	344,348	667,757
SURFCLAM/QUAHOG	329,666	599,093
WEAKFISH, SQUETEAGUE	265,281	574,842
CRAB, HORSESHOE	243,168	412,125
ANGLER	210,329	71,115
MACKEREL, ATLANTIC	205,602	1,285,935
FLOUNDER, WINTER	194,386	180,549
DOGFISH SPINY	191,334	471,260
SKATES	159,955	247,517
FLOUNDER, YELLOWTAIL	123,938	107,149
OTHER	112,152	288,178
BLUEFISH	95,081	182,363
HAKE, RED	81,734	154,170
BUTTERFISH	78,934	183,418
WHITING, KING	46,216	89,075
DOGFISH (NK)	42,722	150,909
SQUIDS (NS)	34,024	185,132
FLOUNDER, SAND-DAB	28,347	33,703
COD	20,378	15,244
SCUP	16,583	18,868
BASS, STRIPED	12,470	21,087
DOGFISH SMOOTH	10,785	15,338
SEA BASS, BLACK	10,569	11,782
HAKE, WHITE	7,687	13,208
HERRING, ATLANTIC	7,339	238,059
SQUID (ILLEX)	6,758	27,867
FLOUNDER, WITCH	6,135	5,684
SEA ROBINS	3,820	11,113
WEAKFISH, SPOTTED	3,414	51,162
LOBSTER	2,816	3,883
HERRING, BLUE BACK	81	230
Total	7,054,207	11,738,513

Source of Data: Northeast Fisheries Science Center, log-book data. All dollar values are reported in terms of year 2000 constant dollar values.

Table 4. Average Annual Value and Landings in Areas Associated with Alternative five, 1996-2000 Annual Averages

SPECIES	TOTAL AVERAGE VALUE	TOTAL AVERAGE LBS
SCALLOP, SEA	3,403,217	658,627
ANGLER	709,384	263,247
SQUID (LOLIGO)	683,208	1,065,868
FLOUNDER, SUMMER	395,344	350,857
SCUP	317,644	363,496
HAKE, SILVER	237,853	387,203
MACKEREL, ATLANTIC	170,460	865,883
SQUID (ILLEX)	157,350	707,453
BUTTERFISH	98,923	149,410
SQUIDS (NS)	51,685	208,646
SEA BASS, BLACK	27,553	31,604
HAKE, RED	25,175	39,278
WHITING, KING	17,138	20,224
OTHER	15,020	21,626
SURFCLAM/QUAHOG	11,912	26,878
LOBSTER	7,107	7,211
FLOUNDER, YELLOWTAIL	6,962	3,766
DOGFISH SPINY	4,519	9,205
BLUEFISH	3,226	6,089
FLOUNDER, WINTER	2,418	1,018
FLOUNDER, WITCH	2,350	1,862
JOHN DORY	2,170	2,827
SEA ROBINS	1,967	1,495
HAKE, WHITE	1,923	12,557
WEAKFISH, SQUETEAGUE	1,696	2,252
DOGFISH (NK)	1,194	3,135
HERRING, ATLANTIC	897	8,229
CRAB, HORSESHOE	555	2,008
DOGFISH SMOOTH	540	813
SKATES	516	829
WEAKFISH, SPOTTED	450	909
CRAB, BLUE	101	156
Total	6,360,455	5,224,659

Source of Data: Northeast Fisheries Science Center, log-book data. All dollar values are reported in terms of year 2000 constant dollar values.

Table 5. Average Annual Value and Landings by Areas and Gear Associated with the Two Area Alternatives, 1996-2000 (2000 Constant Dollar Values)

SPECIES	AREA	Dredge-Scallop		Fish Otter Trawl		Otter Trawl-Other	
		Average Annual Value	Average Annual Landings	Average Annual Value	Average Annual Landings	Average Annual Value	Average Annual Landings
FLOUNDER, SUMMER	0	270,742	60,668	5,062,334	4,900,124	141,826	39,903
SCUP	0	0	0	1,581,489	1,965,565	440	822
SEA BASS, BLACK	0	0	0	497,183	621,161	65,576	7,698
TOTAL	0	65,477,702	12,779,831	69,587,536	127,505,251	5,706,001	898,171
OTHER	0	65,206,960	12,719,164	62,446,529	120,018,401	5,498,158	849,749
FLOUNDER, SUMMER	1	15,345	3,166	440,406	408,549	5,283	1,509
SCUP	1	0	0	7,108	7,243	0	0
SEA BASS, BLACK	1	0	0	3,720	4,477	0	0
TOTAL	1	1,048,307	215,304	2,092,331	3,537,253	31,986	8,251
OTHER	1	1.032,963	212,138	1,641,097	3,116,983	26,705	6,741
FLOUNDER, SUMMER	2	1,351	244	347,707	341,296	6,748	2,952
SCUP	2	0	0	9,476	11,625	0	0
SEA BASS, BLACK	2	0	0	1,736	2,121	0	0
TOTAL	2	168,652	67,785	1,246,583	3,020,726	89,282	37,963
OTHER	2	167,300	67,541	887,663	2,665,684	82,535	35,011
FLOUNDER, SUMMER	3	5,355	1,073	154,089	148,073	9,648	3,390
SCUP	3	0	0	0	0	0	0
SEA BASS, BLACK	3	0	0	3,440	3,602	0	0
TOTAL	3	6,288	1,267	413,850	1,279,226	31,890	34,268
OTHER	3	932	194	256,321	1,127,551	22,242	30,878
FLOUNDER, SUMMER	4	0	0	624,587	584,519	48,817	8,275
SCUP	4	0	0	0	0	0	0
SEA BASS, BLACK	4	0	0	1,428	1,561	245	20
TOTAL	4	0	0	1,525,890	2,915,878	69,484	21,501
OTHER	4	0	0	899,874	2,329,798	20,421	13,206
FLOUNDER, SUMMER	1-4	22,051	4,483	1,566,790	1,482,438	70,496	16,127
SCUP	1-4	0	0	16,583	18,868	0	0
SEA BASS, BLACK	1-4	0	0	10,324	11,761	245	20
TOTAL	1-4	1,223,247	284,355	5,278,651	10,753,083	222,643	101,982
OTHER	1-4	1,201,195	279,873	3,684,955	9,240,016	151,902	85,835
FLOUNDER, SUMMER	5	13,819	3,287	374,235	341,116	7,290	6,454
SCUP	5	0	0	312,342	361,666	5,302	1,830
SEA BASS, BLACK	5	0	0	26,519	31,401	1,034	203
TOTAL	5	3,568,336	693,382	2,334,522	4,406,801	445,685	97,598
OTHER	5	3,554,517	690,095	1,621,427	3,672,618	432,060	89,112
FLOUNDER, SUMMER	ALL	306,613	68,437	7,003,359	6,723,678	219,612	62,483
SCUP	ALL	0	0	1,910,415	2,346,099	5,741	2,652
SEA BASS, BLACK	ALL	0	0	534,026	664,324	66,855	7,921
TOTAL	ALL	70,269,284	13,757,569	77,200,710	142,665,136	6,374,330	1,097,751
OTHER	ALL	69,962,672	13,689,132	67,752,911	132,931,035	6,082,120	1,024,695

Table 6. Average Annual Number of Trips by Area and Gear, 1996-2000

Areas	Scallop Dredge	Fish Otter Trawl	Other Otter Trawl	Total
0	1,897	15,359	277	17,533
1	142	1,849	9	2,001
2	9	579	11	599
3	0	59	5	67
4	0	169	6	179
1-4	151	2,656	31	2,838
5	84	283	20	392

Source of Data: Northeast Fisheries Science Center, log-book data.

Table 7. Estimated Parameters and Associated Statistics for Inverse Demand Models for Black Sea Bass

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO
YEAR	0.01590800	0.00811900	1.95900000
YEARDUM[a]	0.33447000	0.05003000	6.68500000
POUNDS	-0.00000048	0.00000013	-3.81800000
FEBLD	-0.00000040	0.00000014	-2.88800000
MARLD	-0.00000027	0.00000014	-1.89300000
APRLD	-0.00000035	0.00000018	-1.96700000
MAYLD	-0.00000023	0.00000015	-1.49000000
JUNLD	-0.00000055	0.00000022	-2.50600000
JULLD	-0.00000025	0.00000033	-0.76200000
AUGLD	0.00000040	0.00000036	1.12000000
SEPLD	0.00000004	0.00000038	0.10100000
OCTLD	-0.00000032	0.00000023	-1.36300000
NOVLD	-0.00000033	0.00000019	-1.68900000
DECLD	-0.00000043	0.00000020	-2.16800000
CONSTANT	-30.32300000	16.19000000	-1.87300000

[a]Yeardum is set equal to 0.0 for 1990-1996 and to 1.0 for all observations between 1997 and 1999. Febld through Decld equal the product of monthly landings times a dummy variable set equal to 1.0 for month of observation (0.0 otherwise). Pounds equals the pounds landed in each month. The adjusted R-squared equaled 0.81 and the Durbin-Watson coefficient equaled 1.97.

Table 8. Estimated Parameters and Associated Statistics for Inverse Demand Models for Summer Flounder

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 94 DF
YEAR	-1.45E-02	2.03E-02	-0.7153
YEARDUM[a]	0.31972	0.1182	2.704
FEB	0.6425	0.3209	2.002
MAY	0.90413	0.3388	2.668
APR	1.1021	0.3363	3.277
MAY	1.1912	0.3609	3.301
JUNDUM5	1.5469	0.3857	4.011
JULDUM6	1.439	0.4006	3.592
AUGDUM7	0.72354	0.3608	2.006
SEPDUM8	0.27098	0.3628	0.7469
OCTDUM9	7.06E-02	0.3283	0.2152
NOV	0.15015	0.3355	0.4475
DEC	0.20414	0.3369	0.606
POUNDS	-1.04E-07	9.10E-08	-1.137
FEBLD	-2.44E-07	1.27E-07	-1.922
MARLD	-3.40E-07	1.87E-07	-1.813
APRLD	-1.14E-06	2.98E-07	-3.842
MAYLD	-1.49E-06	4.13E-07	-3.607
JUNLD	-2.55E-06	6.24E-07	-4.085
JULLD	-2.08E-06	6.27E-07	-3.323
AUGLD	-4.05E-07	3.74E-07	-1.082
SEPLD	-3.15E-07	2.08E-07	-1.514
OCTLD	-2.51E-07	1.50E-07	-1.681
NOVLD	-4.22E-07	1.87E-07	-2.262
DECLD	-1.48E-07	1.61E-07	-0.9197
CONSTANT	30.493	40.36	0.7555
Adjusted R-squared—0.79		Durbin Watson-1.74	

[a]Yeardum is set equal to 0.0 for 1990-1993 and to 1.0 for all observations between 1994 and 1999. Febld through Decld equal the product of monthly landings times a dummy variable set equal to 1.0 for month of observation (0.0 otherwise). Pounds equals the pounds landed in each month.

Table 9. Estimated Parameters and Associated Statistics for Inverse Demand Models for Scup

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO
YEAR	3.61E-02	1.88E-02	1.926
AUG	0.57936	0.1803	3.214
SEP	0.51119	0.1674	3.053
POUNDS	-5.99E-07	9.26E-08	-6.474
FEBLD[a]	-1.24E-07	8.67E-08	-1.434
MARLD	1.30E-07	8.50E-08	1.53
APRLD	2.06E-07	6.77E-08	3.046
MAYLD	1.81E-07	8.86E-08	2.044
JUNLD	-2.22E-07	1.54E-07	-1.438
JULLD	-1.40E-08	2.11E-07	-0.6624
AUGLD	-1.39E-06	5.25E-07	-2.644
SEPLD	-1.52E-06	4.26E-07	-3.559
OCTLD	-6.64E-08	1.27E-07	-0.5249
NOVLD	-4.08E-08	9.69E-08	-0.4207
DECLD	-1.57E-07	1.05E-07	-1.492
CONSTANT	-70.63	37.43	-1.887
Adjusted R-squared—0.86		Durbin Watson-1.91	

[a]Febld through Decld equal the product of monthly landings times a dummy variable set equal to 1.0 for month of observation (0.0 otherwise). Pounds equals the pounds landed in each month.

Table 10. Estimated Parameters and Statistics for Annual Inverse Demand Model for Monkfish[a]

Variables	Coefficients	Standard Error	t Stat
Intercept	-108.5723968988	10.929491	-9.9338928
Pounds	-0.0000000151	2.109E-09	-7.1444161
Year	0.0551031004	0.0055274	9.9690764

[a]Estimates made using 1970 through 1999 annual data for the United States. Adjusted R-squared equaled 0.93. The Durbin Watson statistic equaled 1.91.

Source of data: NMFS Electronic Data Base.

Table 11. Estimated Parameters and Statistics for Annual Inverse Demand Model for Sea Scallops[a]

Variables	Coefficients	Standard Error	t Stat
Intercept	-335.343103607549	33.862575	-9.9030596
Pounds	-0.000000017482	.000000008	-2.155276
Year	0.171123265893	0.0171181	9.9966183

[a]Estimates made using 1970 through 1999 annual data for the United States. Adjusted R-squared equaled 0.89. The Durbin-Watson statistic equaled 2.02.

Source of data: NMFS Electronic Data Base.

Table 12. Estimated Parameters and Statistics for Monthly Inverse Demand Model for Other Species[a]

	Coefficients	Standard Error	t Stat
Intercept	0.711916802	0.0540771	13.164842
land	-0.0000000244	5.897E-09	-4.1409942

[a]Estimates made using 1996-2000 mean monthly landings and prices; the number of observations equaled 12. Adjusted R-squared equaled 0.79. The Durbin-Watson statistic equaled 1.81.

Source of data: NMFS logbook and dealer data.

Table 13. Percentage Change in Landings of Angler Fish Associated with Alternatives Four and Five[a]

Species	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
Angler	1	-0.34	-2.92	-0.81	0.61	-7.36	-0.82
Angler	2	0.69	0.40	0.63	2.32	-2.30	1.36
Angler	3	-0.94	-0.25	-0.77	0.26	-10.65	-2.34
Angler	4	1.70	0.22	1.37	1.70	-14.18	-1.83
Angler	5	-0.25	-0.72	-0.42	0.74	-12.36	-3.93
Angler	6	2.86	0.61	1.92	3.70	-0.10	2.12
Angler	7	4.44	1.28	2.70	7.51	3.49	5.29
Angler	8	1.20	0.95	1.07	-3.63	3.29	-0.07
Angler	9	0.37	1.16	0.67	-1.26	6.72	1.82
Angler	10	0.61	0.30	0.52	-3.13	7.10	0.11
Angler	11	1.12	0.57	0.96	-1.53	4.43	0.22
Angler	12	0.49	0.86	0.61	0.19	11.28	3.60
Total		0.85	0.41	0.71	0.35	0.40	0.37

[a]Based on 1996-2000 average monthly landings

Table 14. Percentage Change in Landings of Black Sea Bass Associated with Alternatives Four and Five[a]

Species	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
Black Sea Bass	1	-7.13	-4.98	-7.13	0.15	7.37	0.15
Black Sea Bass	2	-4.25	-30.01	-4.26	-0.21	-14.24	-0.21
Black Sea Bass	3	-3.73	-63.91	-3.73	-3.94	-16.21	-3.94
Black Sea Bass	4	5.40	1.23	5.40	-5.29	-5.59	-5.29
Black Sea Bass	5	3.20	0.57	3.19	3.25	-1.73	4.07
Black Sea Bass	6	-14.78	-7.06	-14.73	4.10	8.52	4.61
Black Sea Bass	7	-2.14	0.88	-2.12	4.59	10.51	4.20
Black Sea Bass	8	-8.77	-61.94	-8.77	4.15	16.61	3.33
Black Sea Bass	9	-0.92	-26.07	-0.93	3.33	19.29	2.56
Black Sea Bass	10	0.51	-4.74	0.49	2.55	5.66	2.92
Black Sea Bass	11	-3.62	-28.47	3.58	2.91	9.26	2.31
Black Sea Bass	12	0.90	-5.40	0.89	-2.30	-12.12	-0.02
Total		-2.23	-7.86	-2.24	-1.31	-1.12	-1.31

[a]Based on 1996-2000 average monthly landings

Table 15. Percentage Change in Landings of Sea Scallops Associated with Alternatives Four and Five[a]

SPEC	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
Sea Scallops	1	-4.85	-3.36	-3.39	-8.95	-7.86	-7.89
Sea Scallops	2	-2.21	-0.04	-0.11	-1.09	3.47	-3.39
Sea Scallops	3	-1.76	-0.46	-0.50	-5.29	-1.44	-1.57
Sea Scallops	4	-3.17	0.40	0.08	-3.63	-8.20	-7.80
Sea Scallops	5	-6.02	0.11	-0.53	-4.39	-10.97	-10.29
Sea Scallops	6	-5.06	0.45	1.11	1.81	0.65	0.81
Sea Scallops	7	-7.12	-0.87	-1.76	2.44	1.61	1.73
Sea Scallops	8	3.56	-0.43	0.10	-6.74	-2.05	-2.67
Sea Scallops	9	2.50	-0.41	-0.64	-11.78	1.50	0.01
Sea Scallops	10	5.77	-0.11	-0.64	5.99	2.84	2.01
Sea Scallops	11	2.70	-0.24	0.14	-2.79	-5.91	-5.52
Sea Scallops	12	-0.50	-0.01	-0.05	0.21	8.87	8.24
Total		-1.23	-0.22	-0.33	-2.66	-1.96	-2.04

[a]Based on 1996-2000 average monthly landings

Table 16. Percentage Change in Landings of Scup Associated with Alternatives Four and Five[a]

Species	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
Scup/Porgies	1	-6.09	0.00	-6.09	-21.96	0.00	-21.96
Scup/Porgies	2	-3.10	0.00	-3.10	-11.32	0.00	-11.32
Scup/Porgies	3	-2.98	0.00	-2.98	-18.34	0.00	-18.34
Scup/Porgies	4	-3.54	0.00	-3.54	-31.48	0.00	-31.48
Scup/Porgies	5	-2.08	0.00	-2.08	3.06	0.00	3.06
Scup/Porgies	6	1.34	0.00	1.34	1.78	0.00	1.78
Scup/Porgies	7	1.34	7.85	1.34	2.97	17.51	2.97
Scup/Porgies	8	5.26	0.00	5.26	1.50	0.00	1.50
Scup/Porgies	9	0.10	0.61	0.10	1.52	2.48	1.52
Scup/Porgies	10	1.35	0.44	1.35	1.60	6.60	1.60
Scup/Porgies	11	0.51	0.00	0.51	2.28	2.79	2.28
Scup/Porgies	12	2.25	1.32	2.25	-22.82	11.25	-22.82
Total		-2.67	0.00	-2.67	-13.76	0.00	-13.76

[a]Based on 1996-2000 average monthly landings

Table 17. Percentage Change in Landings of Summer Flounder Associated with Alternatives Four and Five[a]

Species	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
Summer Flounder	1	-0.83	-0.91	-0.83	-7.13	-5.89	-7.13
Summer Flounder	2	1.66	1.53	1.65	-0.45	-8.86	-0.54
Summer Flounder	3	2.23	0.81	2.20	-0.07	-3.73	-0.14
Summer Flounder	4	1.80	0.96	1.76	-0.22	-7.27	-0.52
Summer Flounder	5	-15.78	-6.28	-15.54	-3.40	-1.64	-3.36
Summer Flounder	6	-10.60	-6.22	-10.57	7.16	11.01	7.19
Summer Flounder	7	-2.77	-6.34	-2.78	3.03	10.70	3.04
Summer Flounder	8	-5.70	-28.82	-5.71	2.30	18.55	2.30
Summer Flounder	9	-57.41	-56.67	-57.41	5.65	16.15	5.67
Summer Flounder	10	-12.31	-9.10	-12.26	6.61	13.98	6.72
Summer Flounder	11	-0.67	-2.10	-0.69	-7.56	-6.19	-7.54
Summer Flounder	12	-12.29	-4.31	-12.25	3.17	8.65	3.20
Total		-7.69	-2.45	-7.63	-1.98	1.88	-3.47

[a]Based on 1996-2000 average monthly landings

Table 18. Percentage Change in Landings of Squid Associated with Alternatives Four and Five[a]

Species	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
Squid (All)	1	1.07	1.46	1.07	1.29	11.17	1.29
Squid (All)	2	1.84	4.30	1.84	-1.93	-13.52	-1.93
Squid (All)	3	-2.15	-73.62	-2.16	-4.06	-3.89	-4.06
Squid (All)	4	2.28	0.19	2.28	-0.55	-11.25	-0.56
Squid (All)	5	-0.15	-15.34	-0.15	2.78	8.45	2.78
Squid (All)	6	8.83	1.50	8.83	3.81	8.17	3.81
Squid (All)	7	-1.60	-90.50	-1.60	4.71	41.56	4.71
Squid (All)	8	-13.87	-100.00	-13.87	4.41	22.09	4.41
Squid (All)	9	2.31	5.72	2.31	2.23	23.40	2.23
Squid (All)	10	-4.08	1.53	-4.08	-6.62	9.13	-6.62
Squid (All)	11	-1.56	2.01	-1.56	-3.46	7.05	-3.46
Squid (All)	12	-3.43	6.63	-3.43	4.18	24.69	4.19
Total		-1.17	-6.50	-1.17	-0.62	-6.95	-0.63

[a]Based on 1996-2000 average monthly landings

Table 19. Percentage Change in Landings of All Other Species Associated with Alternatives Four and Five[a]

Species	Month	Alternative four			Alternative five		
		Trawl	Dredge	Total	Trawl	Dredge	Total
All Other	1	-4.40	-16.24	-4.43	1.07	8.50	1.09
All Other	2	-0.90	-10.57	-0.92	-0.65	-10.87	-0.67
All Other	3	-0.83	-0.54	-0.83	-1.80	-6.05	-1.80
All Other	4	-0.90	-1.51	-0.90	-1.07	-14.44	-1.08
All Other	5	-7.13	-3.20	-7.12	-3.04	-0.10	-3.03
All Other	6	-0.54	-2.06	-0.54	-2.09	-1.46	-2.09
All Other	7	-1.80	-0.63	-1.80	-3.36	-2.68	-3.36
All Other	8	0.66	1.48	0.66	-2.66	-7.09	-2.67
All Other	9	-4.55	-3.40	-4.55	-3.00	-7.94	-3.01
All Other	10	-4.05	-19.50	-4.12	-2.40	-13.88	-2.45
All Other	11	-8.21	-18.44	-8.28	3.80	11.49	3.86
All Other	12	-8.35	-11.41	-8.36	2.14	12.80	2.19
Total		-2.82	-9.03	-2.84	-1.38	-0.99	-1.38

[a]Based on 1996-2000 average monthly landings

Table 20. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Angler Fish

Month	Status Quo Landings[a]	Landings		Status Quo Value[a]	Potential Value		Change lbs		Change Value	
		Alternative four	Alternative five		Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	455,558	451,872	451,801	767,751	755,686	743,345	-3,685	-3,757	-12,066	-24,406
2	623,710	627,659	632,198	1,047,555	1,052,994	1,043,197	3,949	8,488	5,439	-4,358
3	531,256	527,154	518,828	968,201	963,696	898,497	-4,102	-12,428	-4,505	-69,704
4	644,745	653,606	632,923	1,197,755	1,207,059	1,098,983	8,861	-11,823	9,304	-98,773
5	578,425	576,001	555,692	1,479,031	1,470,411	1,353,324	-2,424	-22,732	-8,619	-125,707
6	570,648	581,622	582,733	1,418,857	1,433,808	1,428,011	10,974	12,085	14,951	9,154
7	466,136	478,702	490,790	1,459,132	1,482,465	1,515,953	12,566	24,655	23,332	56,820
8	461,309	466,261	460,964	1,419,388	1,433,276	1,454,834	4,952	-345	13,888	35,446
9	491,945	495,259	500,918	1,255,688	1,268,439	1,322,148	3,314	8,972	12,751	66,460
10	846,309	850,672	847,205	1,863,279	1,870,233	1,952,347	4,364	896	6,954	89,068
11	747,500	754,640	749,111	1,495,523	1,506,364	1,536,071	7,140	1,611	10,841	40,549
12	557,718	561,096	577,817	1,171,092	1,179,942	1,265,766	3,378	20,099	8,850	94,674
	6,975,258	7,024,545	7,000,980	15,543,252	15,624,373	15,612,475	49,287	25,722	81,121	69,223

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative 4 or 5. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. If price is allowed to change according the inverse demand model (table 10), revenue is increased by $80,726 and $68,906, under alternatives four and five, respectively. All estimates contained in table are based on logbook data (Maine through North Carolina), and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 21. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Black Sea Bass

Month	Status Quo Landings[a]	Landings Alternative four	Landings Alternative five	Status Quo Value[a]	Potential Value Alternative four	Potential Value Alternative five	Change lbs Alternative four	Change lbs Alternative five	Change Value Alternative four	Change Value Alternative five
1	107,841	100,153	108,007	111,285	103,355	111,466	-7,688	166	-7,931	181
2	203,982	195,302	203,548	162,481	155,534	162,117	-8,680	-434	-6,946	-364
3	148,868	143,308	143,001	133,821	128,799	128,542	-5,560	-5,867	-5,023	-5,279
4	108,402	114,253	102,667	97,983	103,263	92,799	5,851	-5,735	5,280	-5,184
5	33,660	34,734	35,031	36,049	37,189	37,482	1,074	1,371	1,140	1,433
6	5,443	4,641	5,694	4,648	3,970	4,866	-802	251	-678	218
7	2,624	2,568	2,734	2,884	2,825	3,009	-56	110	-59	125
8	4,627	4,222	4,782	5,265	4,803	5,440	-406	154	-462	176
9	3,511	3,479	3,601	2,518	2,495	2,583	-33	90	-24	65
10	16,756	16,839	17,246	8,067	8,107	8,302	82	489	40	235
11	20,245	20,970	20,712	14,243	14,754	14,571	725	467	511	329
12	26,335	26,568	26,328	22,977	23,161	22,939	233	-6	184	-38
	682,294	667,037	673,351	602,221	588,255	594,117	-15,257	-8,943	-13,966	-8,104

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative four or five. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Allowing for changes in ex-vessel prices, average annual ex-vessel value declines by $13,260 and $7,432 for alternatives four and five, respectively. Estimates contained in table are based on logbook data, and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 22. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Sea Scallops

Month	Status Quo Landings[a]	Landings		Status Quo Value[a]	Potential Value		Change lbs		Change Value	
		Alternative four	Alternative five		Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	242,323	234,105	223,205	1,152,751	1,113,906	1,061,988	-8,218	-19,117	-38,845	-90,763
2	496,772	496,219	479,915	2,448,633	2,446,405	2,365,000	-553	-16,857	-2,228	-83,633
3	815,221	811,127	802,403	4,289,416	4,268,175	4,222,846	-4,093	-12,818	-21,241	-66,570
4	1,085,097	1,085,970	1,000,505	5,564,068	5,571,220	5,126,883	873	-84,592	7,151	-437,185
5	1,484,864	1,477,063	1,332,030	7,314,532	7,279,607	6,557,905	-7,801	-152,834	-34,925	-756,628
6	1,816,918	1,837,129	1,831,686	8,310,588	8,396,880	8,376,585	20,210	14,768	86,292	65,997
7	1,776,741	1,745,499	1,807,464	8,800,089	8,653,923	8,951,116	-31,242	30,723	-146,165	151,027
8	1,620,029	1,621,622	1,576,763	8,671,628	8,675,633	8,445,348	1,593	-43,266	4,005	-226,280
9	885,429	879,748	885,539	4,924,988	4,895,083	4,936,327	-5,681	110	-29,906	11,338
10	1,078,452	1,071,575	1,100,145	6,101,103	6,066,735	6,230,899	-6,878	21,692	-34,368	129,796
11	701,229	702,176	662,541	3,630,018	3,633,649	3,428,393	947	-38,688	3,631	-201,625
12	548,898	548,628	594,132	2,663,614	2,662,694	2,890,070	-270	45,234	-920	226,455
	12,551,972	12,510,860	12,296,328	63,871,429	63,663,910	62,593,358	-41,112	-255,644	-207,519	-1,278,071

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative 4 or 5. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Allowing price to change in accordance with the simple inverse price model and the level of landings under alternative five (Table 11) suggests that revenues would change by –1.80 percent vs. the 2.00 percent indicated in the above table. Estimates contained in table are based on logbook data, and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 23. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Summer Flounder

Month	Status Quo Landings[a]	Landings		Status Quo Value[a]	Potential Valued		Change lbs		Change Value	
		Alternative four	Alternative five		Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	2,577,869	2,556,507	2,394,189	2,934,471	2,910,120	2,725,877	-21,363	-183,681	-24,351	-208,594
2	997,161	1,013,655	991,759	1,057,593	1,075,040	1,048,822	16,494	-5,402	17,447	-8,772
3	348,001	355,658	347,500	231,973	236,722	230,725	7,657	-501	4,750	-1,248
4	302,078	307,406	300,515	377,909	384,180	372,631	5,328	-1,563	6,270	-5,278
5	276,675	233,692	267,391	340,124	289,590	329,139	-42,984	-9,284	-50,533	-10,985
6	215,428	192,664	230,919	288,847	258,555	309,819	-22,765	15,490	-30,292	20,972
7	246,301	239,459	253,788	275,468	267,801	283,876	-6,842	7,488	-7,668	8,408
8	223,228	210,483	228,361	206,568	194,711	211,363	-12,745	5,133	-11,857	4,795
9	641,416	273,206	677,780	672,265	286,384	710,919	-368,210	36,365	-385,882	38,654
10	298,018	261,470	318,044	321,781	282,910	344,759	-36,548	20,026	-38,871	22,978
11	429,741	426,791	397,331	424,844	421,610	393,109	-2,950	-32,410	-3,234	-31,735
12	335,814	294,686	346,561	380,718	334,689	393,313	-41,128	10,747	-46,029	12,595
	6,891,731	6,365,676	6,754,137	7,512,561	6,942,311	7,354,352	-526,054	-137,593	-570,250	-158,209

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative four or five. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Allowing for changes in ex-vessel prices, average annual ex-vessel value declines by $559,847 and $129,480 for alternatives four and five, respectively. Estimates contained in table are based on logbook data, and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 24. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Scup

Month	Status Quo Landings[a]	Landings		Status Quo Value[a]	Potential Value		Change lbs		Change Value	
		Alternative four	Alternative five		Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	436,832	410,210	340,920	459,000	431,027	358,221	-26,621	-95,912	-27,972	-100,778
2	646,005	625,991	572,874	516,875	500,861	458,361	-20,015	-73,132	-16,014	-58,513
3	368,405	357,442	300,824	264,957	257,073	216,353	-10,963	-67,580	-7,885	-48,604
4	224,111	216,183	153,568	119,414	115,189	81,826	-7,928	-70,543	-4,224	-37,587
5	152,572	149,396	157,238	119,966	117,469	123,635	-3,176	4,666	-2,497	3,669
6	23,894	24,214	24,319	21,279	21,564	21,657	320	425	285	378
7	14,701	14,899	15,137	19,002	19,258	19,566	198	436	255	564
8	7,886	8,301	8,005	8,505	8,953	8,633	415	118	448	128
9	16,396	16,412	16,646	18,689	18,707	18,973	16	249	18	284
10	49,222	49,887	50,011	32,178	32,613	32,694	664	789	434	516
11	280,984	282,419	287,391	224,041	225,185	229,150	1,435	6,408	1,144	5,109
12	127,431	130,304	98,351	110,862	113,362	85,563	2,873	-29,080	2,499	-25,299
	2,348,439	2,285,657	2,025,283	1,914,768	1,861,260	1,654,633	-62,782	-323,156	-53,508	-260,135

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative four or five. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Allowing for changes in ex-vessel prices, average annual ex-vessel value declines by $40,960 and $218,617 for alternatives four and five, respectively. Estimates contained in table are based on logbook data, and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 25. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Squid

Month	Status Quo Landings[a]	Landings		Status Quo Value[a]	Potential Value		Change lbs		Change Value	
		Alternative four	Alternative five		Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	2,535,290	2,562,439	2,567,967	1,992,464	2,013,801	2,018,147	27,150	32,678	21,337	25,683
2	3,331,445	3,392,783	3,267,068	2,316,620	2,359,272	2,271,853	61,338	-64,377	42,653	-44,766
3	3,142,629	3,074,887	3,015,096	2,170,573	2,123,742	2,082,487	-67,742	-127,533	-46,831	-88,085
4	1,734,094	1,773,643	1,724,452	1,018,891	1,042,134	1,013,256	39,549	-9,643	23,243	-5,635
5	559,950	559,125	575,518	389,167	388,591	399,988	-825	15,568	-576	10,821
6	1,146,205	1,247,451	1,189,830	819,031	891,376	850,203	101,245	43,624	72,346	31,172
7	1,725,150	1,697,539	1,806,359	764,339	752,106	800,319	-27,611	81,209	-12,233	35,980
8	1,625,903	1,400,362	1,697,661	663,191	571,129	692,473	-225,541	71,758	-92,062	29,283
9	1,449,359	1,482,871	1,481,703	586,675	600,240	599,767	33,512	32,343	13,565	13,092
10	3,379,975	3,242,050	3,156,158	2,083,177	1,998,170	1,945,232	-137,925	-223,817	-85,007	-137,945
11	2,127,085	2,093,948	2,053,387	1,384,796	1,363,219	1,336,821	-33,137	-73,698	-21,577	-47,975
12	1,655,116	1,598,360	1,724,393	1,092,315	1,054,881	1,138,082	-56,756	69,277	-37,433	45,767
	24,412,202	24,125,460	24,259,591	15,281,238	15,158,662	15,148,628	-286,743	-152,611	-122,575	-132,609

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative 4 or 5. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Attempts were made to estimate inverse or price dependent ex-vessel demand models; results indicated no price response to changes in landings. These latter estimates used only the 12 monthly mean observations summarized in the above table. All estimates contained in table are based on logbook data (Maine through North Carolina), and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 26. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, All Other Species (Except Surfclams and Ocean Quahogs)

Month	Status Quo Landings[a]	Landings		Status Quo Value[a]	Potential Value		Change lbs		Change Value	
		Alternative four	Alternative five		Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	7,883,670	7,534,339	7,969,964	4,713,527	4,501,889	4,766,862	-349,330	86,294	-211,637	53,336
2	7,823,783	7,751,421	7,771,263	3,459,744	3,424,875	3,433,484	-72,362	-52,520	-34,869	-26,260
3	9,902,466	9,820,510	9,723,848	4,901,511	4,860,989	4,812,435	-81,956	-178,618	-40,522	-89,076
4	9,197,749	9,115,243	9,097,988	4,316,814	4,277,898	4,265,809	-82,506	-99,760	-38,915	-51,004
5	5,940,605	5,517,347	5,760,520	3,274,165	3,042,668	3,176,244	-423,258	-180,085	-231,496	-97,921
6	10,219,324	10,164,146	10,005,805	4,479,811	4,454,602	4,386,634	-55,178	-213,519	-25,209	-93,177
7	13,314,490	13,075,367	12,866,814	5,706,940	5,605,601	5,515,728	-239,123	-447,676	-101,339	-191,212
8	12,801,558	12,885,640	12,460,254	4,567,881	4,598,570	4,442,426	84,081	-341,305	30,689	-125,456
9	8,340,413	7,960,850	8,089,428	4,328,065	4,131,755	4,195,005	-379,563	-250,985	-196,310	-133,060
10	8,107,081	7,773,224	7,908,850	4,275,007	4,085,204	4,160,254	-333,857	-198,231	-189,803	-114,753
11	6,842,396	6,275,960	7,106,232	3,498,589	3,195,596	3,643,543	-566,436	263,836	-302,993	144,955
12	6,337,649	5,807,525	6,476,612	3,804,532	3,484,292	3,894,939	-530,123	138,964	-320,240	90,407
	106,711,183	103,681,573	105,237,577	51,326,586	49,663,939	50,693,362	-3,029,610	-1,473,605	-1,662,646	-633,223

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative 4 or 5. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Simple regressions of ex-vessel price against monthly landings using the 12 monthly observations in the above table suggested that revenue losses would be lower under alternative four than indicated in the above table (-2.88 percent vs. –3.24 percent as indicated in the above table). Allowing price to change in accordance with the simple inverse price model and landings under alternative five suggests that revenues would decrease by only –1.09 percent vs. the 1.23 percent indicated in the above table. Consumer surplus was estimated to decline by $361,464 under alternative five and by $572,934 under alternative four. Estimates contained in table are based on logbook data, and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 27. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Total All Species

MONTH	Total	Landings	Landings	Status Quo	Potential Value	Potential Valued	Change lbs	Change lbs	Change Value	Change Value
	Status Quo Landings[a]	Alternative four	Alternative five	Value[a]	Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	14,239,382	13,849,626	14,056,053	12,131,249	11,829,784	11,785,906	-389,756	-183,329	-301,465	-345,343
2	14,122,858	14,103,030	13,918,624	11,009,500	11,014,981	10,782,833	-19,828	-204,233	5,481	-226,667
3	15,256,845	15,090,086	14,851,500	12,960,452	12,839,196	12,591,886	-166,759	-405,345	-121,256	-368,566
4	13,296,276	13,266,304	13,012,618	12,692,834	12,700,943	12,052,187	-29,972	-283,658	8,109	-640,648
5	9,026,750	8,547,358	8,683,420	12,953,033	12,625,526	11,977,716	-479,392	-343,330	-327,507	-975,317
6	13,997,861	14,051,866	13,870,986	15,343,061	15,460,756	15,377,775	54,005	-126,876	117,695	34,714
7	17,546,142	17,254,033	17,243,087	17,027,854	16,783,978	17,089,567	-292,109	-303,055	-243,876	61,713
8	16,744,541	16,596,891	16,436,788	15,542,426	15,487,075	15,260,516	-147,650	-307,753	-55,351	-281,910
9	11,828,470	11,111,825	11,655,614	11,788,889	11,203,102	11,785,722	-716,645	-172,856	-585,787	-3,168
10	13,775,814	13,265,716	13,397,658	14,684,592	14,343,971	14,674,486	-510,097	-378,156	-340,621	-10,106
11	11,149,179	10,556,904	11,276,706	10,672,054	10,360,378	10,581,659	-592,275	127,527	-311,676	-90,394
12	9,588,961	8,967,169	9,844,195	9,246,110	8,853,021	9,690,672	-621,792	255,234	-393,089	444,562
	160,573,079	156,660,809	158,247,248	156,052,054	153,502,711	153,650,925	-3,912,270	-2,325,830	-2,549,344	-2,401,129

[a]Status Quo landings and value refer to the total landings and ex-vessel value received by those vessels fishing in areas defined by either alternative 4 or 5. Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. Estimates contained in table are based on logbook data, and thus, are not indicative of U.S. totals. All values are in terms of year 2000 constant dollars.

Table 28. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Surfclam Dredge

Month	Status Quo Pounds	pounds landed-4	pounds landed-5	Status Quo Revenue	Revenue-v	Revenue-5	Change Landings-4	Change Landings-5	Change Revenue-4	Change Revenue-5
1	360,141	16,678	1,069	175,161	8,743	477	16,678	1,069	8,743	477
2	416,667	36,808	1,581	204,041	20,260	708	36,808	1,581	20,260	708
3	476,091	47,235	717	232,876	26,180	318	47,235	717	26,180	318
4	523,195	44,757	762	251,012	24,804	356	44,757	762	24,804	356
5	522,616	38,243	3,072	253,547	21,341	1,411	38,243	3,072	21,341	1,411
6	623,753	57,926	2,330	305,169	31,203	1,029	57,926	2,330	31,203	1,029
7	560,943	39,781	1,933	275,360	20,877	844	39,781	1,933	20,877	844
8	619,579	45,747	4,243	306,439	24,767	1,866	45,747	4,243	24,767	1,866
9	594,782	55,740	6,061	297,812	30,830	2,651	55,740	6,061	30,830	2,651
10	614,615	83,217	3,002	308,277	45,964	1,327	83,217	3,002	45,964	1,327
11	526,700	75,368	1,342	265,249	42,247	590	75,368	1,342	42,247	590
12	438,229	57,593	768	220,439	32,515	338	57,593	768	32,515	338
	6,277,312	599,093	26,878	3,095,382	329,732	11,913	599,093	26,878	329,732	11,913

[a]Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. All values are in terms of year 2000 constant dollars.

Table 29. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Sea Scallop Dredge

Month	Landings			Revenue			Change in Landings		Change in Revenue	
	Status Quo	Alternative four	Alternative five	Status Quo	Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	354,907	340,964	331,194	1,601,115	1,545,669	1,484,127	-13,943	-23,713	-55,446	-116,988
2	638,277	636,987	615,804	3,099,350	3,097,568	2,993,731	-1,290	-22,473	-1,782	-105,618
3	938,350	934,260	912,216	4,882,790	4,862,014	4,749,623	-4,090	-26,134	-20,776	-133,167
4	1,158,982	1,163,152	1,054,675	5,998,165	6,020,277	5,459,752	4,170	-104,307	22,112	-538,413
5	1,559,786	1,558,804	1,388,080	7,746,363	7,742,165	6,890,882	-981	-171,706	-4,198	-855,481
6	1,816,478	1,824,475	1,826,174	8,479,157	8,516,991	8,524,605	7,997	9,696	37,834	45,448
7	1,810,914	1,800,712	1,843,771	9,115,221	9,064,164	9,282,140	-10,203	32,857	-51,057	166,918
8	1,667,247	1,663,818	1,644,511	8,992,247	8,972,774	8,870,184	-3,429	-22,736	-19,473	-122,063
9	993,992	991,714	1,017,467	5,557,527	5,545,412	5,689,418	-2,278	23,475	-12,116	131,891
10	1,284,215	1,276,781	1,326,721	7,180,812	7,156,090	7,430,647	-7,434	42,507	-24,722	249,835
11	884,195	875,467	862,490	4,459,831	4,429,239	4,332,913	-8,728	-21,705	-30,592	-126,918
12	711,838	709,848	780,248	3,477,341	3,474,286	3,809,082	-1,990	68,411	-3,055	331,741
	13,819,180	13,776,980	13,603,353	70,589,919	70,426,649	69,517,103	-42,200	-215,827	-163,270	-1,072,816

[a]Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. All values are in terms of year 2000 constant dollars.

Table 30. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Fish Otter Trawl

Month	Landings			Revenue			Change in Landings		Change in Revenue	
	Status Quo	Alternative four	Alternative five	Status Quo	Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	13,769,020	13,396,021	13,612,618	10,191,236	9,956,751	9,966,044	-372,998	-156,401	-234,485	-225,192
2	13,374,146	13,355,866	13,193,179	7,691,886	7,700,289	7,572,218	-18,280	-180,968	8,404	-119,668
3	14,205,956	14,044,941	13,830,376	7,850,296	7,753,442	7,623,507	-161,015	-375,581	-96,854	-226,789
4	12,007,705	11,976,050	11,832,153	6,194,923	6,191,776	6,109,197	-31,655	-175,552	-3,147	-85,726
5	7,298,466	6,830,060	7,133,563	4,425,647	4,148,110	4,337,219	-468,405	-164,902	-277,537	-88,428
6	11,926,148	11,959,967	11,785,085	5,767,107	5,793,528	5,736,346	33,820	-141,063	26,421	-30,761
7	15,492,277	15,225,741	15,150,977	6,831,653	6,710,486	6,700,289	-266,536	-341,300	-121,166	-131,364
8	14,864,397	14,713,970	14,592,173	5,569,870	5,502,064	5,472,813	-150,427	-272,224	-67,806	-97,057
9	10,717,653	10,008,467	10,531,830	5,726,387	5,168,691	5,645,439	-709,186	-185,823	-557,696	-80,948
10	12,321,873	11,827,536	11,908,307	6,727,375	6,451,071	6,503,208	-494,337	-413,566	-276,305	-224,167
11	10,102,391	9,522,409	10,251,812	5,679,401	5,391,892	5,727,233	-579,982	149,421	-287,508	47,832
12	8,785,023	8,171,566	8,970,190	5,590,116	5,208,323	5,700,698	-613,457	185,167	-381,793	110,582
	144,865,056	141,032,597	142,792,263	78,245,897	75,976,424	77,094,211	-3,832,459	-2,072,793	-2,269,473	-1,151,686

[a]Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. All values are in terms of year 2000 constant dollars.

Table 31. Status Quo and Predicted Average Monthly and Annual Landings and Revenue, Other Otter Trawl

Month	Landings			Revenue			Change in Landings		Change in Revenue	
	Status Quo	Alternative four	Alternative five	Status Quo	Alternative four	Alternative five	Alternative four	Alternative five	Alternative four	Alternative five
1	115,455	112,641	112,240	338,898	327,364	335,736	-2,814	-3,215	-11,534	-3,162
2	110,435	110,177	109,642	218,265	217,124	216,884	-258	-793	-1,140	-1,380
3	112,539	110,885	108,908	227,366	223,740	218,756	-1,654	-3,631	-3,626	-8,610
4	129,589	127,102	125,790	499,746	488,890	483,237	-2,486	-3,799	-10,856	-16,508
5	168,499	158,493	161,777	781,023	735,251	749,614	-10,006	-6,722	-45,771	-31,408
6	255,235	267,424	259,727	1,096,797	1,150,237	1,116,824	12,189	4,491	53,440	20,027
7	242,950	227,580	248,338	1,080,980	1,009,327	1,107,138	-15,370	5,388	-71,653	26,158
8	212,897	219,103	200,104	980,309	1,012,236	917,519	6,206	-12,793	31,927	-62,790
9	116,825	111,644	106,316	504,975	489,000	450,865	-5,181	-10,508	-15,975	-54,110
10	169,726	161,400	162,630	776,405	736,811	740,631	-8,327	-7,096	-39,594	-35,774
11	162,594	159,028	162,404	532,822	539,246	521,513	-3,565	-190	6,424	-11,309
12	92,100	85,755	93,756	178,653	170,413	180,892	-6,345	1,656	-8,241	2,239
	1,888,843	1,851,232	1,851,633	7,216,239	7,099,639	7,039,611	-37,611	-37,210	-116,600	-176,628

[a]Estimates of ex-vessel revenue or value contained in table assume no change in ex-vessel prices. If potential landings are greater than observed landings, gains in revenue would be smaller than stated in table; if potential landings are less than observed landings, losses would be smaller than stated in the table. All values are in terms of year 2000 constant dollars.

Table 32. Predicted Monthly and Average Annual Landings, Revenues, and Consumer Surplus, Summer Flounder

Month	Landings			Revenue			Consumer Surplus			Change in Landings		Change in Revenue		Change in Consumer Surplus	
	Status Quo	Alternative four	Alternative five	Status Quo	4	5	Status Quo	4	5	4	5	4	5	4	5
1	3,789,500	3,768,140	3,605,820	5,814,916	5,790,894	5,605,154	782,839	774,080	709,143	-21,360	-183,680	-24,022	-209,761	-8,759	-73,696
2	1,443,243	1,459,734	1,437,843	2,558,706	2,582,092	2,550,989	773,087	784,474	769,388	16,491	-5,401	23,385	-7,717	11,387	-3,699
3	511,243	518,900	510,742	1,395,117	1,413,782	1,393,892	73,776	75,974	73,633	7,657	-501	18,665	-1,225	2,198	-143
4	479,108	484,436	477,545	1,155,989	1,166,079	1,153,016	153,603	156,766	152,681	5,328	-1,563	10,090	-2,973	3,163	-921
5	612,630	569,646	603,346	1,318,296	1,268,539	1,308,108	345,017	299,469	334,899	-42,984	-9,284	-49,757	-10,187	-15,482	-3,170
6	457,480	434,902	472,970	1,046,589	1,024,844	1,059,685	332,028	300,843	354,333	-22,578	15,490	-21,745	13,096	-6,766	4,075
7	564,127	557,285	571,615	1,219,787	1,214,638	1,225,151	404,046	394,313	414,835	-6,842	7,488	-5,149	5,365	-1,602	1,669
8	402,279	389,534	407,412	1,013,203	983,722	1,025,028	43,966	41,395	45,024	-12,745	5,133	-29,481	11,825	-2,570	1,058
9	920,070	551,860	956,436	1,688,666	1,105,758	1,739,154	219,841	88,558	236,349	-368,210	36,366	-582,908	50,488	-131,284	16,507
10	497,469	460,921	517,495	900,133	838,921	933,275	57,368	51,169	60,963	-36,548	20,026	-61,211	33,142	-6,199	3,595
11	835,224	832,274	802,814	1,430,779	1,427,093	1,389,683	225,824	224,352	209,935	-2,950	-32,410	-3,686	-41,096	-1,472	-15,890
12	1,009,921	968,792	1,020,669	2,038,948	1,976,307	2,055,024	274,441	253,085	280,168	-41,129	10,749	-62,641	16,076	-21,356	5,727
	11,522,293	10,996,423	11,384,706	21,581,129	20,792,668	21,438,161	3,685,836	3,444,478	3,641,350	-525,870	-137,587	-788,461	-142,968	-178,742	-64,887

[a]All estimates are with respect to national landings and revenue of summer flounder. Revenue and consumer surplus are estimated allowing ex-vessel prices to change in response to changes in landings. All values are in terms of year 2000 constant dollars.

Table 33. Predicted Monthly and Average Annual Landings, Revenues, and Consumer Surplus, Scup

Month	Landings			Revenue			Consumer Surplus			Change in Landings		Change in Revenue		Change in Consumer Surplus	
	Status Quo	Alternative four	Alternative five	Status Quo	4	5	Status Quo	4	5	4	5	4	5	4	5
1	473,485	446,864	377,573	625,731	597,141	518,515	80,217	72,421	54,231	-26,621	-95,912	-28,591	-107,216	-7,797	-25,986
2	781,488	761,474	708,356	804,114	794,567	766,253	248,632	236,740	206,669	-20,014	-73,132	-9,546	-37,860	-2,314	-9,176
3	487,986	477,023	420,406	665,921	652,912	583,815	74,896	72,227	59,397	-10,963	-67,580	-13,009	-82,106	-2,669	-15,499
4	429,965	422,037	359,422	583,906	573,529	489,720	65,797	64,368	54,009	-7,928	-70,543	-10,377	-94,186	-1,428	-11,788
5	735,563	732,386	740,227	951,105	947,883	955,824	137,978	136,938	139,514	-3,177	4,665	-3,221	4,719	-1,002	1,468
6	440,599	440,919	441,024	542,413	542,701	542,796	97,772	97,896	97,937	320	425	288	383	90	119
7	167,653	167,851	168,089	261,239	261,528	261,874	9,872	9,894	9,920	198	436	288	635	90	198
8	283,617	284,032	283,735	465,596	466,045	465,724	92,568	92,819	92,639	415	118	449	128	251	71
9	313,255	313,271	313,504	436,580	436,593	436,779	130,616	130,627	130,794	16	249	13	198	11	178
10	216,244	216,908	217,033	318,144	319,051	319,221	22,050	22,154	22,173	664	789	907	1,078	103	123
11	493,421	494,856	499,829	649,040	650,483	655,463	89,532	90,014	91,695	1,435	6,408	1,443	6,423	482	2,163
12	291,681	294,554	262,601	389,737	393,182	354,115	49,509	50,195	42,936	2,873	-29,080	3,445	-35,622	686	-6,573
	5,114,954	5,052,173	4,791,797	6,693,526	6,635,615	6,350,099	1,099,439	1,076,292	1,001,913	-62,782	-323,158	-57,911	-343,427	-13,497	-64,702

[a]All estimates are with respect to national landings and revenue of scup. Revenue and consumer surplus are estimated allowing ex-vessel prices to change in response to changes in landings. All values are in terms of year 2000 constant dollars.

Table 34. Predicted Monthly and Average Annual Landings, Revenues, and Consumer Surplus, Black Sea Bass

Month	Landings			Revenue			Consumer Surplus			Change in Landings		Change in Revenue		Change in Consumer Surplus	
	Status Quo	Alternative four	Alternative five	Status Quo	4	5	Status Quo	4	5	4	5	4	5	4	5
1	375,491	367,803	375,657	583,327	572,436	583,562	39,353	37,890	39,385	-7,688	166	-10,891	234	-1,462	32
2	487,878	479,198	487,444	733,403	722,068	732,838	65,320	63,161	65,211	-8,680	-434	-11,334	-565	-2,159	-109
3	336,244	330,684	330,377	515,890	508,781	508,387	46,803	45,319	45,237	-5,560	-5,867	-7,109	-7,503	-1,484	-1,565
4	273,080	278,934	267,345	411,532	419,253	403,908	36,012	37,443	34,640	5,854	-5,735	7,722	-7,623	1,431	-1,372
5	455,381	456,455	456,752	661,093	662,296	662,629	80,636	81,005	81,108	1,074	1,371	1,203	1,536	374	478
6	291,103	290,301	291,354	433,878	432,938	434,172	47,308	47,050	47,389	-802	251	-941	294	-293	92
7	191,022	190,966	191,132	318,968	318,883	319,135	14,457	14,448	14,473	-56	110	-85	167	-26	52
8	160,233	159,827	160,387	284,565	283,839	284,840	1,109	1,103	1,111	-406	154	-725	275	-5	2
9	174,640	174,607	174,730	304,029	303,974	304,178	7,387	7,385	7,395	-33	90	-55	149	-3	7
10	257,282	257,364	257,771	411,597	411,710	412,270	28,906	28,924	29,013	82	489	113	673	18	108
11	315,756	316,481	316,223	483,783	484,702	484,375	43,827	44,026	43,955	725	467	920	592	199	128
12	311,187	311,420	311,181	461,664	461,946	461,657	49,367	49,437	49,365	233	-6	282	-7	71	-2
	3,629,297	3,614,040	3,620,353	5,603,727	5,582,826	5,591,949	460,484	457,192	458,282	-15,257	-8,944	-20,901	-11,777	-3,340	-2,150

[a]All estimates are with respect to national landings and revenue of black sea bass. Revenue and consumer surplus are estimated allowing ex-vessel prices to change in response to changes in landings. All values are in terms of year 2000 constant dollars.

Figure 1. 1990, 1999, and 1990-1999 Average Annual Landings by State

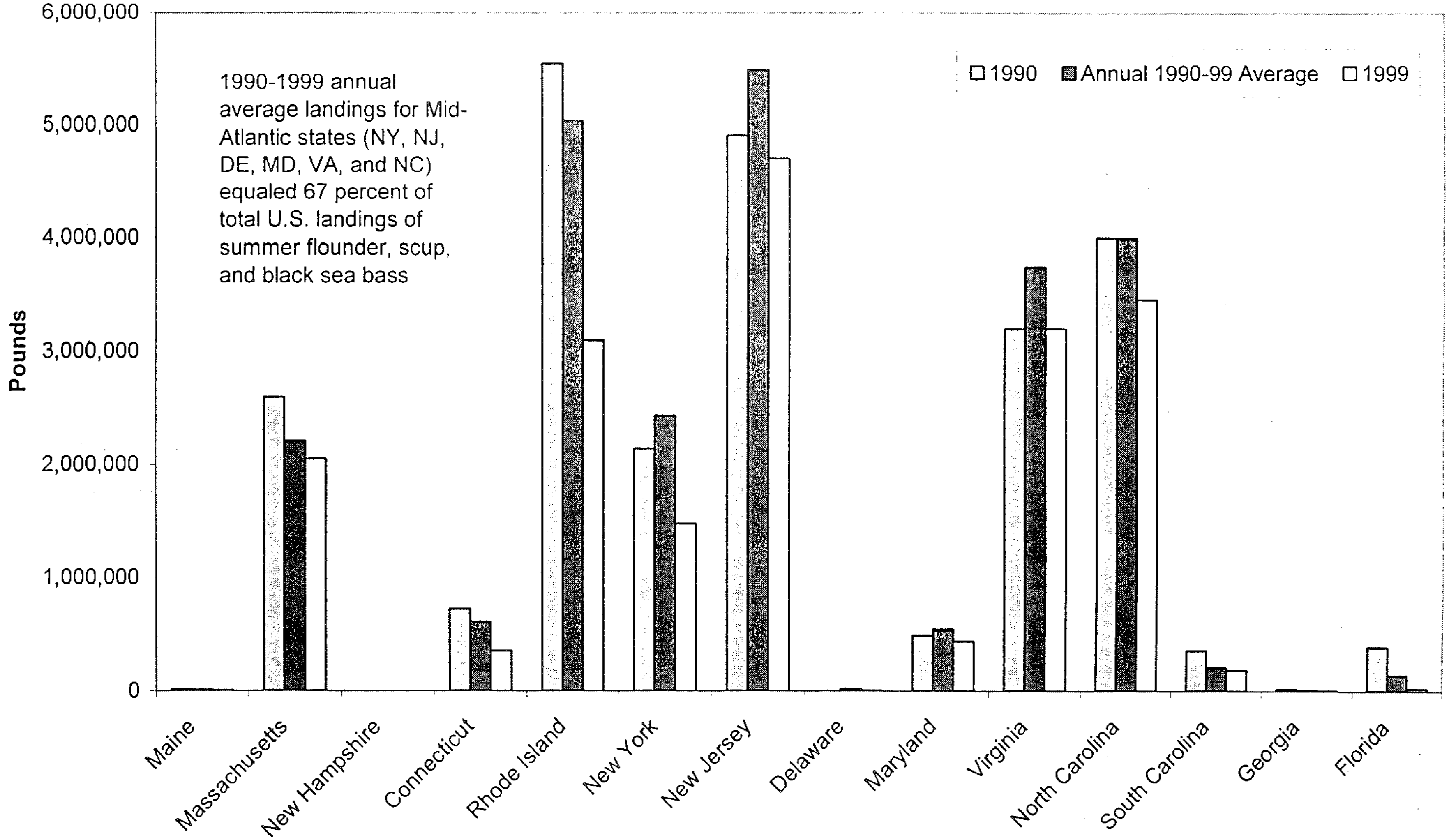


Figure 2. Average Annual Percent of Total Landings of Scup, Summer Flounder, and Black Sea Bass, 1990-1999

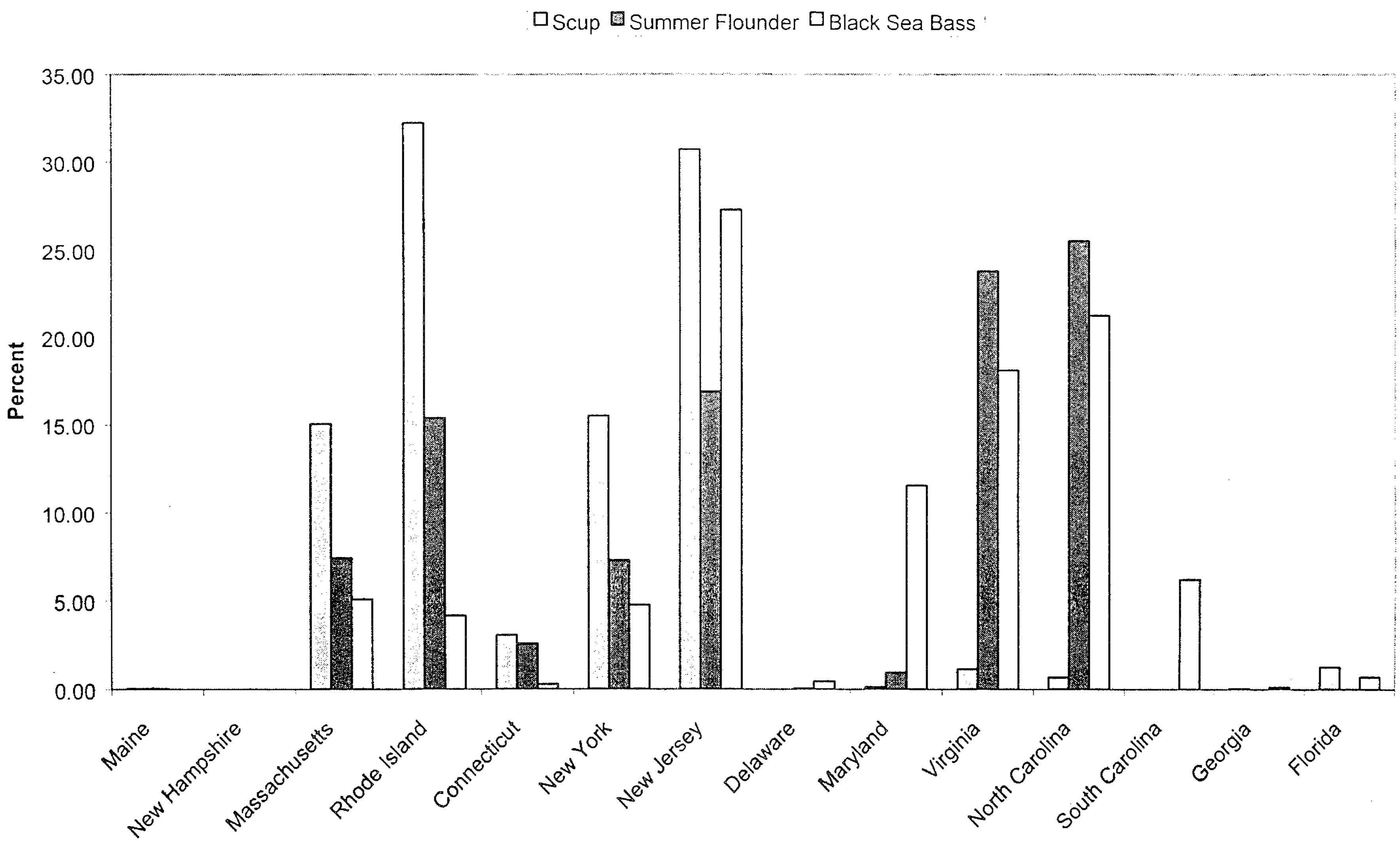


Figure 3. Seasonality of Landings and Ex-vessel Price, Summer Flounder, 1990-1999

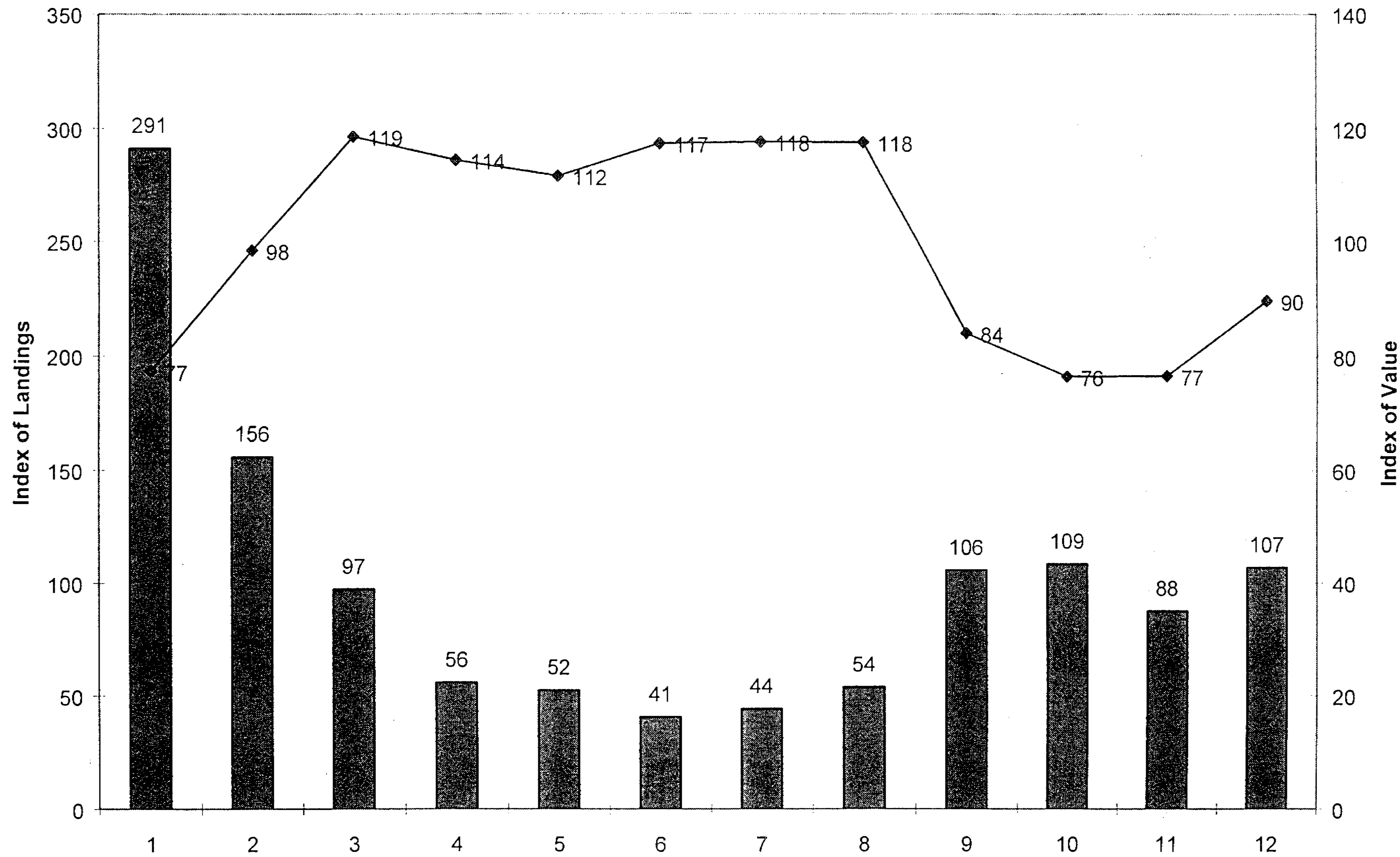


Figure 4. Seasonality of Landings and Ex-vessel Price, Scup, 1990-1999

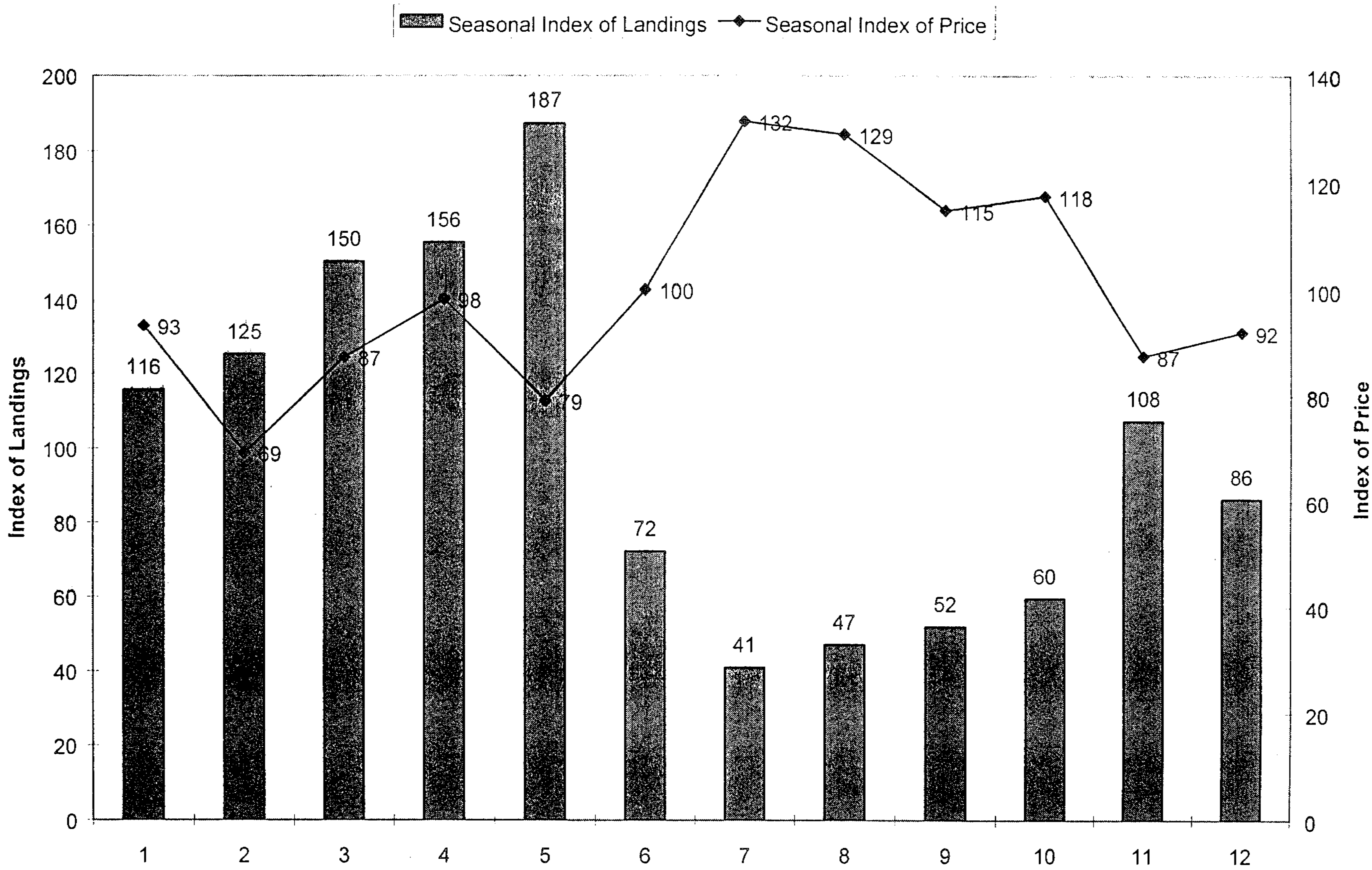


Figure 5. Seasonality of Landings and Ex-vessel Price, Black Sea Bass, 1990-1999

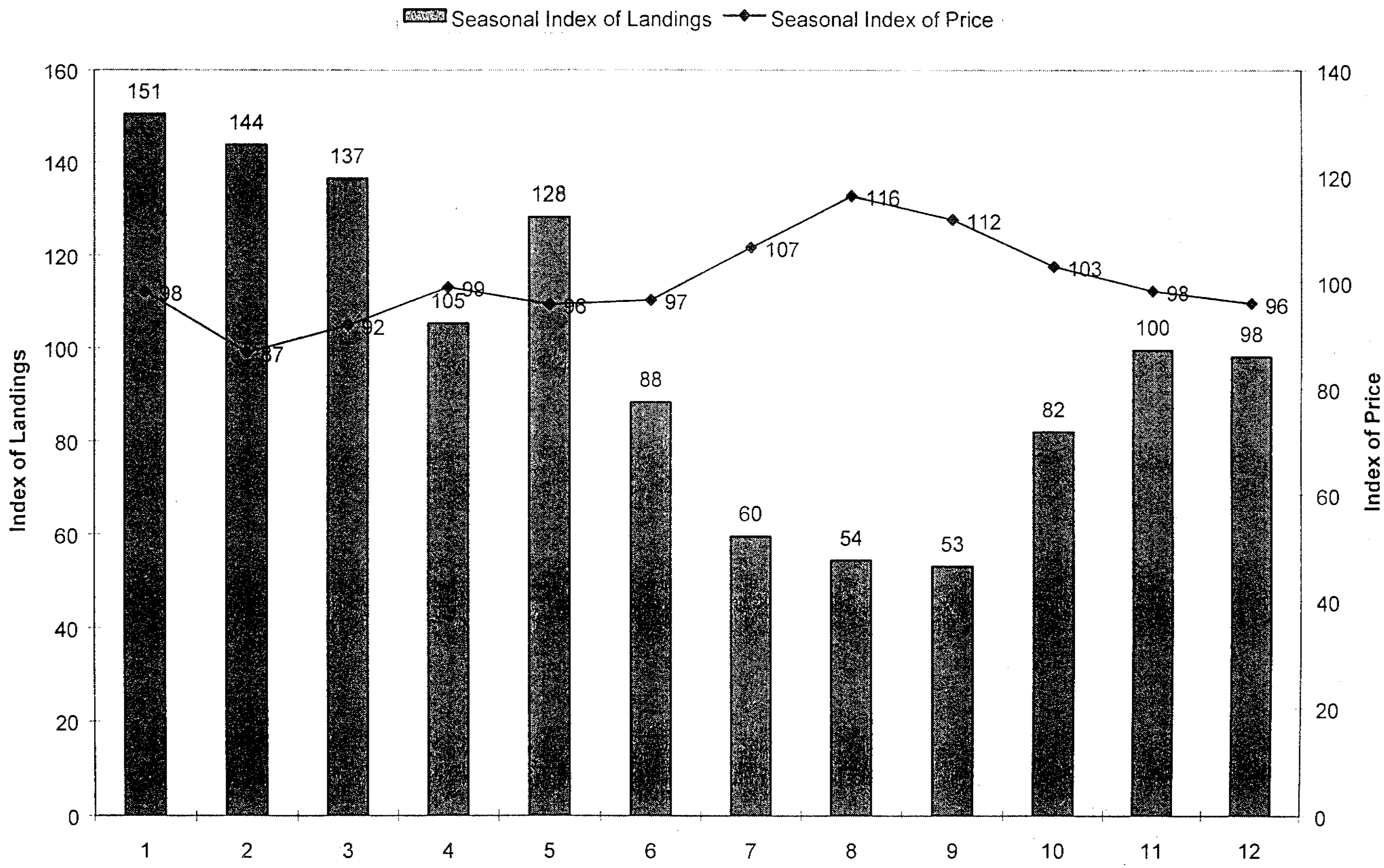
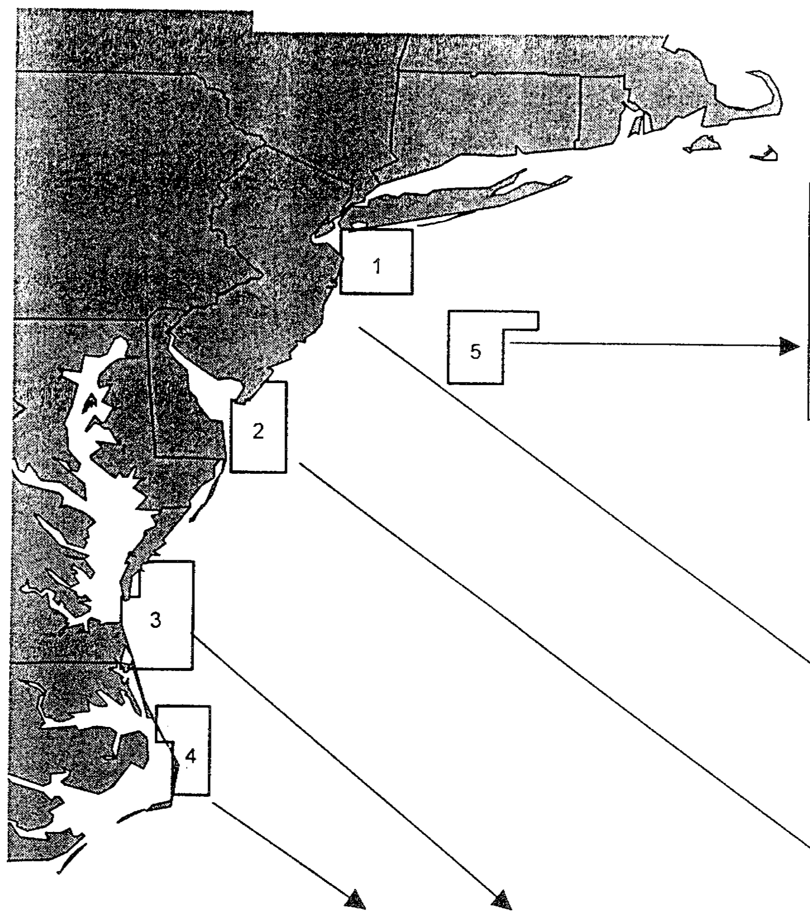


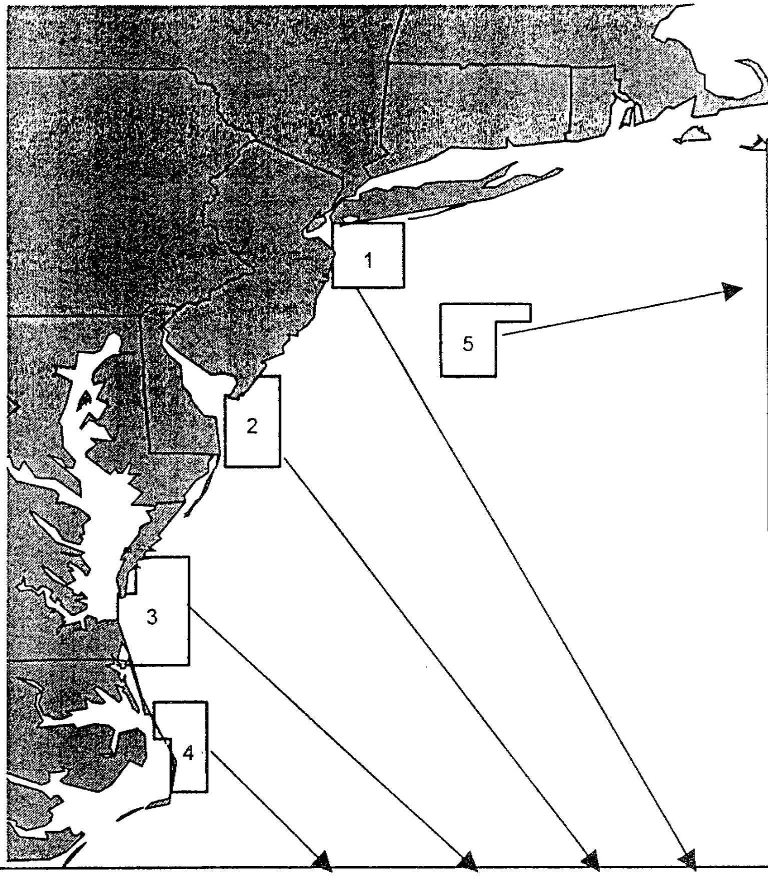
Figure 6. Average Yearly Landings by Gear for Closed Areas



Gear	Zone 5 Value	Zone 5 LBS	All other activity south of 41.5 Value	All other activity south of 41.5 LBS
Dredge-Scallop	$3,569,510	694,102	$65,688,763	12,852,460
OT Fish	$2,342,383	4,440,488	$70,597,780	129,606,581
OT Other	$447,179	108,325	$6,459,968	1,629,180
Dredge- Clam	$11,913	26,878	$2,753,737	5,651,344

Gear	Zone 1 Value	Zone 1 LBS	Zone 2 Value	Zone 2 LBS	Zone 3 Value	Zone 3 LBS	Zone 4 Value	Zone 4 LBS	Zones 1-4 Value	Zones 1-4 LBS
Dredge-Scallop	$1,050,063	215,924	$275,306	67,800	$6,278	1,344	$0	0	$1,331,647	285,067
OT Fish	$2,142,421	3,627,932	$1,262,793	3,058,923	$416,084	1,285,379	$1,536,023	2,931,762	$5,357,322	10,904,000
OT Other	$51,615	19,770	$128,692	48,858	$56,195	47,513	$74,236	40,833	$310,739	156,974
Dredge- Clam	$109,277	201,706	$220,404	697,208	$100	179	$0	0	$329,732	599,093

Figure 7. Average Yearly State Landings for Closed Areas



State	Zone 5 Value	Zone 5 LBS	All Other Activity South of 41.5 Value	All Other Activity South of 41.5 LBS
NE (ME,NH,RI,CT)	$986,929	2,086,238	$35,797,352	59,303,488
MA	$1,942,338	496,210	$49,969,117	26,730,564
NJ	$1,655,934	1,525,032	$20,355,991	28,334,548
NY	$515,629	796,678	$9,380,937	15,572,658
VA	$1,208,615	255,096	$22,285,808	8,169,725
MD	$0	0	$574,773	1,072,552
NC	$39,186	26,833	$2,464,013	3,290,126
FL	$0	0	$10,658	14,650

State	Zone 1 Value	Zone 1 LBS	Zone 2 Value	Zone 2 LBS	Zone 3 Value	Zone 3 LBS	Zone 4 Value	Zone 4 LBS	Zones 1-4 Value	Zones 1-4 LBS
NE (ME,NH,RI,CT)	$79,339	153,461	$20,554	119,073	$42,954	249,994	$1,511	2,060	$144,358	524,587
MA	$101,366	38,568	$25,234	11,252	$0	0	$0	0	$126,600	49,820
NJ	$2,502,668	2,798,782	$1,018,800	2,402,674	$28,774	160,318	$10,361	26,539	$3,560,603	5,388,312
NY	$369,574	700,307	$13,948	13,183	$0	0	$0	0	$383,523	713,489
VA	$104,484	22,404	$238,085	190,604	$347,238	855,228	$318,770	366,054	$1,008,578	1,434,290
MD	$0	0	$187,640	346,973	$126	188	$0	0	$187,766	347,161
NC	$8,072	17,368	$2,654	4,750	$32,878	51,169	$1,264,763	2,544,957	$1,308,367	2,618,244
FL	$2,235	699	$0	0	$0	0	$0	0	$2,235	699

Figure 8. Average Annual Number of Vessels Fishing in Areas Defined by Alternatives 4 and 5, 1996-2000

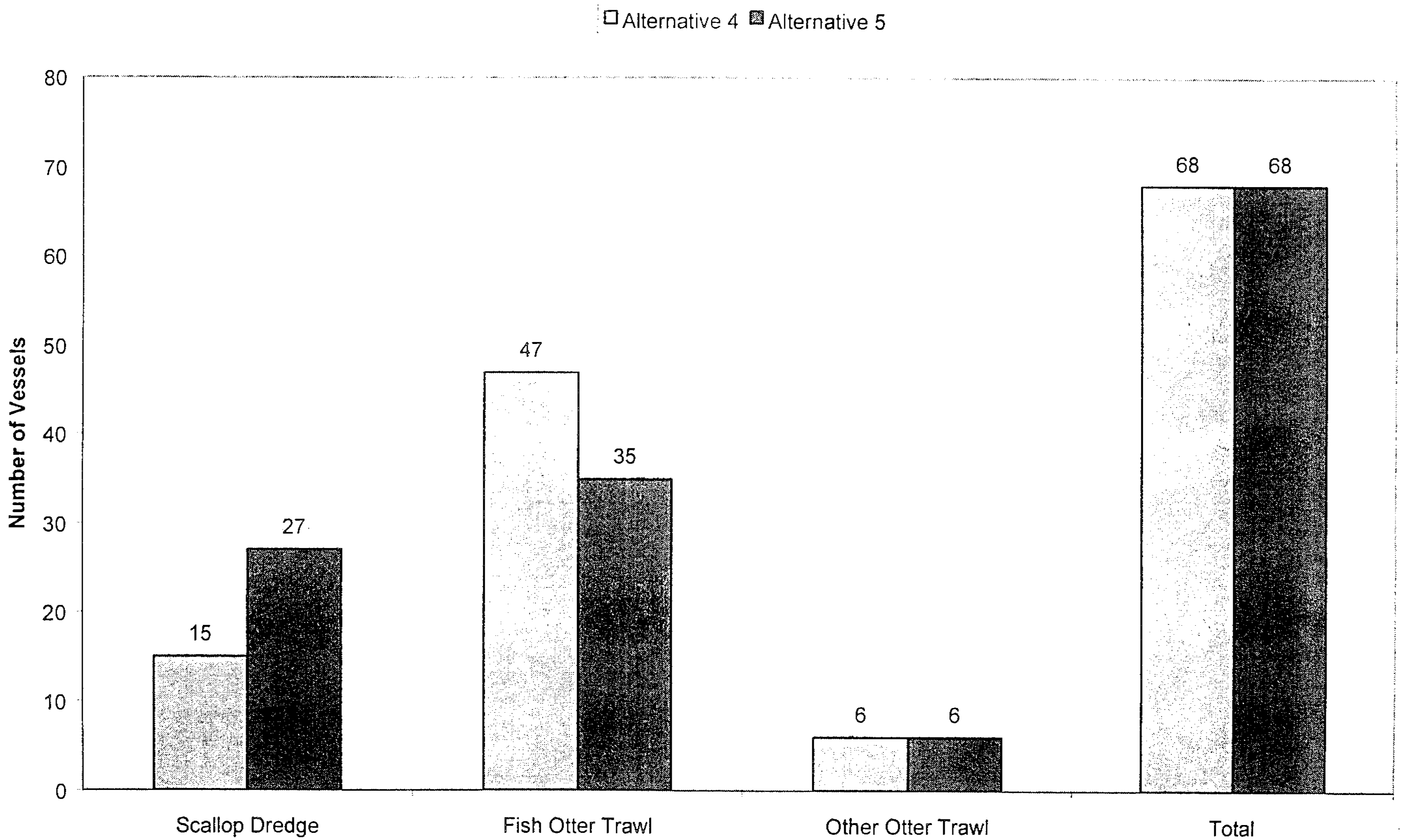


Figure 9. Average Annual Percent of Ex-vessel Value Derived from Areas Defined by Alternatives 4 and 5, 1996-2000

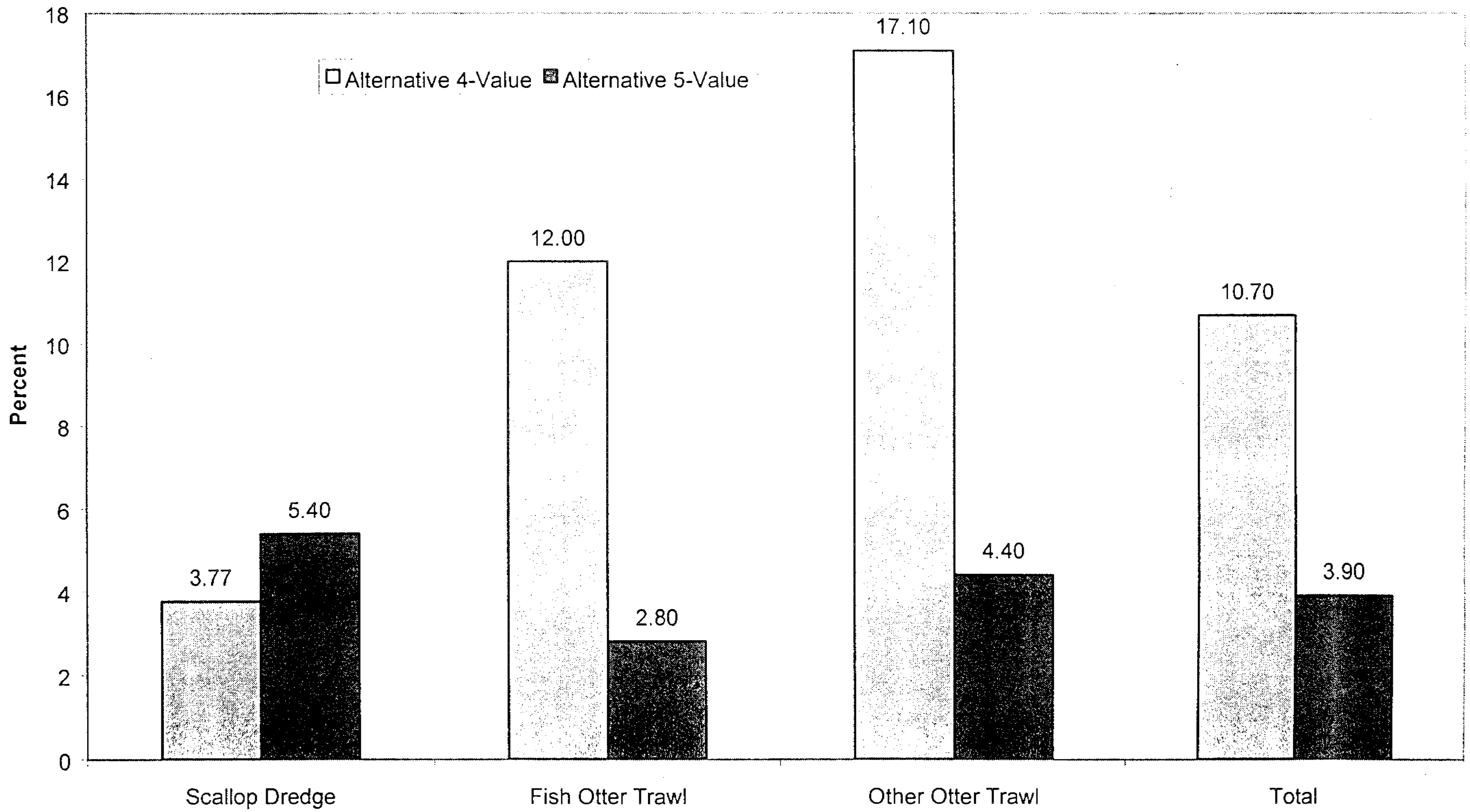
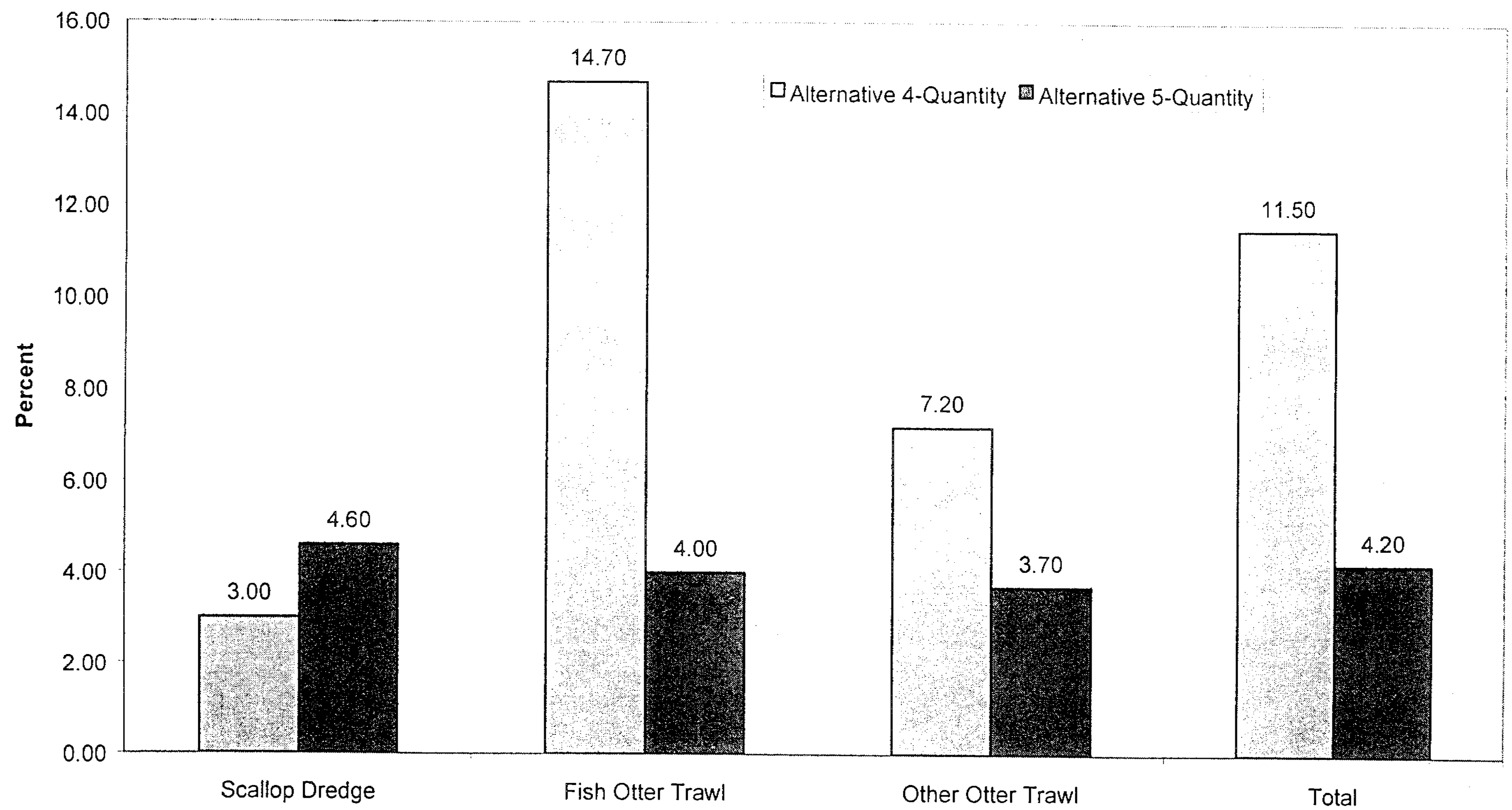


Figure 10. Average Annual Percent of Landings Derived from Areas Defined by Alternatives 4 and 5, 1996-2000



APPENDIX G. PUBLIC HEARING SUMMARIES

18 March 2002, Cape May, New Jersey

Bruce Freeman, MAFMC and ASMFC, opened the hearing at 7:00 pm. Approximately twenty-five members of the public attended the hearing. John Connell of ASMFC, Mike Lewis of ASMFC staff, and Valerie Whalon of MAFMC staff were also present. Ms. Whalon presented the summary of the amendment. Bruce Freeman then opened the hearing to the public for comments.

Mike Scott, a black sea bass potter on the F/V Wizard, from Bay Head, NJ, read comments from a letter. He preferred Alternative 6b the hybrid alternative, where draggers get a coastwide quota in the winter, and a state by state quota is allocated for the remainder of the year. He is also in favor of Alternative 10a. Mr. Scott said that removing traps from water in 10 days is impossible. He is not in favor of pot/trap tags or limits on pots/traps.

Joan Berko, a sea bass potter on the F/V Wizard, from Bay Head, NJ, read her comments from a letter (attached). She first asked if the Alternative 6 was supposed to read March instead of April. Mr. Freeman explained that April was correct. Note: her letter refers to Alternative 6b as March rather than April, but she intends it to match the Alternative as referenced in the public hearing document. Ms. Berko prefers Alternative 6b. She feels that Alternative 1 would allow the problem to get worse. She's also in favor of Alternative 9b. She prefers Alternative 10a (status quo). She says that the pots get tended when the fishery is closed. She notes that the Council might want to abolish the vessel upgrade limit, so potters can buy faster boats that will allow them to move traps faster. She also notes that the Council will have to tell lobster fishermen to remove the pots. Ms. Berko is not in favor of trap tag requirements. She says that lobster tags didn't work. She wants the Council to leave trap limits at status quo, because traps fish differently in different areas. She also noted that the 800 pot/trap limit wouldn't be consistent with Addendum 3 of Amendment 1 of the Lobster FMP. Regarding the effects of fishing on EFH, Ms. Berko notes that the effects of traps are minimal in the high energy sand environment in which they are fished. She says that party boats have a bigger effect on the sand with their anchors.

Joe Wagner, a commercial trap fisherman from Ocean View, NJ, agrees with everything that Ms. Berko and Mr. Scott said. Additionally, he doesn't agree with any closure zones for any one group. He said that it is not fair to give an area to one user group and close it for another user group. He said that if an area is going to be closed it should be closed to everyone. He used the example of artificial reefs that pot fishermen can't fish in. He feels that if an area is going to be closed than it should be made a sanctuary, and don't allow anyone to fish there. Regarding the wet pot storage, he feels that once pots are put out they should be allowed to be fished. He hopes that if a state-by-state quota is implemented there won't be any closures and it will take care of the problem. He said that there are not many pot fishermen in NJ, and the elimination of wet storage is an impossible task. He can't sustain a business with the number of fish they are allowed to catch. If the season opens and shuts and the gear has to be brought home in 10 days, circumstances might make it impossible. Something may happen like your boat breaks or you have a broken leg, or something. He says that pot fishermen are taking risks every time they put traps out and take them in. He feels that it's just not feasible, especially near tourist towns, like he's in. He said that people will complain about the smell and it wouldn't be right to the other businesses that depend on the tourism. He added that he thinks Ms. Berko did a wonderful job conveying their (NJ potters) concerns.

Denise Wagner, representing the commercial trap fishery from Oceanview, NJ, prefers Alternatives 6a, 9b, and 10a. She does not like the wet storage alternatives because they are not practical. She said that they would be the only fishery not allowed to catch other fish as bycatch. She said that when they put their gear out they have to let the traps soak for two weeks before they catch anything. She also prefers Alternative 11a, no trap tags and Alternative 12a, no trap limit. She prefers EFH Alternative 1. She does not want a closure to any particular fishery. She said that if an area is being closed to anyone then it should be closed to everyone. She is concerned that they state of NJ will continue to develop artificial reefs.

In response to a general question from the audience Mr. Freeman explained the hybrid Alternative 6. He said that mobile gear fishery operated primarily in the winter, while the trap fishery primarily operated from May through December. As such, the May through December quota can be allocated to states that, can in turn, allocate it by gear.

Jim Harris, a mobile gear fisherman from Cape May, NJ, said that he preferred Alternative 6c and EFH Alternative 1. He noted that roller rig and rock hopper gear should only be 18" max. He asked if there would be anything in the amendment that would limit historical participation,

Mr. Freeman explained that states could implement landing permits or ITQs, but it depends on how good the records are in order to support those systems.

Mr. Harris replied that if they don't have the records, then they are out of luck.

Cookie VanNote, a black sea bass potter from Cape May, NJ, asked how a black sea bass pot is defined under alternative 10a. She explained that you can catch different fish and crabs with the same pot. She doesn't understand how she can be told that she can't use her pots to catch anything else. She said that she doesn't have black sea bass pots, she has fishing pots. If the pots have to be taken from the water then all her other permits are no good. She feels that she can't use her other permits, those permits should be bought back from her.

Mrs. Wagner pointed out that anything that any trap that is able to catch lobster needs to have lobster vents, meaning that it is impossible to tell the difference between different kinds of pots.

Mr. Wagner felt that they were wasting time talking about something that doesn't have to be done. He said that they never had to bring traps in before. He doesn't make enough money from the fishery for a business, he just does it because he loves to do it. He said that he would make more money waiting tables. He said that when he brings the pots to the dock he can't clean the pots because the environmentalists complain. When the pots sit on the dock they will stink and nobody would like him, he would have to leave the town. He feels that the amendment contains a lot of things that were put in by people who know nothing about the business.

Bob Burcaw, a pot fishermen from Sea Isle City, NJ, said that when an 8 inch fish could be kept sea bass pots had small mesh and vents, but now that the minimum size limit is 11 inches, you can't tell difference between sea bass and lobster pots.

Ken Hand, a dragger on the Instigator from Cape May, NJ, prefers Alternative 1 for EFH. He feels that the gear restricted areas under EFH are the most ridiculous thing that could ever be started and if they are implemented all fishing may as well be closed.

Carmen Conti, Sr., of Sea Isle City, NJ, feels that more fish can be caught now, than ever. He doesn't think the 1 inch jump in size limit is right. He said that most fish are undersized and caught several times.

Mr. Harris wanted to know if more studies were needed in order to close areas under EFH. He said that they trawl the same areas year after year and there is always fish there, therefore he doesn't think that trawling is having an negative impact on the EFH.

Mr. Freeman explained the process through which the areas were chosen. He said that the Council is dealing with the issue because it was put into law under the reauthorization of the Magnuson Act.

Mr. Harris responded that if draggers did damage, the bottom fish wouldn't keep coming back. He thinks that draggers may do damage to the fish stocks because of size mesh that is being fished, but mesh sizes are different in different fisheries. He said that draggers aren't doing the damage to fish stocks that they used to do. He sees more sea bass than ever in his life. He noted that there is little bycatch in the fisheries. He said if there is bycatch, it's because of the trip limits, i.e. regulatory discards.

Frank Harrel, of the Star Brite, NJ, said that the scientists say that the fish are recovering. He doesn't understand why EFH alternatives have to be entertained when scientists say that fish are coming back without closed areas. He noted that the conservation measures are working.

John Connell, of the Commission, reiterated that public comments can still be sent in to the Council or Commission by April 15.

Patrick Nagle said that he feels anything done to make fishermen bring sea bass pots home during a closure will not work because they can be called sea bass pots, stone crab pots, etc.

Mr. Hand, regarding closed areas, said that if areas are going to be closed than they should be made into sanctuaries, not a place to gather up fish so that other people can catch them. He feels that people are taking advantage of the situation, there should be no fishing by any gear in sanctuaries. He is talking about a state of NJ sanctuary.

Tom Rippman, a recreational fishermen, doesn't think that party boats take so many fish that they should not be allowed to fish in a sanctuary.

The hearing was closed at 8:30.

Joan Berko
Michael Scott
174 Park Ave.
Bay Head, NJ 08742

March 14, 2002

Mr. Daniel T. Furlong
Executive Director
Mid-Atlantic Fishery Management Council
Room 2115, 300 S. New Street
Dover, DE 19904

Re: Comments on proposed Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Plan

Dear Mr. Furlong:

We offer the following comments on Amendment 13, concerning the commercial black sea bass fishery.

Management Alternatives

We prefer **Alternative 6b** - hybrid quota system based on 1993-1997 landings data: coastwise quota from January through March and state-by-state quotas from April through December.

Alternative 1 (status quo) will allow the present situation to get worse. Alternatives 2a and 2b (quarterly quota system with rollover provision) won't achieve anything, since the problem of unrestricted entry into the fishery in state waters will still remain. It will only provide quota for new fishermen. Alternatives 3a, 3b, 3c,and 3d (permit categories) would only cap effort in federal waters. Boats without federal permits would continue to enjoy unlimited entry.

As one of the five vessels holding both permits, we believe **Alternative 9b,** removing the regulation restricting fishermen using a Southeast Snapper/Grouper permit during a northern closure, is an excellent idea. Under the current regulations, we are unable to fish for grouper in the south for the winter, since giving up the Northeast permit would mean being unable to fish for black sea bass in New Jersey in the spring.

Alternative 10a, status quo, is the only possibility when considering removing traps from the water during a closure. Besides from the fact that it might take longer than four weeks to remove all pots, **we do not store our pots in the water during closures!** It is a fallacy that you could leave traps for months without lifting them.

One concept should be considered: abolishing the upgrade limit on our Northeast Permits. Since almost all of the fisheries are managed with trip limits of some sort, this shouldn't be a fishing capacity issue. These closures have become commonplace; it would make sense to be able to get a faster and/or bigger boat in order to move more traps around easier, if it is financially feasible.

When the sea bass quarter is closed, lobster is our directed fishery. While the traps used may fit the definition of a sea bass pot, ours are legal lobster traps under 50CFR 697.2-Subpart A-definitions. In order to land lobsters, these sea bass pots have lobster escape vents installed. They have federal trap tags, and are baited when lobster fishing. If a black sea bass trap is defined as "any pot or trap gear that is capable of catching black sea bass", then every lobsterman holding a federal black sea bass permit would have to remove his traps during a closure, too.

Regarding effects on essential fish habitat, many of the spots we fish are of high-energy sand bottom. During a strong blow, the sands will shift. Therefore, effects of traps are minimal. Our gear is lifted once after several days. Party boats fish these same spots every day, one boat after another, each setting out two anchors at a time. This cumulative effect is much more than that of the traps.

Grapple hooks are used by small boats and divers to actually anchor in the wreck or bottom structure, and then yanked out when they are done, taking off a piece of the bottom. The only time we need to grapple, it is because a party boat or recreational boat has hauled our gear away with their anchors and cut the buoys off, or tied up to our flags instead of anchoring.

There should be no trap tag requirements (**Alternative 11a**). Besides adding another expense, it will be confusing when combined with lobster tags. It has also been observed in the lobster fishery that a tagging system doesn't deter fishermen from deploying more than the allowed number of traps.

Restricting the number of traps you are allowed to fish with will be inequitable. Catch rates and soak times vary among different states, and even within the same state. They also change throughout the year. Leave it up to the individual fisherman. It might take longer for traps in New Jersey to fill up than in another state, and that will leave us at a disadvantage when someone else can lift the same traps every day or every three days. Two hundred traps fished in one state might be the equivalent of fourteen hundred in another state; therefore, we favor **Alternative 12a**-status quo.

Another point to consider is the proposed Addendum I to Amendment 3 of the ISFMP for lobster. This may make it possible in the near future to fish 2656 traps in Area 3, or 1440 traps in areas 4 or 5. If the 800-trap limit in alternative 12c was chosen to be comparable to the lobster trap limit, that number should be increased to 1440 at the least. Otherwise, black sea bass fishermen not holding federal lobster permits will be disadvantaged.

Sincerely,

Joan Berko

Michael Scott

18 March 2002, Bourne, MA

The Bourne, MA public hearing regarding Amendment 13 to the Summer Flounder, Scup, Black Sea Bass FMP was convened at 7:00 p.m. on Monday, March 18, 2002 at the Best Western Bridge Bourne Hotel.

40 members of the public signed the registration form.

4 written comments were hand delivered by members of the public to me.

The hearing concluded at 9:30 p.m..

Summary minutes follow:

The meeting began with Dr. David Pierce, Deputy Director, MA Division of Marine Fisheries, providing guidance on the hearing process, and Dan Furlong, Executive Director of the Mid-Atlantic Council, reviewed all options included in Amendment 13 (see attached "Remarks for public hearing on Amendment 13 to the Summer Flounder, Scup, Black Sea Bass FMP"). Comments from the public provided at this meeting include:

- Opposed to state-by-state quota, it would reduce MA's landings by anywhere from 50-90%.
- MA has been conscientious in conserving black sea bass, e.g., 12" minimum size limit, limited entry program for directed fishery, number of pots limited to 200, no night time trawling, etc. Consequently, its fishermen should not be punished by an unfair allocation system now that the stock is recovering.
- Of the commercial fishery management options provided, Option 2.b. is acceptable.
- Need better science, i.e., no current stock assessment is available. "How can you manage a resource when you don't know what it is?"
- Why not use 1998 through 2001 data if this is just an allocation issue. Old data is not relevant to the current situation.
- More quota is needed.
- No support for prohibiting the deployment of pots until the first day of the open season following a closure necessitating pot removals.

- MA, RI, and CT should have representation on the MAFMC regarding fisheries that are in their waters, i.e., allocation without representation is unfair.

- One commentor supported status quo.

- Given the dynamics of the fishery, the ever-changing technologies, the impact of other fisheries on black sea bass, how can predictions about these options be made for their future consequences when everything is in a state of flux and we do not have a current, valid black sea bass stock assessment?

- Need to address equity issues, i.e., same size limits, same mesh size, same vent sizes, etc. So long as different gears use different practices and standards there will be inequities in the fisheries for black sea bass.

- MA needs to get credit for conservation efforts, both historical and current.

- If the last three years data (1998-2001) were used as a basis for state-by-state quota allocation, then MA black sea bass fishermen might support such a system provided MA could manage its share, i.e., state conservation equivalency system.

- Do what's best for black sea bass.

- Apparent increase in effort is not so . . . endorsement for black sea bass catch have been added to "other" commercial permits for landings/information purposes. Number of permitted black sea bass fishermen in the directed black sea bass is unchanged.

- No need to pull pots if closures occur in 2nd or 3rd quarters. Might be appropriate to pull pots after 4th quarter.

Observations:

- No comments on black sea bass permit and snapper/grouper change regarding the waiving of the six month relinquishment of New England black sea bass permit.

- No comments about gear allocation option - have to "wait and see."

- No comments regarding EFH options - don't see themselves affected by proposals.

HAND DELIVERED

CAPE COD
COMMERCIAL HOOK FISHERMEN'S ASSOCIATION, Inc.
210 Orleans Road
North Chatham, MA 02650 • 508-945-2432 Fax: 508-945-0981
E-mail: contact@ccchfa.org
Web: www.ccchfa.org

3/18/02

Daniel T. Furlong
Executive Director
Room 2115 Federal Building
300 S. New St.
Dover, DE 19904

Dear Mr. Furlong:

The Cape Cod Commercial Hook Fisherman's Association (CCCHFA) is against the proposed state-by-state allocation for black seabass. We feel it would be an injustice to the state of Massachusetts to be given the proposed minute percentages of the overall coast-wide quota of black seabass, especially for a state fishery that has done so much for the preservation of the black seabass biomass and stock enhancement.

The Massachusetts seabass fishery is comprised mainly of a pot and trap fishery. This environmentally friendly gear type lands approximately 90% of Massachusetts's landings, with very little to no dead discards. Undersized seabass and unwanted bycatch can be released live. The aggressive conservation and protection of black seabass that the Massachusetts fishermen provide should be an example taken by all other states. We understand that part of the proposed rules would now start to accomplish these goals, however Massachusetts has been doing this for 15 years. We at the CCCHFA want the Massachusetts seabass fishermen to have equal access to this fishery in a coast-wide quarterly quota. We admire the state of Massachusetts for all that it has done for this fishery and will endorse sustainable fisheries of this sort.

Sincerely,

Andrew Baler
Treasurer Cape Cod Commercial Hook Fisherman's Association

CC: Paul Diodati, Director Division of Marine Fisheries

CC: Pat Kurkul, National Marine Fisheries Service

HAND DELIVERED

Massachusetts Pot and Trap Fishermen's Association
P.O. Box 760 S. Dennis, MA 508-385-9094 (Tel); 508-385-9067 (Fax)

3/15/02

Mr. Daniel T. Furlong
Mid-Atlantic Fishery Management Council
300 S. New Street Room 2115
Dover, DE 19904

Dear Mr. Furlong:

The Massachusetts Pot and Trap Association adamantly opposes state-by-state allocations of black seabass quotas. Pots and traps land ninety percent of the black seabass in Massachusetts. This fishery is amongst the most benign passive gear type. Massachusetts imposed its own conservation effort to rebuild the black seabass stock beginning in 1985.

In 1985 Massachusetts mandated a minimum size of 10".

In 1987 Massachusetts mandated a minimum size of 12" at the request of the fishermen.

In 1988 the state limited each fisherman to 400 pots. A moratorium on seabass pot licenses was imposed.

In 1991 the pot limit was reduced to 350.

In 1992 draggers were prohibited from night fishing in state waters and mesh size went to 41/2" except during the April through June squid season.

In 1993 a moratorium was placed on mobile gear licenses.

Also in 1993, the pot limit was reduced to 200.

In 1994 the state of Massachusetts eliminated all pot licenses that did not have a catch history.

In 1998 pot fishermen were required to use 2 7/16" escape vents attached with biodegradable wire. Also, trap tags were issued.

These restrictions were intended to help rebuild the depleted seabass stocks and to allow the smaller fish a chance to spawn once.

Massachusetts fishermen took a serious hit and decrease in landings from 1991-1997 largely due to these heavy conservation efforts imposed on them in order to rebuild stocks.

State-by-state allocation aggressively discriminates against Massachusetts. We are being penalized because of our strong efforts for stock rebuilding and conservation. It is against all management practices to reward those who have depleted stocks and penalize those who helped rebuild them. Massachusetts seabass fishery is one of the most sustainable in the world.

In the years where our landings were very low, we had the ability to land millions of pounds of under 12" seabass but we chose not to, attributing to our decreased landings in those years. At the same time, all other states involved in the seabass industry were continuing to fish hard on the small seabass and this in turn produced large landings for these states. As the stock continues to increase, Massachusetts's landings of 12" and up fish increase.

The criteria for state-by-state allocation of seabass for Massachusetts are biased. All the new proposed regulations and recent size increases for many states were instituted by Massachusetts fifteen years ago. If all other states had a 12" minimum size and reduced trap limits fifteen years ago I am positive that those state landings also would have shown serious decreases as did Massachusetts. The scenarios used to calculate state-by-state allocation penalizes Massachusetts for proper management and conservation of the seabass fishery.

We are against state-by-state allocations and want to maintain the present system of coast-wide quarterly quotas.

We understand that the preferred alternative by the Mid-Atlantic Council is to incorporate state-by-state allocations. This prevents Massachusetts fishermen from reaping the rewards of their hard work and conservation efforts. The best case scenario is ten percent of the coast-wide quota as a state allocation. This is unacceptable. If a state quota was imposed it would need to be done on a fair playing ground and all the millions of pounds of small fish that Massachusetts fishermen were restricted from landing should be incorporated into our landing figures.

The Massachusetts seabass fishery has had the same number of participants and effort for the last 15 years. There are 67 fish pot permits, which land over 90% of the yearly harvest of black seabass. There has been no increase in effort. Hand gear fishermen were issued a black seabass endorsement last year for the first time. Prior to last year, they were allowed to commercially fish without this endorsement. Once again, there has been no increase in effort, strictly an increase in the abundance of fish.

How can the Mid-Atlantic Council dictate how Massachusetts regulates and allocates its seabass fishery if we don't have a vote on this council? Our only vote is on the Atlantic States Marine Fishery Council. Presently, the Atlantic States Marine Fishery Council and the Mid-Atlantic Council's decisions are damaging Massachusetts commercial fisheries to a point where thousands of small fishing businesses may not survive.

Sincerely,
Board of Directors Massachusetts Pot and Trap Fishermen's Association

CC: Paul Diodati, Director Division of Marine Fisheries
CC: Pat Kurkul, National Marine Fisheries Service

HAND DELIVER
7:20 A.M.
Warren

MENEMSHA BASIN SEAFOOD, INC.
P.O. Box 4628, Vineyard Haven, MA 02568

To: Atlantic States Marine Fisheries Commission

From: Warren M. Doty

Date: March 18, 2002

Subject: Comments on Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan

The preferred alternative for changing the system for quota allocation should be 2b. This would fine tune the present coastwise quota system and leave the quarterly quota management plan in effect.

The proposals that involve establishing a state by state quota allocation system are totally unacceptable to Massachusetts. Under the present management plan Massachusetts has been landing between 500,000 and 600,000 pounds of Sea Bass over the past three years and we expect to land a similar amount in 2002. All of the new state allocation plans presented in Amendment 13 would reduce Massachusetts' landings of Sea Bass to between 50,000 and 250,000 pounds per year. That represents a cutback of between 50% and 90% of our commercial catch. That is a tremendously unjust and uncalled for reduction for Massachusetts' fishermen.

And the appalling thing is that this reduction does nothing to advance conservation of the resource. The change is proposed not to save the stock of juvenile or mature Sea Bass. The change is proposed specifically to deny Massachusetts' fishermen their rightful share of the catch and reallocate this share to Mid Atlantic States.

The state by state allocation scheme proposed in Amendment 13 does not consider landing statistics for 1998, 1999, 2000, and 2001. These statistics are available and are reliable. They are not considered simply because they show greatly increased landings in Massachusetts for these four years and they would give Massachusetts a bigger share of the pie than the Mid Atlantic states favor. The decision to not count 1998 through 2001 is a political decision and not one based on available data.

And why have Massachusetts' landings of Black Sea Bass increased so dramatically over the past four years? In Massachusetts we have managed this Sea Bass stock carefully and responsibly. More than ten years ago we set our minimum size for harvestable fish at 12 inches. Other states landed seven and eight inch fish and only recently raised their size limits to ten inches. We are the

Phone 508-693-7676 Fax 508-696-7858

only state using a twelve inch minimum size. We are saving the juvenile fish and letting them grow to maturity and heavier weight. We have set a pot limit for trap fishermen at 200. Other states are just now beginning to consider pot limits. We understand that some pot fishermen in other states set 1,000 pots at a time. We have limited entry into the Sea Bass fishery and have issued no new permits in over ten years.

While the above restrictions apply to our trap fishermen, we have set tremendous limits on our draggermen. In the area of Nantucket Sound favored by Sea Bass we permit no dragging within three miles of the shore. We permit no vessels fishing anywhere in state waters that are over seventy-two feet in length. We permit no night dragging. We require our small dragger flatfish fleet to use large mesh nets (6 inch mesh) so the juvenile Sea Bass, Scup, and Squid are not taken as a bycatch. We have a moratorium on new permits for mobile gear fishermen and have given out no new licenses for eight years.

In Massachusetts we have carefully managed our Sea Bass fishery. We have restricted fishing effort and we have protected juvenile fish. Starting in 1998 we began to see rewards for these efforts and our Sea Bass landings increased. The Sea Bass are again in our waters and we are continuing to harvest them in an environmentally sound manner.

In Massachusetts we expect and deserve an annual catch of 500,000 to 600,000 pounds of Sea Bass. Any quota system that does not grant us this is not acceptable.

Hand Delivered
@ 6:50 pm
3.15.02

Massachusetts Pot and Trap Fishermen's Association
257 Members

Reasons for Keeping Quarterly Quotas and not State-by-State Quotas For Black Sea Bass

<u>SIZE LIMITS</u>

Seventeen years ago, the size limit for black sea bass in Massachusetts was 8", whereas there was **no size limit** for the Southern States Area (Rhode Island to North Carolina). The fish were so small when they migrated up here, that we asked the Department of Marine Fisheries (DMF) to increase the size limit, which they did the next year to 10". The following year, the fishermen had another meeting with the DMF, because the 10" size was still too small, and they increased the size to 12".

The fishermen can recall back then, that in a 100-trap haul, there would be so many undersized fish that you could keep only 10 pounds of fish out of 100 pounds caught. In some areas to the East, you were lucky to catch <u>any</u> fish big enough to keep.

In the Southern States Area, there was no size limit and they were devastating the stock of black sea bass. They kept every fish, no matter what the size. **Ninety percent** of the fish caught were **peewee - small - medium** grade (i.e. under 1 pound or under 12"). <u>Also, Massachusetts's medium grade was 1.25lbs to 1.5lbs and down in the southern states historically the grade was.75 lbs to 1lbs</u>. The **pewee-small**, worth 25 cents or less, was used for cat food.

The Southern States were wiping out the majority of the biomass of black sea bass, which is the smaller size fish. Catching these small-size fish leaves **millions of pounds per year less fish** that will grow to breeding size in the following years.

Black sea bass are a fast-growing fish and have a short life span. Therefore, when the majority of the fish are peewee or small grade, they must be allowed to spawn **at least one time** to keep stocks in healthy condition.

When the black sea bass migrate up here in May, the fishermen in the Southern States Area have already caught a vast number of undersize fish that the Massachusetts fishermen would have thrown back (i.e12 and under).

A black sea bass starts off from North Carolina in January to migrate North. Every fisherman from North Carolina to Massachusetts has the potential to catch
that fish. When it gets to Massachusetts in May, it is still, according to our size limit, too small to catch. When it leaves in the fall to make its long migration back to the South, it is still under 12". The next year it repeats this migration process,

and, if the fish survives Southern fishing season, it will arrive here in May and will finally be big enough to keep. That means the Massachusetts fisherman has about a 30% chance of ever catching that fish, but if the size limit was non-existant, as it is in the Southern States Area, that fish could have been caught up here, adding more to the historical poundage caught by Massachusetts. This was shown in the study done by the DMF and the fish-tag program of the Massachusetts fishermen. Therefore, you must factor in all the fish under 12" released by Massachusetts fishermen to arrive at the true amount of fish landed in this State.

In closing on size limit, the black sea bass fishery would have totally collapsed well before 1995 if Massachusetts fishermen had kept those tens of millions of pounds of fish that were under 12". These millions of fish we have released are the reason there are any black sea bass left.

In the Southern States Area, they have done everything possible to make the black sea bass extinct. Isn't it ironic that Massachusetts alone, through **conservation efforts** started 17 years ago, has saved the black sea bass from near extinction.
Now the states that would not be catching any black sea bass at all (if it were not for Massachusetts) want to reap the benefits of our efforts and put the **Massachusetts black sea bass fishermen in the extinct category**.

TRAP LIMITS

In the early 1980's, most pot fishermen in Massachusetts set 100 - 400 traps. The trap limit was reduced to 200 traps in the early 1990's, while in the Southern States Area there was **no** trap limit. Some fishermen in that area set 4,000 traps, while most set approximately 2,000.

In Massachusetts, there were approximately 35 pot fishermen @ 200 traps apiece, for a total of 7,000 traps. If we had no trap limit and we set an average of 2,000 traps apiece, Massachusetts fishermen would have been fishing 70,000 traps.

Take into consederation that Massachusetts only catches black sea bass from May until October, while from Rhode Island to North Carolina, they catch these fish 365 days a year (or for 12 months compared to 6 months).

For example, in the year 1991, Massachusetts caught 244,169 pounds out of 7,000 traps whereas New Jersey caught 1,034,139 pounds. If Massachusetts could have fished 70,000 traps, the catch would have been ten times more, or 2,441,690 pounds, and that **does not include** the millions of pounds of fish under 12" that were released.

Everyone knows that the more traps you set, the more fish you catch. Just ask any Southern States Area fisherman. If this were not true, why do some fisherman have as many as 4,000 traps set? Having a lower trap limit is just another example of **conservation efforts** by Massachusetts fishermen.

We understand the suggested reduction to 800 pots apiece, but if you are trying to follow the lead Massachusetts had set in **conservation** in the early 1990's, why not put it on an equal basis and reduce the limit to 200 pots apiece? Are we finally getting some recognition for our efforts?

ESCAPE VENTS

The Massachusetts fishermen have been using two 2 7/16" circular lobster vents per trap for the last four years, which proves very efficient as they allow most of the undersized fish to escape. Another practice we have had for years, in the event that a trap is cut off, is to make the dumping door with a bio-degradable hog ring , a catgut, or wood latch so the door will fall off to let the fish escape unharmed. This is yet another **conservation effort** for the good of the black sea bass industry.

TRAP TAGS

Massachusetts has been using trap tags for four years, which is a control on the number of traps set. This regulation works; one local fisherman tried to overset his limit of traps, was caught and fined. This penalty could have been worse.

We, the members of the Massachusetts Pot and Trap Fishermen's Association feel proud that we, through our **conservation efforts** started 17 years ago, have saved the black sea bass from being completely fished out.

Isn't it a shame that the Southern States Area did not have enough foresight to see a potential disaster coming in the early 1990's?

Remember that keeping the smaller fish is always the worst option in fish conservation. If there are millions of small fish left to spawn, you will end up with millions of big fish. Look what has happened in the last three years with **conservations efforts**; the fishery is well on its way to total recovery.

It seems to us that the path the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fisheries Management Council is taking, is the path Massachusetts took 17 years ago; you're following everything step by step like we drew the plan for you. Therefore, if you are going to follow our blueprint, you must include **all** the various factors into the quota management plan and either give us our fair share of the quota (30% - 40%) or keep it the way it is now.

Sincerely,

Jon Tolley, Board of Directors MPTFA

Joe Towns, Board of Directors MPTFA

We, the members of the Massachusetts Pot and Trap Fishermen's Association feel proud that we, through our **conservation efforts** started 17 years ago, have saved the black sea bass from being completely fished out.

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Sincerely,

Jon Tolley, Board of Directors MPTFA

Joe Towns, Board of Directors MPTFA

MASSACHUSETTS POT AND TRAP FISHERMAN ASSOCIATION SUGGESTED OPTION

1.Keep quartly qoutas.

2. Factor in the 10's of millions of lbs. of undersize fish (12"or less) **that Massachusetts has** caught and released over the last 20 years.

3. Wait until every state is at the 12" minimum size . **So that every state is on an =level**

4. Factor in if every Mass. Pot fishermen had fished 2000 traps per season and include the 10's of millions of lbs. of undersized fish that were caught and released over the last 20 years.

5. Do the last 5 years statistic because that is the closest to every state being equal.

6. Factor out the **peewee, small, and medium (down south a medium fish is a fish under 12") fish** down in the southern states and only count the large and Jumbo.

19 March 2002, Ocean Pines, MD

The hearing was opened at 7:10 p.m. by hearing officer Bill Outten. Council Chairman Rick Savage was present. Staff members present were Chris Moore and Kathy Collins. There were approximately 20 members of the public present.

Dr. Moore presented Amendment 13, then the hearing was opened for questions and comments.

Beverly Lynch, of Maryland, asked about Alternative 3a and 3b - quota allocation by permit category, regarding limiting to years 1993-97.

Dr. Moore explained that the allocation in each category is based on years 1993-97.

Jim Dawson, of Virginia, stated that in Amendment 13 on Page 427, Table 89, for Chincoteague, Va for 1999 they only landed 84,125 lbs of sea bass. That is wrong. He asked if it was from mandatory reporting? He said he landed 40,000 lbs himself. He wanted to know what happened to all draggers? He said that Chincoteague is one of largest ports. If he could prove that one number is wrong, he believes there may be a lot more numbers that are wrong. He thinks the procedure needs to be investigated because if there are going to be rules and regulations made, they need accurate numbers. Especially when talking about state by state quotas, they need to get better numbers. He feels that 180,000 lbs is not enough to satisfy a couple of fishermen, let alone a whole state. He asked why out of date figures were being used in the first place. He pointed out that on Page 15 of the Summary Document regarding gear type, 29.88% of black sea bass was landed in 2000 by midwater trawls which he feels is a big percentage. He feels that quarters 2-4 need to be readjusted and worked out by today's standards.

Dr. Moore stated that Table 89 is used for social impact analysis, not to document total amount of landings that came out of VA. If you look at other tables for the entire VA landings for 1999, you will see a different number. He suggested to look at how the table is referenced, i.e., "Ports and Communities". In terms of years used for allocation schemes, years beyond 1997 were effected. This document contains information up to 1999, which was the last data available when we were developing the document.

Jim Dawson explained that sea bass was not a mandatory reported fish until 1997, so every table referenced in the document is not valid. He suggested to look in Amendment 13on Page 410, Table 61, to see how the landings in 1999 were attributed. He believes the table looks fairly accurate as to what today looks like. He feels that is what is truly being done. He believes that, as far as an allocation scheme years after 1997 should be used. There were no major closures until 2000 and there were three good years of statistics. He thinks fishermen would be satisfied if they could use those three good years before 2000. Why did they reject further analysis after 1997?

Dr. Moore explained that the years 1998, 1999, and 2000 were years where the quota was restrictive.

Jim Dawson said that fishermen fished freely in 1998 and 1999 and there were no overages. Today's problem is with instate fisheries. For example; with flounder, when allocated a particular quota, VA has a 300,000 lb inshore quota, when the quota is caught, they shut the fishery down. Give MA a defined number based on historical landings, then base that number on a percentage. He feels the main problem is with instate fisheries. If MA were given a defined number telling them this is what they can catch based on history, even if it was taken away from the coast, it could be regulated some how.

Harry Doernte, of Virginia, stated that for the proposed alternatives, they should take three of them and make one good alternative. He suggested they could have a three tier permit with A1, A2, and A3. He added that instead of fishing against a quota for that permit category, they should have the trip limits scaled down. A1 permit should get 1/4%, A2 permit should get ½%, and A3 permit should get 100 lbs incidental. He suggested to have two regions (inshore/offshore or north/south) but still have three permit categories. He believes that *De minimus* status should be included as an alternative. He added that with the quota system the way it is now, there is no reason for someone to go out and set an unlimited number of pots. He thought that 800 pots was a fair number. Nobody has an idea of how many pots are out there today, so if pot fishermen had to get a tag for their pots, then they would get an idea of how many pots are out there. He feels the wet storage of pots should be addressed and he suggested maybe having it for two weeks from when the closure is announced, not the day of the closure.

Beverly Lynch stated that her husband is a pot fishermen and they support Alternative 3a, allocation by permit category. It is a general alternative that gives the most quota for people making a living sea bass fishing. Some MD dragger boats might not qualify for full-time permits. Anyone who has not landed at least 10,000 lbs of sea bass in three years should be considered as not making a living at sea bassing. A 2,400,000 lb quota divided by 52 boats averages about 46,000 lbs per boat. The quota could be allocated further by gear type under Alternative 8. She believes if 10 boats in MD landed and qualified for full time permits at 46,000 lbs apiece, they have a potential to land 460,000 lbs of sea bass in MD. She is opposed to Alternative 5, state by state quotas because it would be difficult to sell a boat and permit because the boat can only be used in the state the boat has landings in. People who own boats could no longer move from state to state. She feels that a fisherman should be allowed to take his landings history with him. Thinks MD's quota should be 390,000 lbs at most, divided the 22 boats that they believe have landed sea bass in MD, the result would be under 18,000 lbs each. The quota could be less in MD because the Commission could adjust landings to account for MA larger size limit or by shares based on changes in landings of recent years. Feels this would short change the state of MD if they have state by state quotas. Regarding Alternative 10, wet storage of pots, she prefers status quo. They have found no observer data to verify loss of fish in pots. Discards from the trawl fishery should be more of a concern. Prefers status quo for Alternative 11 regarding trap tags. Opposed to Alternative 12, trap limits. An 800 or fewer pot limit is ridiculous.

Tom Smith, of Maryland, stated he is against trap limits. He believes it is not reasonable to have just

800 traps. He believes it would be difficult to deal with not allowing wet storage of pots during a closure. It would not be an easy chore to pull the pots for two weeks, it is time consuming and the weather can be a problem.

Ray Twiford, of Chincoteague, VA, stated he has been fishing for 20-25 years for black sea bass. He just bought a new boat and does not have allocations like those who have had their boat for 15-20 years. He has his allocations from his old boat and has a permit on that boat. He asked that with the new boat, since he has only had it since the first of last year, what kind of permit category would he fall into? He stated that a lot of guys fish with sea bass pots. He understands that not allowing wet storage would be a lot of work. If they don't take the pots up, they could open them up the last week of fishing, that could be the same as taking them up. It would be easy to empty them out and reset them, so when the season opens back up, the pots would not have fish in them and this would save fish.

Dr. Moore explained that it would probably be difficult for him to demonstrate 3 years of 10,000 lbs with a new boat. He stated that he would probably fall into the low category.

Merrill Campbell, of Maryland, stated that he would prefer Alternative 3a or 3b, with one exception, that he would like to see the cut off date at the year 1997. The dates keep getting changed back and forth. He feels that it is not fair for new fishermen to get into the fishery and benefit from historic landings. He is opposed to Alternative 5a, state-by-state allocation system based on 1988-1997 landings data because there are a large number of loopholes. He feels this could benefit states where fishermen have just come into the fishery. It is stated in 5a that if boats are not federally permitted, landings would be prohibited by the Regional Administrator in any state that had reached its quota, feels this is a liberal and broad statement that allows fishermen to be at their mercy. Environmental interests could come in and lobby the state of MD. On Page 9, the Summary Document states that 'changes in state landings data could modify the allocation percentages . . . Council and Commission can modify allocations based on state regulations that were in place during the base years 1988 to 1997'. . . he said this also allows a loophole. This would allow for states to get more fish. It would take from historical base years, the true fishermen and states that have documented landings. MA would try to benefit. The only way to keep what we have worked for is Alternative 3a and 3b to preserve historical fishermen and their landings. He feels that gear types could be incorporated into 3a and 3b to be fair to gear types fishermen use. He believes that Alternative 10, regarding wet storage, it would be impossible and unsafe for fishermen to bring home pots in 10 days. This would penalize the fishermen. He recommends status quo for Alternative 12 for restricting the number of pots and traps used by fishermen. He would not like to see limiting pots at this time. He asked about the 3% of the sea bass quota to be set aside for research. Most of the research is done in the northeast, they should consider the mid-Atlantic area.

Dr. Moore stated that there will be some programs allocated this year. We go through the specifications process each year and say that the quota will be so much and that there will be a set-aside quota for research for a certain percentage. Then it is up to researchers and fishermen to apply for that set-aside. This year we did have some good projects looking at different vent sizes in pots and traps.

Harold Martin, of Martin Fish Co., Ocean City, MD, suggested that Alternative 3 may be a viable option. His greatest concern would be the wet storage issue. To have to bring pots up and take them back out would not be feasible and would be hard to enforce. Putting them in and out of the water takes too long. He said that, of all the laws the Council has limited to be done by pot fishermen this would be the most ridiculous.

Kerry Harrington, of Maryland, asked that under Category A1, how many of the 52 vessels in the statistics qualified after the 1999 data?

Dr. Moore responded that he did not know.

Kerry Harrington suggested, regarding wet storage of pots, they could switch the vents to change to lobster pots. That way you wouldn't have to take the pots out of the water and put them back after two weeks. He said that the daily allocations would be tough because it is a long run to catch 1,500 lbs of fish. That is usually done within two hours and it takes three and a half hours just to get out far enough to fish and three and a half hours to get back. It doesn't make economic or ecological sense. If we could take 6,000 lbs in one or two days, that would be more beneficial. It could be based on a call-in so you wouldn't have to keep coming in and going back out to fish. It strains you from making a living by having to come back in to the docks.

Joseph Golden of OC, MD, stated that he thought Alternative 3a and 3b would be helpful to fishermen. Regarding wet storage, he doesn't feel there is enough time. The season should be open longer. Changes in size limits and trip limits are a problem. They should wait to see how things are going to work for a while with the current rules and regulations. He feels that there should not be a restriction on the number of pots - you should be allowed as many as you can fish.

Earl Gwin, of Maryland, was against state-by-state quotas. He believes that everyone is clear on trap limits. He puts out 800 pots. He feels that management plans are working to cut down on the percentage of fishermen. Fish markets are being closed now because they are not getting enough fresh fish. He feels that prohibiting all mobile tending gear should be an alternative.

Joe Kelly, of Virginia, said that he did not receive any information on Amendment 13 hearings and he knew that the majority of sea bass fishermen did not know about the hearings. He feels that what regulations and fishery amendments have done is put one user category against the other. He stated that they are not getting their fair share of fish that they used to catch. He stated that the charts in the Amendment indicate that MA landed 6% during those years 1988-97. Now they are up to 30-40%. These things need to be addressed. He added that if the ball was in the other court, the northern states would do everything to change it. Everyone in MD needs to stick together. He feels that Alternative 5, regarding state-by-state allocations, needs to be re-thought. If you think NMFS and Councils are going to give 80% of sea bass to 50 boats, you are mistaken. Need to fight state by state allocations. He asked if Alternative 5 was considered, would it mean that a federal permit holder from VA couldn't land in MD or a federal permit holder in MD couldn't land in VA?

Dr. Moore responded that if regulations in MD said you need to demonstrate history of landings MD before you could land in the state, and you are a VA permit holder and did not have any demonstrated landings in MD, you would not be permitted to land. Each state is allocated an amount. Basically that state can do what they want with it. That alternative is exactly like the one for the summer flounder fishery.

Joe Kelly feels that sea bass trap fishermen are getting discriminated against. He doesn't believe they should have to wait until the first day of the season to set their gear. If some of these alternatives come into play, we won't have the boats we have now. Regarding the wet storage issue, if there is going to be an extended closure, they should be allowed to take the doors off instead of having to throw pots on the docks for two weeks. Each pot weighs about 50-60 pounds. Trap tags and limits should remain status quo. If anyone tears up the habitat and damages the stocks, it would be the mobile gear fishermen more than anyone else. He stated that they need to look at history in order for all fishermen to get a fair share.

David Martin, of Martin Fish Co., Ocean City, MD, suggested they should manage the trawl fishery separate from the trap fishery. Should stay status quo, i.e., stay with the regulations we are under now for a while and give them a chance to work.

Jim Dawson pointed out that at the top of Page 6 of the Summary Document for Alternative 3, they are taking the month of April away for the fishermen. He believes it should stay January - March and April - December. You would see the percentage come back to where it should be.

Dr. Moore suggested that when looking at quota allocations by permit category alternatives, realize these are for the entire year. There is a discussion in that the Council and Commission might further sub-divide allocations over the year. One way to do that is in the two periods January - April and May - December. You would do that so the quota would last over the year. You would still have the same permit categories. Another way to do it would be to do permit categories and quarterly allocations or do permit categories without period allocations.

Jim Dawson stated he would favor it go by quarters. The classification of A category is a good thing and they need to do that. Thinks they really need to know the figures of today because we need an update on the amount of vessels in the fishery today.

Kerry Harrington stated that the numbers that the regulations are based on are numbers prior to 1998, so if they are using 1998-2001, they would have to start all over again.

Dr. Moore said that based on northeast weighout trip data, they were not going to see the number of vessels go from 52 up to 110. In 1997, limiting quotas were in place. If someone got into the fishery in 1998 or 1999, it would be unlikely they would fall into category A1.

Ray Twiford asked that if they go back to 1997 when they didn't have to have a permit, since he bought a new boat, how would you go about using landings before 1997?

Dr. Moore explained that if the alternative goes into place, he will need to get information from Gloucester to prove landings history. That is what would be used to find the category he would fall into.

Ray Twiford stated that an 8" fish is old enough and mature enough to reproduce. This year they are increasing the minimum size to 11" ,and an 11" fish would be considered a medium fish now. He has seen in the last five or six years, in the fall when they start to migrate south, millions of boxes of fish. He said that the laws are changing so fast and not allowing anything in the ocean to take care of itself.

Dr. Moore explained that the Amendment does not respond to a biological concern but more of a socio-economic concern. More of a concern expressed by fishermen in the sense that these quarterly quotas, to some people, have disadvantaged the majority of commercial fishermen fishing for black sea bass along the coast. The issue about the stock increasing, is something we discuss each year when setting annual specifications. The fact that small fish are being seen is probably due to increase in mesh size on commercial trawlers, putting in vent sizes, and minimum fish sizes.

Merrill Campbell agreed that the time period should be kept in quarters. He referred to Page 19 of the Plan Amendment. He asked about subregions where it references inequities between border states, he asked what the inequities would be between DE and MD? He said that he favors the idea subregions. He said he didn't think there were any DE sea bass fishermen left.

Dr. Moore explained that there might be a couple of states that share a water body where there would be different regulations. He added that the DE fishermen landed in OC, MD and that DE would get a very small percentage of the quota.

Harold Martin asked what the time frame for implementing alternatives would be. He stated that they need time to allow for what is already in place to see how it is going to work.

Dr. Moore said the earliest would be January 1, 2003.

Joe Kelly asked if there was a list of the 52 vessels under the A1 category?

Dr. Moore told him that there was not a list of the 52 vessels.

Joe Kelly explained that his problem is that when he purchased a boat with sea bass history which operated out of Pt. Pleasant for years, he obtained the vessel and got the permits, but he doesn't know the history of the vessel. He believes NMFS would have the information. Unless you can prove landings, a vessel such as this doesn't have any more right to fish than a 24' mako. He feels they are getting to the point that if they are going to have to prove these vessels have history, they would have to go back, in some cases, 12 to 15 years. They shouldn't have to do that if a vessel has a federal permit and has been in operation since the 1940's. He asked if they can rely on NMFS figures to be factual? Are there numbers going back from the 1980's?

Dr. Moore said that if this was implemented, they would need to document their landings from 1988 - 2001. That means weighout slips or some document that indicates to the Service that you meet these qualifying criteria.

Kerry Harrington asked if vessels with state permits only pertain to state waters? He asked what if they are catching fish in federal waters? He knows that there are a lot of fish being caught outside of three miles with state permitted vessels because they are fishing right next to him.

Dr. Moore explained that they can't catch and land in federal waters unless they have a federal permit.

Jim Dawson stated that the research set-aside allocated a good portion to squid bycatch. He thinks they dropped the ball. He asked that if we really wanted accurate data, why didn't we use the full three percent? They need to find a better way to release the fish, some type of vent would be good. He added that when bringing the sea bass up out of the water, air bladder expansion is a problem, so the smaller fish would die and be wasted anyway. If there were some kind of vent they could escape through, it would be helpful.

The hearing was closed at 9:00 p.m.

19 March 2002, Smithtown, New York

Tony DiLernia, MAFMC, opened the hearing at 7:00 pm. Approximately twenty-five members of the public attended the hearing. Mike Lewis of ASMFC staff was also present. Mr. Lewis presented the summary of the amendment. Mr. DiLernia then opened the hearing to the public for comments.

Dave Aripotch, a dragger from Montauk, NY, stated that he had just received the document the day before. He had not been given the time necessary to read and digest the information in order to make thoughtful comments. Everyone on Long Island was in the same unfair situation. Mr. Aripotch went on to state that he wanted the quota allocation to remain status quo, fearing that any change might cause New York to lose fish that they had caught historically, using mobile gear. He was also against any closed areas based on EFH protection, so supported EFH Alternative 1. Mr. Aripotch questioned the EFH section in its entirety, stating that felt it was unclear as to what life stage should be protected and where that life stage is located.

John Mihale, a commercial hook and line fisherman from Island Park, NY, had also just received the document the day before. He felt that the biggest problem as a hook and line fishermen is that the season has been closed for extended periods of time in recent years. He supported Alternative 2b. Everyone would probably like the black sea bass season to be open throughout the entire quarter. Frontloading with large possession limits then going to an adjusted quota hasn't been working, especially when the change is made at a high percentage of the quarterly quota. He suggested that each quarter start with a smaller initial possession limit and go to an adjusted limit at a pre-specified date. Another alternative might be to start with a small possession limit and increase it later in the quarter. The most important thing is to keep the fishery open all quarter. When the fishery gets closed the market is lost and the price goes down. Mr. Mihale felt that he didn't want to give the fishery to big boats who catch all the small fish and had large landings. He expressed a long-standing desire for a 12" minimum size and an amendment to the plan to allow for it.

Tony DiLernia stated that minimum size is not set by amendment but can be adjusted annually.

Mr.Mihale stated that he is penalized for throwing small fish back, for being conservationally minded.

Jeff Valente, a recreational fisherman from Huntington Manor, NY, cited what he saw as a steady population decline in every species, except for fluke. He believed that the current management program is not working and that sport and recreational fishermen are not being represented adequately.

Sima Freierman of Montauk Inlet Seafood suggested a regional quota system. She believed that maybe we're not learning any lessons. Fish move up and down the coast. She asked about what happens when the bulk of permits, based on historical participation, are down in areas that have warm water earlier? She feels that state-by-state quotas are a disaster. Both plans are setting geo-political walls around stocks, but should be moving in the opposite direction. She feels that ecosystem-level management needs to be considered. She did not support alternative 4 or 5 and wants documented proof of adverse impacts before we discuss closures of EFH areas.

John DiGiacomo, a fishing tackle retailer from Oakdale, NY, was recognized but asked to be recognized later.

Chuck Weimar, a commercial fisherman from Montauk, NY, stated that he had just received the document the day before. He also believed that a state-by-state quota would be in violation of National Standard 4 and that its adoption by the Council and Commission would give him the opportunity to file a lawsuit. He was also opposed to closed EFH areas.

Mr. DiLernia suggested that, if the fishermen were unsatisfied with the time permitted for review, they may want to request an extension of the public comment period

Mr. Aripotch stated that he may want to do so.

Gordon Colvin of the New York Department of Environmental Conservation and a member of both the Council and Commission wanted to get his comments on the record on behalf of the DEC. He did not support this amendment for public hearing. Although the ASMFC Summer Flounder, Scup and Black Sea Bass Management Board had identified state-by-state quotas as the preferred alternative and the Council was aligned in that direction, he did not support it. He stated that the Council and Commission need to work harder to find other solutions to the fishery's problems. Those fisheries with state-by-state quota systems have based their quotas on historical landings. Have we learned anything? There is no period of history in which the effort among states to collect landings data was equal. Gordon's perception was that New York is a state in which lower effort was put into data gathering than in Massachusetts or North Carolina. Though he was not sure what the solution is, he recognized that the black sea bass fishery may have a more acute problem in its failure to record landings. New York black sea bass landings are not large and would therefore have been more difficult for port samplers to record. New York sampling didn't do a good job at recording high volume species, let alone low volume. Handline and pot landings estimates were especially inaccurate and all but absent from the historical database. No option based on historic landings (regional or state-by-state) will do justice to New York fishermen and the DEC will not support them. Mr. Colvin closed by expressing his appreciation at being given the opportunity to speak.

Mr. Aripotch stated that New York had the 3rd largest landings for scup, and is not properly represented in the EIS. They are at least number 3, probably number 2 in scup landings. He took particular issue with Section 2.2 of the Environmental Impact Statement.

Pat Augustine, the New York Governor's Appointee to the Summer Flounder, Scup and Black Sea Bass Management Board, fully agreed with Gordon Colvin. He stated that all of these issues are very complicated and that he was interested in what folks have to say to help him determine how to vote.

John DiGiacomo had received the summary document the day before and did not get the full amendment at all. He doesn't get many documents and wanted to be put on the mailing list.

John Mihale supported Alternatives 1 and 2. He stated that one or a combination of them would work best for New York fisherman. He is a hook and line fisherman and fish show up in May-June. Alternative 2b works best for him. Status quo works best for those with mobile gear. The most important issue is that the fishery stays open all year. He reiterated his idea of starting with a small trip limit and/or date specific adjustment of possession limits. Mr. Mihale was opposed to Alternative 3, stating that it would reward those who took every fish, no matter what they were worth, and penalize those who only kept larger fish and conserved the resource. He was opposed to all of them, but if had to pick one he would choose 3a. He stated that there were no reporting requirements up until 1994. Not sure when those who were only licensed with the state had to report. His logbooks have records, but that won't work. The state has no way of documenting landings prior to the adoption of the vessel trip reports.

Tom Jordan, a commercial hook and line fisherman, supported Alternatives 1a and 2b and was opposed to Alternatives 3-8.

Ron Onorato, a commercial hook and line fisherman, was opposed to all of Alternative 3. He stated that it is not economically feasible for the group with the largest number of participants to have the smallest amount of quota.

Mr. Aripotch was opposed to any change that takes quota from draggers and gives it to someone else. Apparently the Council and Commission believes that reallocation has merit. There is a big pot fishery in Virginia and Maryland. "Over his lawyer" will they take all of his fish away from him. It will be the Civil War all over again.

Tony DiLernia recognized general opposition to Alternatives 4 and 5.

Fred Livoti, a commercial fisherman from Moriches, NY, was uncomfortable with the use of 5 year-old data.

Mr. Aripotch state that he was "least opposed to" Alternative 6, though he opposed all of them.

Mr. Mihale was opposed to Alternative 6.

Mr. DiLernia called for comment on Alternative 7.

Mr Mihale was opposed to Alternative 7.

Mr. DiLernia called for comment on Alternative 8.

Mr. Mihale was opposed to Alternative 8.

Ms. Freierman stated that if gear-specific allocations are being made so that fish aren't dying in a particular gear due to blanket regulations, than she is in support of Alternative 8. If changes are being made to slice and dice the pie then she is opposed.

Mr. DiLernia called for comment on Alternative 9.

Mr. Aripotch was opposed to Alternative 9.

Mr. DiLernia called for comment on Alternative 10.

Ms. Freierman ideally supported Alternative 10b, but in deference to pot fishermen would go along with 10c. She stated that the indefinite wet storage of black sea bass pots needed to be prohibited.

Mr. Aripotch asked if anyone checks pots during season closures.

John Goncharuk, a pot fisherman, fishes primarily for lobsters but uses his pots for black sea bass too. How would a prohibition on wet-storage affect his gear? Should he have to pull his lobster pots because they catch black sea bass?

Mr. Colvin stated that because lobster pots require a trap tag it wouldn't be necessary to pull them. It will be fished if it's a lobster pot. He also said that the Coast Guard will not enforce lobster tagging, and he is not sure that they will enforce fish trap tagging.

Mr. Mihale was in favor of 10b in the hope that everyone will work together to make sure there is no closure. This problem would be minimal if fishermen were only given enough trap tags to catch what they should. He also supported Alternative 11b.

Mr. Colvin stated that many pots use vents. During closure that vent could be removed, allowing everything to get out. A pot tag could be incorporated in the design of the vent. It would be easier to remove the vent than pull the pot.

Mr. DiLernia called for comment on Alternative 11.

Mr. Mihale was in favor of Alternative 11.

Ms. Freierman asked if fishermen would have to buy tags.

Mr. DiLernia stated that yes, fishermen would be required to purchase tags.

Mr. Augustine stated that he would support a trap tagging program

Mr. Goncharuk suggested that the problem of too many pots started with lobsterman using black sea bass traps. There is no limit on number of pots a fisherman can use for black sea bass.

Mr. DiLernia called for comment on Alternative 12.

Mr. Mihale was not sure how many pots would be sufficient. He thought that 400 pots might be sufficient. He wondered if they would be permitted to fish for other species. Massachusetts does restrict their fishermen to 200 pots and they come in with 2000 lbs of black sea bass at 12".

Mr. Weimar stated that somebody has to be held accountable for the huge number of pots in the water. If NMFS issues pot tags, fishermen should be required to return each one in order to get next year's tags.

Mr. DiLernia called for comment on the EFH Alternatives

Mr. Weimar supported EFH Alternative 1.

Ms. Freierman supported EFH Alternative 1 until EFH and the adverse impact of mobile gear has been proven.

Kevin McGuire supported EFH Alternative 1.

Mr. Aripotch supported EFH Alternative 1.

Sandy Mason, a commercial fisherman, supported EFH Alternative 1.

Sid Smith, a commercial fisherman, supported EFH Alternative 1.

Mr. Valenti supported EFH Alternative 5.

Mr. Mason was opposed to EFH Alternative 5.

Mr. DiLernia closed the hearing at 8:30.

19 March 2002, Warwick, RI

The Warwick, RI public hearing regarding Amendment 13 to the Summer Flounder, Scup, Black Sea Bass FMP was convened at 7:10 p.m. on Tuesday, March 19, 2002 at the Comfort Inn, Warwick, RI.

4 members of the public signed the registration form.

The hearing concluded at 7:45 p.m..

Summary minutes follow:

The meeting began with Brian Murphy, RI Department of Environmental Management, providing guidance on the hearing process, and Dan Furlong, Executive Director of the Mid-Atlantic Council, reviewing all options included in Amendment 13 to the Summer Flounder, Scup, Black Sea Bass FMP (see attached "Remarks for public hearing on Amendment 13 to the Summer Flounder, Scup, Black Sea Bass FMP"). Comments from the public provided at this meeting include:

- How can gear allocation option work if fishermen use multiple gears when prosecuting the black sea bass fishery, e.g., trawler with hook and line, trapper with hook and line, etc.

- In the alternative 3 options it appears that they only consider federal permit holders - are state only fishermen excluded? How are they treated in alternative 3?

- If state-by-state allocation system is adopted, RI should be recognized for its past and current conservation efforts, i.e., size limits, trip limits, trap limits, etc.

- If state-by-state allocation system is adopted, it should be based on that period of time when the stock was robust and it should be based on as long a period of time as possible so as to use the best five years within that period.

- Supports tag program for limited effort in the trap sector of the black sea bass fishery.

- Supports pot limitation ... fewer pots will not only reduce effort, but will also reduce possible interactions with endangered species or marine mammals.

- Why was F-based management system rejected from further analysis regarding black sea bass management alternatives?

- Should disallow wet storage of pots/traps. This measure would also help to reduce possible ESA/MMPA issues.

Observations:

- No comments on black sea bass permit and snapper/grouper change regarding the waiving of the six month relinquishment of New England black sea bass permit.
- No comments regarding EFH options.

20 March 2002, Norfolk, Virginia

Jack Travelstead, Public Hearing Officer, opened the hearing at 7:00 p.m. There were approximately 25 members of the public in attendance. Mr. Travelstead introduced Council member Bob Pride, and Council staff members Dr. Chris Moore and Marla Trollan. He invited all to comment on the document as a permanent record for the Council, Commission and National Marine Fisheries Service (NMFS). Dr. Moore presented the summary of Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan. Mr. Travelstead proceeded to open the hearing for public comment.

Harry Doernte, black sea bass fishermen from Virginia, stated that if he had to choose a single word to describe the black sea bass management, it would be "pathetic". He believed the plan is not that bad but rather it is the way it has been administered. He said that he recently attended a meeting in Baltimore, MD, and the Regional Administrator said that there was not enough black sea bass to go around. He thought that there is plenty out there and it was the way it had been allocated that is the primary problem. He explained that in 1996, the industry wanted 5,000 lbs. for a moratorium and later agreed to 1,000 lbs. He continued that the Council had said that if you landed one pound of black sea bass, you would automatically qualify for a permit. Once the Council accepted one pound as a qualifier, NMFS defended it by saying that the qualifying criteria allowed for equitable distribution to all participants. He said that when NMFS implemented the plan, there were suggestions that the number of pots be limited. In consideration of black sea bass overfished resource, the Council decided to save the issue for further consideration in plan amendments. He believed that is where we are today. He thought that the Council needs to address the number of pots that are out there now. In relationship to size limits, he said that NMFS states that it is important to realize that all black sea bass caught north of Hatteras are caught by otter trawls. He referred to Table 11 in the Public Hearing Document that shows that in 1988-1992, pots outfished trawlers by a large percentage. In 1991, 60% of the fishery was pots and 20% were trawls. He said that in one of the first closures, he wrote NMFS asking about having the pots pulled. He then requested a response from NMFS. He said that two weeks later he sent a registered letter and another letter to Donald Evans. One of the replies from NMFS (Penny Dalton) stated that "we expect that all black sea bass fishermen will pull traps to eliminate tending gear". He said that Colleen Coogan responded by saying that he should get more involved in the administration of the plan. He stated that he later attended an Atlantic States Marine Fisheries Commission meeting when they were developing trip limits for Quarters 2, 3 and 4. One of the Commission members asked what trip limits would be necessary to keep the fishery open. After the meeting, he wrote a letter to various individuals and no one knew what the trip limits were for 2001. He said that we now have trip limits of 4,000 lbs (with 2,000 lbs a day) even though NMFS closed it last year with a 2,000 lb trip limit. He believed that the quarterly quotas should be revised, and no longer have it a big trawl fishery in first quarter (permit classes-whether 2 or 3). He also believed that there is no way that fishermen should be allocated a percentage of quota but rather trip limits. Furthermore, the highest rated permit should get a full trip limit, second rated should get half, while the third class could be incidental to keep plan open for the quarter. There should be weekly limits in the federal plan. He also thought that the Council should have federal provisions to have triggers or reverse triggers and these provisions should carry forward unused quotas to the end of the year. He stated that during the qualifying period, no one had 3-4 pots when the plan was implemented. Today there are half a dozen or more. He believed that all pots must be tagged with pot limits of 800 that decrease down to 400 throughout the year. He thought the wet storage is a joke. He said that the Council addressed this in Duck, in February 2000. The Council adopted a framework motion to do something about it. He thought that the pots are staying out there unattended and that the Council and NMFS needed to promote conservation. He stated that under National Standard 5 (utilization of the fishery resource), the Council and NMFS are not utilizing the resource nor utilizing bycatch. He suggested that there be a prohibition in the plan to prohibit transfers at sea and only allow one landing in each 24-hour period as well as limit the pot size to 2 x 2 x 4. He recommended that the Council look at the 12" minimum size limit. He believed that this will increase exploitation and the quota.

Jim Dawson, commercial hook and line and trap fishermen from Virginia, stated that the problem with quarterly systems is that it is based on 1988-92 data. He believed these are old figures that need to be updated. From 1997 on, the state has complete data for the black sea bass fishery. Using old data and the control date for 2001 is inconsistent. If the Council and NMFS are going to allow for licensing in 2001, then they need to look at figures for 2001. He thought that the system worked better in the beginning when there weren't strict limits. He believed that there are too many people in the fishery and NMFS has allowed too many licenses to be distributed. He stated that if the quarters were broken down accurately, we wouldn't have the quarters closed early. He thought that a readjustment of the quota is in order based on years through June 2001. He favored the classification of license groups and suggested classifying by permit categories (i.e., A2 and A3 would have a small number of pots or no pots at all). He wanted to ensure that the fishermen are allowed to reach trip limits in Quarter 3. He believed that the number of pots and wet storage is an enforcement issue. Under National Standard 10, he thought that the Council/NMFS would put fishermen at risk by asking them to retrieve their pots in 10 days. He recommended limiting the new people that enter into the fishery. Trawlers that used to fish for dogfish are now catching black sea bass. He suggested placing more emphasis on set-asides and conduct more studies on black sea bass to see how fishermen can keep from damaging the fish when they bring them up from the bottom. He also recommended a classification of licenses for vessel upgrading like it did for multispecies. He didn't think that the size limit should go up to 12".

Joe Delcampo stated for the record that he favored permit categories. He recommended restricting the number of pots to 400. He thought that the wet storage of pots should not exceed two weeks and that pots should not be allowed in the water until the season opens. He supported a 12" size limit and recommended changing the vessel size and trip limit size.

Jack Stallings, commercial sea bass fishermen (FV/Grumpy), agreed with Harry Doernte with the exception of wet storage of pots (favored Alternative 10C). He believed that two weeks is too short and may get shut down by weather. He supported Alternative 12B by limiting the number of traps per vessels to 400.

Mark Hodges, trap fishermen and fishing vessel captain in Virginia, asked if the figures in the plan would be able to be changed. He supported state-by-state quotas based on todays landings data and believed that straight state-by-state would be advantageous for fishermen. The primary reason he favored this is that he believed the federal government doesn't realize the problems in the fishery. He referred to page 410 of the Amendment and said that state landings amounted to one-third of the quota. The trap fishermen don't have licenses and don't have to venture far because of the coastline. NMFS can't solve this problem without addressing how to regulate a state based on landings. This could be solved under Alternative 3a (quota allocations by permit category). He favored state-by-state quota more than any of them if the Council/NMFS can change the way the quota (full or hybrid for just first three months) is allocated. If we lost April because of closures, we could have long closures because of dragger fleet. He believed the best way to manage this type of fishery is through an ITQ program. If we had this system based on history, it may be possible to get it passed under Alternative 3a permit allocation and fold into ITQ program. He believed that if there were an ITQ program, fishermen wouldn't have to have trap limits, sizes, etc. Some potters would qualify for 800 pots but would not be able to catch quotas under the ITQ program. If the Council passed trap limits on the federal end, it may conflict with state-by-state quotas. He suggested that at the 10" size limit they lose catch; however, at a 12" it would be 1/3 of the marketable catch. He thought the wet storage time of 10 days or two weeks is ridiculous. It would be easier to leave the door off the pots. It costs thousands of dollars in fuel to get the pots in for 30 days. Depending on weather, fishermen would lose at least a week of fishing time by just leaving doors off the pots. He stated that it is a shame that we didn't use ITQs years ago. Rockfish is an ITQ based on tags and black sea bass should have the same system. He believed that without a state by state quota there would be no way to solve this problem of the closures.

Rob Holtz, CCA of Virginia, stated that his main goal is to keep the fishery open for as long as possible. He believed that it is destructive to leave pots in the water and that the Council needs to restrict the number of pots. He suggested implementing a tagging program and developing a bouy system to mark pots so that they can be retrieved when there are storms. In regards to essential fish habitat, he favored Alternative 2 to not allow bottom disturbing in estuaries.

Joe Kelly, commercial sea bass fishermen, said that everyone agrees that the fishermen did not catch their amount of sea bass last year. He referred to Alternative 4 and stated that 16% of the coastwide landings were caught by the north, 83% by southern. Most of the quota was landed by Massachusetts last year (41%). He believed that this is where the problem lies. What has happened is that the landings are going north. If we are going to allocate on historical basis we need to keep track of what the states have landed. He believed that status quo favors the north. He pointed out that in the commercial fishery, when it comes down to cut and make allocations, the north is quick to point our history of landings (look at bluefin tuna). He said that the best alternative for allocating the quotas is to take care of the closures. If fishermen had state-by-state quotas, Virginia would be open for most of the year. The Council needs to base the quota on historical landings. He stated that he has been fishing for 12 years with black sea bass pots. In regards to the wet storage of pots, he believed that any responsible black sea bass potter will take care of their rigs. He said that when there was a closure, he brought in his gear and/or takes his doors out of the pots. He stated that it is not that easy to get into the fishery. Fishermen do not just jump in and buy 1,500 pots. Commercial fishermen are like farmers, they will bring in the most amount of fish in the shortest amount of time. He recommended looking at Alternative 4 and allocating by region. He thought that fishermen should hold Councils responsible for passing quotas that address the history of landings. If the states controlled fishery, the closures would be short. He recommended fishermen ban together to have state-by-state allocation of quota. He recommended leaving the amount of gear status quo and that a restriction on pots was not necessary. He believed that there is more sea bass now than ever and the fish are bigger.

Patrick Standing Jr., representing BackBay Seafood, asked how it is possible to limit fishermen to a category when they don't have a history in the fishery. He said that his history may be short but it is still a history. He believed that Alternative 4 seemed fair. If fishermen had a state-wide history, we need to protect it. It would be unfair for those that have made a capital investment to limit to a substandard category. He suggested looking at Alternative 4 and 5 based on state quota percentages.

Luke Negangand, commercial fishermen from Virginia, stated that part-time efforts would still apply to category A2 with 150 vessels, whereas, at B2 category it would be one of 41 vessels. He said that he would qualify for the A2 category. The 4,000 trip limit would not be considered bycatch for him. For the 52 vessels, there would need to be trip limits implemented. In A1 category choice, it is important that fishery stay open. If this gets passed, all emphasis should be on 52 boats to keep them fishing. However, no one will implement trip limits for 98 boats. Hook and lining is a good way to fish and is still important; however, hook and line at the state level is a joke. You have to adhere to same limits as recreational fishermen. The state needs to realize hook and line is not a joke. He stated that he is not against the permit categories.

Harry Doernte asked what was the purpose of a control date? He stated that the Council had a control date but after the control date, documented landings did not count.

Jim Dawson stated that the problem is that fishermen cannot go through quarters without closures. He suggested there needs to be a readjustment of where we are today and that there is still the problem of enforcement. He asked who will conduct enforcement efforts and how will they do it? He believed the Coast Guard will not be able do it right now. He recommended the Council/NMFS try harder to keep seasons open. He said that in the fall, his catch has been reduced by 80% which has affected him a great deal. Since 1999, his income is down 50%. He recommended conducting a stock assessment in the back bays through the research set-aside program. He suggested that the state-by-state quotas should be for a full year only based on updated recent figures for the year. He thought that Alternative A1 with 50,000 pounds may work. Alternatives A2 and A3 should not have a trip limit. He believed that because there is a lack of statistical data, the Council/NMFS should use the most recent data. He believed that using categories, Massachusetts would eliminate this problem. He recommended putting a stop to the new people entering the fishery. He asked if we can request to know how many more vessels would be classified under Alternative A1?

Dr. Moore stated that the number would likely be different than 52 vessels. This is the best estimates for these categories at this time.

Patrick Standing, Jr., believed there is nothing that indicated what was being proposed when he came into the fishery. He believed that without something on the books, he can fish under the "right to work" law. He stated that the Council/NMFS could be looking at lawsuits.

Joe Delcampo said that fishermen used lobster pots up north, but did not jump into the fishery until the 1990s. He asked how the state-by-state system would work?

Jack Travelstead stated that if the Council/NMFS went with state-by-state quotas, each state could develop a program based on their allocated quota. He mentioned that there had been talk of an ITQ program. Under this program, there would be maximum flexibility to meet different needs.

Joe Delcampo asked if the fishery would remain open longer with less closures?

Jack Travelstead stated that the longer we go back in history, the more time there is to build your percentage of the quota once you have the quota, the fishery is open as long as individuals still have their portion of the quota. He said that if fishermen wanted to eliminate the first three months from the year, then Virginia percentage would go way down. The hybrid approach is of more concern.

Joe Delcampo stated that this is really a financial management plan. He said that he qualifies for A1 category but can not get a larger vessel. He recommended guidelines be established for what you can do with your permit.

Bob Pride referred to the state-by-state numbers on page 10 of the Public Hearing Summary Document. He asked what were landings in 2000-2001? He said that if the fishery went to state-by-state, Virginia may not get more of overall pie.

Jim Dawson said that we just need to use more accurate data.

Joe Kelley recommended keeping the trip limits in place and making the season longer. He thought that if you possess a federal permit, you should also be able to land with a state permit.

Joe Delcampo recommended that for the A1 category, the Council/NMFS needed to treat the vessels in the state the same.

Mark Hodges asked how the Council/NMFS would get to hybrid allocation?

Dr. Moore stated that when the Council looked at the data, we looked at what kind of gear was landing black sea bass and whether the otter trawls were important in January, February, March, and April. These months were important for otter trawl landings. If the Council/NMFS goes to a hybrid system, then we could go to March/April timeframe. He suggested that if they want to comment in writing in favor of the hybrid system, they should indicate the months.

Mark Hodges said that under the tagging system, if fishermen were limited to 800 pots and lost 200 in month of April, there would need to be system to rebuy more tags by law. Storms can ruin the pots.

Jim Dawson said that storms are a big problem with pots.

Joe Kelly stated that in the lobster fishery, they allocate an extra 10%. Fishermen can purchase this to fill in any gear they use. He said that he usually loses more than 3% of his gear every year.

Joe DelCampo asked when the Council will act on these proposals?

Dr. Moore stated that on the federal side, the earliest that there could be a change would be January 2003.

Mark Hodges said that 95% of the closed areas are probably sand. The draggers have been working the bottom for 50 years or more. He asked what will happen two to three years from now when NMFS has the ability to close these areas? He thought that NMFS will close huge areas over several years. He believed that the change needs to be made in Sustainable Fisheries Act. All commercial fishermen see the unfair stock assessment for black sea bass. NMFS needs to do a virtual population analysis on data other than just a trawl survey. They need to come up with fair assessment.

Dr. Moore stated that the stock assessment for black sea bass may occur in the fall but it depends on a coordinated tagging program.

Mark Hodges said that NMFS has a bias toward conservation if they do not have information. He believed that the fish are there and the Council/NMFS needed to have fair representation and manage it correctly.

Jim Dawson asked what is the process to voice concern?

Dr. Moore stated that we need to get together and do this on each state level.

Harry Doernte recommended that street sweeper gear be outlawed.

The public hearing closed at 9:15 p.m.

21 March 2002, Manteo, North Carolina

Red Munden, Public Hearing Officer, opened the hearing at 7:05 p.m. There were five members of the public in attendance. Mr. Munden introduced Council staff members Dr. Chris Moore and Marla Trollan. Dr. Moore presented the summary of Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan. Mr. Munden proceeded to open the hearing for public comments.

Dale Meckins asked about the permits necessary to fish. He stated that the Council closed the season last year with restrictions of six months before you could get your permit back. However, the South Atlantic was not closed at any time. He said that if we sent in a permit and the Council kept it for two months, then he would miss a period of time to fish. He believes that not many people have licenses because it is not enforced. He was afraid that if fishermen were to give up their northern permit, they would never get them back.

Dr. Moore stated that there were probably 5 people that participate in the fishery north and south of Hatteras.

Dale Meckins said that the Council/NMFS expects the fishermen to pull the pots in two weeks; however, it really takes about six months.

Red Munden referred them to page 15 of the Public Hearing Summary Document, Alternative 9 - the current regulations are status quo. He said that Alternative 9B would remove the permit requirement that restricts fishermen from using a Southeast Snapper/Grouper permit during a northern closure. He stated that fishermen would not have to relinquish their permits if they already had a snapper/grouper permit.

Dale Meckins said that they do not want to give up their permits.

Dr. Moore agreed that it made sense to get rid of the requirement.

Red Munden said that Mr. Meckins had already approached Dennis Spitbergen, Council member from North Carolina, and himself about this issue. Red explained that there was no rational for this when there is a closure north of Hatteras.

Dale Meckins stated for the record that he supported Alternative 9B.

Wayne Lee, recreational fishermen, said that in regard to Alternative 5 on page 8 of the Public Hearing Summary Document, he wasn't sure which alternative was best but thought that Alternative 5A would be best supported by North Carolina. He stated for the record that he also supported Alternative 9B. He believed there was no reason to give up the northern permits for six months to fish in the south

Atlantic. He stated that he also supported Alternative 10C, to prohibit storage of black sea bass pots for longer than four weeks. He believed that this would allow the pots to come out of the water so there would be no mortality on fish.

Ken McConall, commercial black sea bass fishermen, agreed with Dale Meckins and supported what he had stated earlier.

The public hearing closed at 7:20 p.m.

APPENDIX H. COMMENT LETTERS AND COUNCIL RESPONSE

Appendix H. Comment letters and council responses.

A total of 47 comment letters were received on Amendment 13 draft public hearing document. One was from NMFS and one was from the EPA. The remaining letters were from the general public, representing private fishermen, fishermen groups, environmentalists, and concerned citizens. All of the letter are reproduced in this Appendix.

There were a total of 24 substantively different comments.

Management Alternatives

Quota Allocation

Comment 1: A total of 6 commenters stated that they preferred a state by state quota system. One preferred the state by state system using the best 5 years of landings for each state. Two preferred using the most recent 5 years of data to allocate the quota to each state. One suggested implementing a state by state quota after regulations are uniform in each state and using years of uniform regulations for the base year. Another commenter suggested taking into account differences in state regulations along the coast to calculate each state's allocation.

Response 1: The Council and Commission met on May 1, 2002 to adopt a preferred alternative for the black sea bass commercial quota system and other commercial management measures. They considered the material in the public hearing draft, the supplement (Appendix A) that was drafted in response to comments from the Regional Administrator, the public hearing summaries, and all the public comments received on the draft Amendment/EIS. After considerable discussion, the Commission adopted and will implement a state-by-state quota system beginning January 1, 2003. This state by state system will give states the ability to manage their quota for the greatest benefit of the commercial black sea bass industry in their state. The Council supports this action by the Commission. In a complementary action, Council voted to adopt an annual coastwide allocation system to facilitate the state-by-state allocation system that was adopted by the Commission.

The coastwide quota alternative selected by the Council to facilitate the state by state quotas implemented by the Commission is an alternative that falls within the range of state by state quota alternatives considered in the public hearing document. Specifically, the preferred quota management program is essentially the same as the state by state alternatives considered in the DEIS with the difference being that the states would manage the program. As such, the resulting impacts would be consistent with those described in the public hearing document.

The annual coastwide quota would be implemented and administered by NMFS. The current data reporting and monitoring system would continue. The fishery would close when the quota was projected to be taken. This closure would occur regardless of whether or not individual states still had quota available. However, given the states experience with other state by state quota systems, as well as their ability to transfer quota, it is unlikely that this situation would occur.

Since black sea bass is a shared resource between the states and federal governments, a federal system that does not compete with the system implemented by the Commission is needed. The fishery is a multi-jurisdictional fishery that demands cooperation between the Council and Commission. Without the cooperation of the states, no federal action could meet the National Standards. The coastwide quota is a system that recognizes and facilitates the state-by-state allocation system implemented by the Commission. This system will result in less conflicts between the management bodies than any other system. This system would replace the quarterly quota system that is currently in place.

An example of the state-by-state allocations are the allocations chosen by the Commission for the 2003 and 2004 fishing season. After considerable debate, the Commission adopted allocation percentages for 2003 and 2004 that represented a compromise between the allocation percentages associated with the various base periods presented in the public hearing draft for this amendment (Table 5). Specifically, allocations adopted by the Commission for 2003 and 2004 were as follows: Maine 0.5%, New Hampshire 0.5%, Massachusetts 13%, Rhode Island 11%, Connecticut 1.0%, New York 7%, New Jersey 20%, Delaware 5%, Maryland 11%, Virginia 20%, and North Carolina 11% (Table 9b). For 2005 and beyond, the Commission would have to take action to continue or modify the allocation formulas. If the Commission fails to take action to adopt state-by-state allocations in 2005, the Council would take action through a framework to reinstate the status quo quarterly quota system or take other mitigating action. A complete description of the manner in which the Commission will implement a state-by-state allocation system and the compliance criteria required by each state is fully described in the document entitled "Amendment 1 to the Black Sea Bass Fishery Management Plan" (Appendix B).

This alternative was chosen as the preferred alternative, because a federal coastwide quota would facilitate state-by-state allocation system, which would allow for the most equitable distribution of the commercial quota to fishermen. In fact, the Commission has decided to allocate the black sea bass quota to states taking into consideration historical landings and current fishing trends. Additionally, this alternative would not place a burden of federal monitoring on NMFS. Specifically, under this alternative, states would have the responsibility of managing their quota for the greatest benefit of the commercial black sea bass industry in their state. States could design allocation systems based on state specific landing patterns using possession limits and seasons to ensure a continuous and steady supply of product over the season for producers and/or a fair an equitable distribution of black sea bass to all fishermen who have traditionally landed black sea bass in their state. States would also have the ability to transfer or combine quota, increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns.

Comment 2: A total of 13 comments were received stating that the state of Massachusetts should be recognized for its conservation efforts, and as such, any state by state allocation would not be equitable.

Response 2: Under the new system adopted by the Council, the annual quota would be allocated on a coastwide basis each year. The Commission adopted a state-by-state allocation system that would allocate the coastwide quota to each state. After considerable debate, the Commission

adopted allocation percentages that represented a compromise between the allocation percentages associated with various base periods. Specifically, they adopted the following allocations: Maine 0.5%, New York 7%, New Jersey 20%, Delaware 5%, Maryland 11%, Virginia 20%, and North Carolina 11%. The Commission could modify the allocations based on a consideration of prior state regulations and their effects.

The allocations would remain in effect for 2003 and 2004. After that (2005 and beyond) the Commission would have to take action to continue or modify the allocation formulas. The federal coastwide quota would remain in place for 2003 and 2004. If the states failed to take action for the 2005 fishery, the quota system would revert back to a quarterly system, i.e., the system that is currently in place.

Comment 3: One comment was received stating that *de minimus* status should not be implemented and states with such small portions landings should not be allocated landings in a state by state system.

Response 3: The Commission adopted allocation percentages, including an allocation of 0.5% for the state of Maine. As such all states will be responsible for monitoring their landings and closing their fisheries when their allocation is reached. The *de minimus* language will not apply to the state by state allocation system.

Comment 4: A total 20 comments were received in favor of the quarterly quota. One commenter suggested that the quarterly quota should be allocated using the most recent data. Four commenters were in favor of a rollover provision. One commenter suggested quarterly quota system with trip limits by permit category.

Response 4: The Council disagrees with this comment. The purpose of this amendment is to revise the quarterly commercial quota system for black sea bass implemented in Amendment 9 of the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan. The quarterly quota system was designed to allow for black sea bass to be landed during the entire 3 months in each quarter. However, the black sea bass fishery experienced early closures during the last three quarters in 1999 and 2000. In fact, in Quarters 3 and 4 of 2000 the quarterly allocation was harvested within one month, leaving the fishery closed for the remaining two months of those quarters.

The Council considered the rollover provision alternatives. However, given that the all four quarters in 2001 closed early, 100% of the quota was landed in the first quarter of 2002, and the second quarter in 2002 closed early, it is unlikely that adding a rollover provision would allow the black sea bass fishery to remain open throughout the year.

A quarterly quota system with trip limits by permit category was not part of the suite of options that was considered by the Council. Given, the performance of the black sea bass fishery, the Council feels that trip limits by permit category would not remedy the problems associated with the quarterly quota system.

Comment 5: Five comments were received in favor of one of the permit category alternatives.

Response 5: The Council disagrees with this comment. The Council chose a federal coastwide quota with a state-by-state allocation system because it could allow for the most equitable distribution of the commercial quota to fishermen, without the additional burden of federal monitoring on NMFS. The permit category alternatives would introduce the additional burden of enforcing individual permit allocations. Additionally, the burden of monitoring the fishery for NMFS and the states would increase, relative to the current system. The reporting requirements for dealers would also increase under the permit category alternatives.

Comment 6: A total of 4 comments were received in favor of a hybrid quota system.

Response 6: The Council disagrees with this comment. The Council chose a federal coastwide quota with a state-by-state allocation system because it could allow for the most equitable distribution of the commercial quota to fishermen, without the additional burden of federal monitoring on NMFS. The burden of monitoring the fishery, for NMFS and the states, would increase under the hybrid quota systems, relative to the current system.

Comment 7: Fourteen comments were received in favor of allocating the quota by gear type.

Response 7: The Council considered an allocation by gear type. However, this alternative would redistribute landings among gear types relative to the status quo. In addition to the economic impacts this may cause, this alternative could redistribute fishing effort relative to gear types which could have had negative consequences to EFH and protected resources. Additionally, the burden of monitoring the fishery for NMFS and the states would increase, relative to the current system. The reporting requirements for dealers would also increase under this system.

Other Black Sea Bass Management Measures

Comment 8: Two commenters were in favor of removing the permit requirements that require fishermen to relinquish their black sea bass permit for six months, if they use their snapper/ grouper permit to fish for black sea bass south of Cape Hatteras during a Northeast closure.

Response 8: The Council agreed with this comment and adopted the alternative to remove the permit requirements. The Council sees this restriction as an unnecessary burden on those fishermen that possess both permits. There are only 5 vessels that possess both permits and as such the Council does not foresee any biological, economic, social, EFH, or protected resources impacts as a result of adopting this alternative.

Comment 9: Six commenters were against requiring black sea bass fishermen to remove pots/traps during a closure, while eighteen comments were received in favor of requiring pots to be removed during a seasonal closure. Some commented that the pots/traps are used to catch other species during closed periods. Some comments were received stating that it was not practical to remove pots during a two or four week closure since some fishermen have large

numbers of pots deployed long distances offshore. In addition, situations such as weather, health, family business, may preclude fishermen from hauling pots/traps within the time allowed. Three commenters suggested that the pots/traps remain deployed but require the doors to remain open. Fourteen commenters felt the pots/traps should be required to be removed during closures of 2 weeks or more. One commenter felt that they should only be required to be removed during closures of 4 weeks or more.

Response 9: The Council has no information on the number pots/traps and areas fished by individual fishermen, nor how long it takes for fishermen to deploy and haul back their pots/traps. The Council decided to adopt the status quo alternative which allows pots/traps to remain fishing during a closure. Pots/traps are fished for other species during black sea bass closures and it may take more than four weeks to retrieve and deploy pots/traps for some fishermen. Additionally, the Council feels that the management measures adopted to reallocate the quota should keep the black sea bass fishery open throughout the year.

Comment 10: Three commenters were opposed to pot/trap tag requirements. Four commenters were opposed to trap limits. Two comments were received stating that the pot limits proposed were not consistent with the Lobster FMP.

Response 10: The Council agrees with this comment. The Council does not feel that a pot/trap tag program is necessary at this time because a pot/trap tag program is only necessary if pot/trap tag limit is implemented. The Council is not implementing a pot limit because of the lack of information on the number of pots fished by individual fishermen. Without this information, economic, biological, EFH, and protected resources impacts cannot be analyzed. Additionally, pot/trap limits are not necessary because trip limits constrain landings. Under the preferred alternative adopted by the Council and Commission, individual states can implement pot/trap tag programs and limits, if necessary.

Comment 11: Two comments were received stating that more restrictions should be in place to limit access to the black sea fishery.

Response 11: During the development and adoption of Amendment 9 the Council considered the requirements necessary to obtain a black sea bass moratorium permit. Additional restrictions for limiting access for black sea bass moratorium permits are beyond the scope of this amendment and would require another amendment process.

Comment 12: One comment was received asking for a substantial decrease in the black sea bass quota.

Response 12: The Council sets that commercial quota annually to meet the target exploitation rate dictated by the rebuilding schedule. The commercial quota is adjusted at that time, if necessary. However, survey indices indicate that black sea bass abundance is increasing and the stock is rebuilding. As such, a decrease in the commercial quota is not required.

Comment 13: Two comments were received suggesting that the upgrade limits on larger vessels

would be abolished. Commenters stated that trip limits would constrain effort and that older, slower vessels can be unsafe and impractical. One commenter suggested that only boats in permit category A should be allowed to upgrade their vessels.

Response 13: Upgrade limits were beyond the scope of this amendment, but were considered during the development and adoption of Amendment 9. At that time, the Council and Commission considered the upgrade limits necessary to prevent an increase in the fishing power of the fleet. If it becomes apparent that these restrictions need to be removed it will need to be discussed in future amendments.

Comment 14: One commenter suggested that commercial and recreational size limits should be the same.

Response 14: The commercial quota and recreational harvest limit are adjusted annually in order to meet the target exploitation rates of the rebuilding schedule. Also adjusted annually are the management measures necessary to constrain landings to the commercial quota and recreational harvest limit. These two fisheries are evaluated separately and the management measures are adjusted as appropriate for each fishery.

Comment 15: One commenter suggested that all fishing for black sea bass should be banned during spawning season.

Response 15: The Council disagrees with this comment. There is no evidence to indicate that fishing during spawning season has a negative impact on black sea bass recruitment, behavior, or habitat. As such, there is no reason to adopt such a regulation. Should this evidence become available, such a management measure could be implemented during the annual specification process. Additionally, management measures such as minimum fish size, minimum mesh size, escape vent size, and roller size, protect younger fish from harvest, allowing more fish to grow to maturity and spawn, increasing stock biomass and yields.

Comment 16: One commenter felt that the amendment does not address conservation or rebuilding the stock, just a reallocation of the quota.

Response 16: The purpose of this amendment was to revise the quarterly commercial quota system for black sea bass that was implemented in Amendment 9 of the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan and to address the disapproved EFH sections of Amendment 12. Conservation is addressed through the consideration of the beneficial biological impacts that would accompany the quota system. The purpose of the amendment was not to address rebuilding of the black sea bass stock. Stock rebuilding was addressed in Amendment 9 with the adoption of the rebuilding schedule.

Comment 17: One commenter felt that the trigger to lower the quota should be when 50% or less of the quota is harvested. One commenter suggested that trip limits should be different for hook and line gear.

Comment 17: Under the adopted alternative, the individual states can decide to impose gear-specific trip limits and triggers to constrol landings in the state.

Comment 18: Two commenters suggested that hook and line gear should be the only gear allowed to catch black sea bass.

Response 18: The reason for restricting the commercial harvest of black sea bass fishing to hook and line gear is unclear. Limiting the commercial harvest to hook and line gear would violate the provisions of National Standard 4. Specifically, it would be allocating the resource to only one user group. It would prohibit participation by user groups that have historically participated in the black sea bass fishery, e.g., pot/trap and otter trawl fishermen. Additionally, prohibiting all gear but hook and line gear may also disadvantage some communities.

EFH Alternatives

Comment 19: Twenty-one comment were received in the favor of the EFH status quo alternative.

Response 19: The Council agrees with this comment. The Council feels that many actions adopted by this Council and NEFMC, and implemented by NMFS over the past ten years have indirectly and directly acted to protect EFH. While the Council does agree that the literature indicates that certain types of mobile gear can have an adverse impact on EFH, the Council also agrees that bottom tending mobile gear can also have a positive impact on EFH. While the nature of these impacts can be inferred from literature, the extent of the impacts remains largely unknown. This is confounded by the fact that true value of habitat to different species' productivity is also largely unknown. If information becomes available that indicates that gear impacts on EFH are affecting the productivity of a stock, appropriate EFH measures can be implemented at that time.

Comment 20: Three comments were received in favor of a prohibition of bottom tending mobile gear in the nearshore areas.

Response 20: The Council determined that this alternative was not practicable. The nearshore shallow water areas encompassed by this alternative are predominantly a high energy sand environment, indicative of disturbance tolerant species. Gear impact/habitat research indicate that such habitats and species are less susceptible to gear impacts with quicker recovery rates than more stable deep water or live bottom habitats. Although inferences to habitat impacts can be made, there is no data on the functional value of this habitat on the density, growth and productivity of various species of fish in the Northeast Region. This alternative may avoid gear impacts but at a very high cost to the commercial fishing industry. Since there is no demonstrable link between preventing the impacts on habitat and any quantifiable benefit to the various species of fish using these areas, the Council did not feel it was practicable to adopt this alternative.

Comment 21: Three comments were received in favor of a prohibition of bottom tending

mobile gear in the Hudson Canyon.

Response 21: The Council determined that this alternative was not practicable. The Council funded research by Rutgers University to evaluate the impact of mobile fishing gear on tilefish habitat (Able and Muzeni 2002 draft). In this report, Able and Muzeni (2002) concluded that there is no direct evidence of tilefish habitat being adversely impacted by otter trawls, or other gear types. Additionally, the report concluded that the "most important impact on tilefish habitat has been the fishery (primarily longline) for this species [tilefish]...the impacts occur when fishing mortality removes the tilefish...individual burrows are not maintained..." With such a high cost to the commercial fishing industry and no demonstrable link between bottom tending mobile gear and impact to tilefish habitat, the Council did not feel it was practicable to adopt this alternative.

Comment 22: Four comments were received in favor of restrictions on roller rig and rock hopper gear. One commenter admitted that they did not have any information on which restrictions would be appropriate.

Response 22: The Council feels that it currently does not have enough information to further restrict the use of roller rig and rockhopper gear. First, the adverse nature of the impacts of roller rig and rock hopper gear on habitat is not clearly understood. Restrictions on this gear (e.g., smaller roller size) may render some areas inaccessible to trawl gear and thereby eliminate the impact of this gear on habitat in these areas. However there is some information that the use of smaller rollers may cause more damage to habitat through shearing or crushing forces. Additionally, the incidence of the use of this gear in the EFH for summer flounder, scup and black sea bass is unknown. The Council already restricts the maximum diameter of roller size to 18" in the scup and black sea bass fisheries. This restriction prevents fishermen from trawling in the harder, rough bottom areas. As a result, black sea bass associated with these areas would be protected from harvest allowing more fish to grow to maturity and spawn, increasing stock biomass and yields.

Comment 23: Four comments were received in favor of a prohibition of streetsweeper gear.

Response 23: The Council feels that it currently does not have enough information to prohibit use of streesweeper gear. The Council is currently not aware of the incidence of this gear or its impact on habitat. The Council is aware that NEFMC prohibited the use of streetsweeper gear for precautionary principles. However, this ban was in response to a concern regarding the efficiency of the gear for catching groundfish, rather than a concern for habitat.

Comment 24: One commenter suggested that all bottom tending mobile gear should be restricted to sand and mud bottoms.

Response 24: The Council did not consider restricting all bottom tending mobile gear to sand and mud bottoms. The Council already has restrictions in place to protect various habitat types in the Mid-Atlantic. For instance, the Council limited the maximum diameter of roller size to 18" in the scup and black sea bass fisheries. This restriction prevents fishermen from trawling in

harder, rough bottom areas. Additionally, the Council has adopted many management measures that have acted directly and indirectly to reduce gear impacts on habitat.

Chris
3/6/02

March 4, 2002

RE: Flounder, Scup, Black Sea Bass

Dear Daniel T. Furlong-Executive Director Mid Atlantic Fishery Council;

My feeling on Amendment 13 is that I firmly believe that you should put recreational and commercial fisherman on the same page.

On seabass and scup fishing eliminate the pot trap fishing. Recreational and commercial fishing should be hook and line only because it would create more jobs for the fisherman commercially and it puts commercial and recreational fishing on the same page. Seabass die coming up from deep depth. I can't tell you how many times I've had seen lungs hanging outside of the fish's mouth. If you put the recreational fisherman on a strict 25 fish , per species i.e. scup and seabass, per trip with no size limit, it will help without killing the small fish you throw back. Similar with the commercial, create a poundage per vessel, per trip, per fisherman, but hook and line only. This way your keeping recreational and commercial fisherman closer to the same page. This will also create less hassle to your council because the two groups will react more united. Also make size limits for both recreational and commercial the same.

In regards to fluke fishing, again put everybody on the same page, hook and line fishing only. Eliminate all other commercial fishing types. Raise the recreational to the 17 inch proposed size, but do so to the commercial sector as well. Also allow recreational and commercial fishing year round without the other gear types. Allow commercial unlimited poundage on hooked line.

In summary, if everyone is on the same page, then everybody can care about the fisheries together and build them together. Less fish, raise the size limits and create closures during spawning periods.

Thank you;

Edgar S. Palmer
Hot Seat Inc.
2647 Haddonfield Road
Pennsauken, NJ 08110
856-665-3669

15 Elm St
Florham Park NJ 07932
March 18, 2002

To MAFMC
Dan Furlong, Exec Director

Re Public Hearing Summary - Amendment 13
Public Comments Invited -

(1) I want all quotas set by council revised downward 70% at least
(2) All pots traps should have names on them.
none should ever be left unattended for longer than two days. Allowing fish to be caught + die in unattended traps is a horror and disgrace. If its too many for the commercial fisherman to pick up in two days, cut his quota so he CAN check them every two days. IN NO CASE Should a fisherman be able to leave a pot or trap in the water to catch fish so they can die in his pots -
Please make sure I am notified of all actions by Council (notices, hearings etc)
Long closures also have consequences for the general public, who deserve greatest consideration from council

If states have no landings - don't establish de minimus - close down all landings entirely. Just shut it down!

Alternates 1-2-2b-3-3b-3c 3d-4a-4b-5a-5b-5c-5d-5e 6a-6b-6c-7a-7b are all unacceptable. Simply cut quotas 100%

Alternative 8 - eliminate trawl allocations entirely + completely. Trawlers are extremely harmful to the environment. Greed is the only reason they were ever allowed. It is time to eliminate trawling entirely.

Alternate 8b-9a-9b - I am not favorable to these alternates

Alternative 10a - all Black Sea Bass Pots/Traps must be pulled in within 2 days of any season ending or fishing cessation.

10b - allows too long a period to pull out pots/traps! DO NOT LET FISH DIE UNNECESSARILY IN POTS/TRAPS!

10(b) Do not let any fisherman anywhere anytime have more pots/traps than he can pull out in 2 days!! No fish DYING IN TRAPS/POTS should ever be allowed.

No individual fisherman should be allowed to set or own more traps than he can get out in 2 days

10c - Completely unacceptable

alternate 11 - All pots/traps must be tagged with owners name + tag info.

alternate 12A - UNACCEPTABLE

alternate 12b - 400 black sea bass pots + traps - TOO MANY are allowed by this alternate!

alternate 12C - TOO MANY POTS/TRAPS.

EFH alternatives for Summer Flounder/Scup + Black Sea BASS

EFH alternative 1 - UNACCEPTABLE

EFH - alternative 2 - UNACCEPTABLE

" " " 3 - Bottom tending mobile gear should be prohibited in HUDSON CANYON

EFH alternative 4 - ALL ROLLER Rig and rock hopper gear must be totally phased out.

EFH alternative 5 - PROhibit street Sweeper gear - YES prohibit this gear + its use totally.

Economic Impact - Since the commercial fishermen have already almost totally damaged fish stocks, we should (the general public's interest) stop them before the sea is barren. They (commercial fishermen and their greed) are already almost putting themselves out of business thru overfishing.

If the general public (who needs to be protected from rapacious commercial fishing interests) is not protected + its interests looked after - the seas will be barren.

B Sachau

PUBLIC HEARING SUMMARY DOCUMENT
Amendment 13 to the
Summer Flounder, Scup, and Black Sea Bass
Fishery Management Plan

Mid-Atlantic Fishery Management Council
Room 2115 Federal Building
300 South New Street
Dover, DE 19904
Phone: (302) 674-2331
Fax: (302) 674-5399
Website: *www.mafmc.org*

Your Comments are Invited

The Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (Commission) seek public comment on Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP). If the management measures proposed in this amendment are adopted by the Council and Commission and implemented by the federal government and the states, this amendment would: 1) revise the quarterly commercial quota system for black sea bass implemented in Amendment 9 to the Summer Flounder, Scup, and Black Sea Bass Fisheries Management Plan; 2) address the problem related to permit requirements for fishermen that have both a Northeast Black Sea Bass Permit and a Southeast Snapper/Grouper Permit and fish for black sea bass north and south of Cape Hatteras, NC; 3) address the problems related to the wet storage of black sea bass pots/traps; 4) establish *de minimus* specifications for black sea bass under the Atlantic State Marine Fisheries Commission Interstate Fisheries Management Program Charter; 5) implement tag requirements for black sea bass pots/traps; 6) limit the number of black sea bass pots/traps fished by fishermen; and 7) assess the impacts of fishing activities on EFH and implement management alternatives for summer flounder, scup and black sea bass to prevent, mitigate or minimize adverse effects from fishing to bring the FMP into compliance with Section 303(a)(7) of the Sustainable Fisheries Act.

The summer flounder, scup and black sea bass fisheries are jointly managed by the Council and the Commission. The Council manages the fishery within a fishery conservation zone of marine waters from 3 to 200 miles offshore; whereas, the Commission manages the fishery in state waters.

The Council and Commission will accept comments on Amendment 13 during the 45-day public hearing and comment period. The comment period began March 1, 2002 with the publication of the Notice of Availability and ends April 15, 2002. Public comments may be submitted on any aspect of the amendment including the draft Environmental Impact Assessment, Preliminary Regulatory Economic Evaluation, and Essential Fish Habitat Assessment. Following the review of public comments, the Council and Commission will choose the management measures for submission to the Secretary of Commerce.

You may comment at the public hearings or you may submit written comments by April 15, 2002 to:

Daniel T. Furlong
Executive Director
Room 2115 Federal Building
300 S. New Street
Dover, DE 19904

Please mark on your correspondence, "Amendment 13 Public Comment". If you would like to be included on our mailing list to receive press releases, newsletters, meeting notices, etc., please contact the Council office at the above address.

Why is the Council Proposing to Take Action?

A number of management alternatives have been proposed to replace the quota system currently in place for the black sea bass commercial fishery. Specifically, the quarterly quota system implemented in Amendment 9 was designed to allow for black sea bass to be landed during the entire 3 months in each quarter. However, the black sea bass fishery experienced early closures during the last three quarters in 1999 and 2000. In fact, in Quarters 3 and 4 of 2000 the quarterly allocation was harvested within one month leaving the fishery closed for the remaining two months of those quarters.

Long closures have obvious economic consequences to fishermen and processors. A market glut at the beginning of the quarter allows for a drop in prices as a large number of fish flood the market. After a short landings period, the fishery is closed and fishermen, especially those that fish primarily for black sea bass, are faced with the additional economic concerns of no or reduced income.

In addition to early closures, the quota in the first quarter was not taken in 1998, 1999, and 2000. This relates to the fact that the allocation percentages are based on historic landings during a period of time when the mesh size for summer flounder was smaller and the fishery was mixed, i.e., fishermen targeting summer flounder with 4" mesh landed significant quantities of black sea bass as bycatch from January to March. As a result of the quota system and minimum mesh sizes for summer flounder, the flounder fishery is now very direct and fewer sea bass were landed in the winter fishery in 1999 and 2000.

shut down the fishery entirely

Possible inequities have also been created by the current management system as landings have shifted to the north. In fact, preliminary data for Quarter 4 in 2000 indicate that 41% of the landings for that quarter occurred in one state, Massachusetts. A shift in abundance of black sea bass to the north may account for these higher landings. However, some fishermen have also indicated that more restrictive possession limits have favored fishing operations in the north where black sea bass are caught closer to shore.

Some states have no or little associated landings of black sea bass. As such, this amendment would also establish *de minimus* specifications under the Atlantic State Marine Fisheries Commission Interstate Fisheries Management Program Charter. *De minimus* status is granted when, under existing conditions of the stock and scope of the fishery, conservation and enforcement actions taken by an individual state would not be expected to contribute significantly to a coastwide conservation program required by an FMP or amendment. Any state that has commercial landings of less than 0.1% of the total coastwide commercial landings in the last preceding year for which data are available is eligible for *de minimus* status. The *de minimus* specifications would only apply to the commercial fishery in the event a state-by-state quota system was adopted and implemented.

This amendment would address the problem related to permit requirements for fishermen that have both a Northeast Black Sea Bass Permit and a Southeast Snapper/Grouper Permit and fish for black sea bass north and south of Cape Hatteras, NC. Current regulations restrict fishermen with the Northeast permit from fishing south of Cape Hatteras during a northern closure unless they relinquish their permits for a period of 6 months. These fishermen have indicated that this requirement is unnecessarily burdensome given the fact that only a few fishermen have both permits and the reporting system in North Carolina can accurately track landings north and south of Cape Hatteras.

stop practice of wet traps

This amendment also addresses the problems related to the wet storage of black sea bass pots/traps. Wet storage is a practice where commercial black sea bass pot/trap fishermen allow their pots/traps to remain in the water during periods when the black sea bass fishery is closed. This practice allows the pots to continue to attract and capture fish. When the fishery is closed, these fish cannot be landed and fish die in the pots/traps.

This amendment would also limit the number of pots/traps and implement a pot/trap tagging program to reduce effort in the black sea bass fishery. The Council and Commission are concerned that pot fishermen have continued to fish with a large number of pots even though their landings are controlled by possession (landing) limits. This level of effort may be associated with an increased level of discards and mortality of black sea bass that die in traps before they can be harvested.

Amendment 12 to the FMP was partially approved on April 28, 1999. The disapproved portions included sections related to the potential impacts of fishing gear on summer flounder, scup, and black sea bass EFH. Pursuant to Section 303(a)(7) of the Magnuson-Stevens Act, the Councils shall minimize to the extent practicable adverse effects on EFH caused by fishing. Additionally, 50 CFR part 600.815 (a)(3) states that the Councils must act to prevent, mitigate, or minimize adverse effects from fishing, to the extent practicable, if there is evidence that a fishing practice is having an identifiable adverse effect on EFH. In addition, management alternatives that could be used to prevent, mitigate or minimize adverse effects from fishing are described below. Section 600.815 (a)(4) states that, fishery management options may include, but are not limited to: (i) fishing equipment restrictions, (ii) time/area closures, and (iii) harvest limits.

What Is the Process?

This amendment was prepared under both the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1976, as amended by the Sustainable Fisheries Act of 1996 (SFA), and the Atlantic Coastal Fisheries Cooperative Management Act of 1993 (ACFCMA). The MSFCMA requires that the management measures proposed in an FMP be consistent with ten National Standards for fishery conservation and management. Under ACFCMA, if a state does not implement management measures required by an FMP or amendment, the federal government may impose a moratorium on the landing of the species covered by the FMP in that state.

Black sea bass allocation by period and region (second period allocation) –hybrid allocation system.

Period	% allocation based on 1988 to 1997 landings	% allocation based on 1993 to 1997 landings
January-April	45.23% coastwide	43.32% coastwide
May-December	54.77% Regional	56.68% Regional

Assuming a hypothetical[1] commercial quota of 3,024,742 (lbs)

January-April	1,368,091 lbs	1,310,318 lbs
May-December	1,656,651 lbs	1,714,424 lbs

Allocating the May-December quota component to regions based on 1988-1997 landings, and 1993-1997 landings would yield the following regional allocations:

Region	% Years 1988-1997	lbs	% Years 1993-1997	lbs
North	16.56%	274,278	14.92%	255,865
South	83.44%	1,382,373	85.08%	1,458,559
Total	100.00%	1,656,651	100.00%	1,714,424

[1]This is the same commercial quota level that has been in place since the implementation of Amendment 9.

Alternative 8

An allocation system by gear type

8a

Quota allocation by gear type based on 1988-1997 landings data

Under this alternative, the quota would be allocated by gear type based on 1988-1997 landings data. The percentages by gear type would range from 0.40% for gill nets to 45.82% for bottom/mid water trawl gear.

To allow for equitable distribution of landings to the northern and southern contingents of the fishery, further allocations may be required by period. Specifically, trawl allocations would further divided into two periods - January through April and May through December. Possession limits would be implemented for each gear type and period. Possession limits could be modified based on a recommendation of the Monitoring Committee to the Council and Commission and implementation by the Regional Administrator and the states as part of the annual specification process.

The quota would apply throughout the management unit, including both state and federal waters. All commercial landings would count toward the quota for each respective gear types. Any landings in excess of the quota that occurred for any gear type would be subtracted from the following year's quota for that gear type.

This alternative was considered because it recognizes that different gear types are used in the black sea bass fishery over the year. Bottom/mid water trawls, pot/traps, and hook and line were the major gear

Black sea bass allocation by period and region (second period allocation) –hybrid allocation system.

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This alternative was considered because it recognizes that different gear types are used in the black sea bass fishery over the year. Bottom/mid water trawls, pot/traps, and hook and line were the major gear

Trawl allocation should be dropped entirely types used to land black sea bass from 1988 to 1997. Allocating the quota to the different gear types and tailoring management measures to the specific needs of each fishery may work to distribute landings equitably throughout the year. As such, overharvesting the quota or harvesting the quota too quickly may be avoided.

8b An allocation system by gear type based on 1993-1997 landings data

The same as alternative 8a except the base years used in the allocation formula would be 1993-1997.

Black sea bass landings (percentage) by gear type, Maine to Cape Hatteras, North Carolina, for various time periods

Gear Type	88-97	93-97	00
NO — Bottom/Midwater trawls	45.82%	45.51%	29.88%
CUT — Pot/Traps	44.72%	43.14%	48.82%
NO — Gill Nets	0.40%	0.65%	1.56%
ok — Lines	7.75%	8.37%	13.67%
Other	1.31%	2.33%	6.07%

Alternative 9 Modify the permit requirements for fishermen that have both a Northeast Black Sea Bass commercial permit and a Southeast Snapper/Grouper permit

9a Status Quo

Current regulations restrict fishermen with a Northeast Black Sea Bass commercial permit from fishing south of Cape Hatteras during a northern closure unless they relinquish their permit for a period of 6 months.

This alternative is required by the National Environmental Policy Act (NEPA). It is the "standard" or base to what the other proposed alternatives are compared to for the biological, economic, and social impact analyses.

9b Remove the permit requirement that restricts fishermen from using a Southeast Snapper/Grouper permit during a northern closure

This alternative would remove the regulation that requires a fisherman with a Northeast Black Sea Bass permit surrender that permit for 6 months if they want to catch and land black sea bass south of Cape Hatteras during a northern closure.

Fishermen (located in Virginia and North Carolina) indicate that this restriction creates undue hardship on fishermen that possess both permits. These fishermen are fishing on two different stocks of fish, therefore the current regulations have no apparent benefit to the stock.

Alternative 10 Prohibit the wet storage of black sea bass pots/traps during a closure

10a Status Quo

This alternative is the status quo alternative. Under the current system, commercial black sea bass pot/trap fishermen allow their pots/traps to remain in the water during periods when the black sea bass fishery is closed.

This alternative is required by the National Environmental Policy Act (NEPA). It is the "standard" or base to what the other proposed alternatives are compared to for the biological, economic, and social impact analyses.

prohibit wet storage causing fish mortality

They they have too many

10b **Prohibit the wet storage of black sea bass pots/traps during a closure of longer than two weeks**

They should be removed for 1 day!!

This alternative would require that fishermen remove all black sea bass pots and traps from state and federal waters when the fishery is closed for more than two weeks (14 days). Fishermen will have no more than 10 days, from the starting date of the closure, to remove their pots and traps. Fishermen will not be allowed to deploy pots and traps until the first day of the following open period.

This alternative is included because it is a common practice during a closure is to allow pots/traps to continue to fish. As such, black sea bass and other species caught in the traps either die in the traps or are harvested at the beginning of the following quarter. This can result in harvesting the next quarter's quota very quickly. A two week closure was chosen to satisfy NEPA requirements by including a range of alternatives on a management option. A closure of less than two weeks may be impracticable, i.e., it may take more than two weeks to lift all the pots/traps that an individual fisherman has set in the ocean.

10c **Prohibit the wet storage of black sea bass pots/traps during a closure of longer than four weeks**

closed for 2 days remove that hour

This alternative would require that fishermen remove all black sea bass pots and traps from state and federal waters when the fishery is closed for more than four weeks (28 days). Fishermen will have no more than 10 days, from the starting date of the closure, to remove their pots and traps. Fishermen will not be allowed to deploy pots and traps until the first day of the following open period.

This alternative is included because common practice during a closure is to allow pots/traps to continue to fish. As such, black sea bass and bycatch either die in the traps or fishermen are harvested at the beginning of the following quarter. This can result in harvesting the next quarter's quota very quickly. A four week closure was included to to satisfy NEPA requirements by including a range of alternatives on a management option. A closure of less than four weeks may be impracticable, i.e., it may take more than four weeks to lift all the pots/traps a fishermen has set in the ocean.

not satisfactory

Alternative 11 Initiate a black sea bass pot/trap tag program

11a Status Quo

any trap pot BE MUST TAGGED with owner info

This alternative is the status quo alternative. Under the current system, black sea bass pot/trap tags would not be required.

This alternative is required by the National Environmental Policy Act (NEPA). It is the "standard" or base to what the other proposed alternatives are compared to for the biological, economic, and social impact analyses.

11b **Trap tag requirements for federal permit holder fishing with black sea bass pots/traps**

This alternative would require that any black sea bass pot or trap fished must have a valid black sea bass pot/trap tag permanently attached to the trap bridge or central cross-member. A black sea bass trap is defined as any pot or trap gear that is capable of catching black sea bass. Black sea bass pot/trap tags would be purchased from the NMFS Northeast Region Permit Office.

This alternative is included because a tag program would be necessary to implement a program to limit the number of pots/traps used by fishermen. This alternative would also allow for an accurate count of the number of pots/traps used by fishermen.

Alternative 12 Restrict the number of pots and traps used by fishermen

12a Status Quo

There should be a limit of 20

This alternative is the status quo alternative. Under the current system, there is no limit to the number of black sea bass pots and traps that federal permit holders are allowed to fish with, deploy, possess in, or haul back from state or federal waters.

This alternative is required by the National Environmental Policy Act (NEPA). It is the "standard" or base to what the other proposed alternatives are compared to for the biological, economic, and social impact analyses.

12b Restrict fishermen to no more than 400 black sea bass pots or traps

This is much too much

Under this alternative federal permit holders may not fish with, deploy, possess in, or haul back from state or federal waters, more than 400 black sea bass pots or traps. A black sea bass trap is defined as any pot or trap gear that is capable of catching black sea bass.

This program could be implemented in conjunction with the black sea bass pot/trap tag program. In any fishing year, each permit holder would be authorized to purchase a set number of tags, up to a maximum of 400 pot/trap tags.

This alternative is being proposed to limit the number of pots/traps used by fishermen. There is currently no such effort control and the number of pots/traps used by fishermen is unknown.

400 too many

12c Restrict fishermen to no more than 800 black sea bass pots or traps

Under this alternative federal permit holders may not fish with, deploy, possess in, or haul back from state or federal waters, more than 800 black sea bass pots or traps. A black sea bass trap is defined as any pot or trap gear that is capable of catching black sea bass.

much too much

This program could be implemented in conjunction with the black sea bass pot/trap tag program. In any fishing year, each permit holder would be authorized to purchase a set number of tags, up to a maximum of 800 pot/trap tags.

This alternative is being proposed to limit the number of pots/traps used by fishermen. There is currently no such effort control and the number of pots/traps used is unknown.

Black Sea Bass Commercial Management Alternatives Considered but Rejected for Further Analysis

An allocation of quota to three subregions

An F-based management system

An individual allocation of effort or quota

Days-at-Sea (DAS) option, based on separate permit categories and defined possession limits

Individual quotas (IQ) based on historic performance

Harvest Cooperative Sector Allocation

The use of base years before 1988 and/or after 1997 for allocation formulas

EFH Alternatives for Summer Flounder, Scup, and Black Sea Bass

SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS EFH ALTERNATIVES

OUTLAW TRAWLS

Options available to the Council to minimize impacts of fishing gear on essential fish habitat include, but are not limited to: 1) area and/or seasonal closures, 2) specific gear modifications/restrictions, and 3) harvest limits. Management alternatives that could be used to prevent, mitigate or minimize adverse effects from fishing are described below and are analyzed for biological, economic, and social impacts to the environment. In addition, several alternatives were considered by the Council but were rejected for further analysis and are described below.

EFH Alternative 1

Current management measures (Status Quo)

This is the "No Action Alternative." It would result in no additional management measures to minimize the effects of fishing on EFH.

This alternative is required by the National Environmental Policy Act (NEPA). It is the "standard" or base to what the other proposed alternatives are compared to for the biological, economic, and social impact analyses. The Council has implemented many regulations that have indirectly acted to reduce fishing gear impacts on EFH. These include many of the current regulations which have restricted fishing effort to achieve the target mortalities implemented by the rebuilding schedules in the FMPs. Such regulations include restrictive harvest limits, gear restricted areas, and restriction on the size of roller rig gear to 18" rollers for scup and black sea bass.

Currently, there are 32 stocks managed by NEFMC, MAFMC, and SAFMC in the Atlantic Ocean that are designated as overfished (NMFS 1998). These designations have resulted in a reduction of fishing effort from Maine through Florida. A reduction of effort due to decreased target mortalities in an FMP translates into a decrease in gear impacts on habitat throughout the western Atlantic ocean. Additionally, the majority of habitat in the Mid-Atlantic region is dynamic sandy bottom. Current research shows that bottom tending mobile gear has a short-term impact on this type of habitat. As such, further EFH regulations may not be necessary at this time.

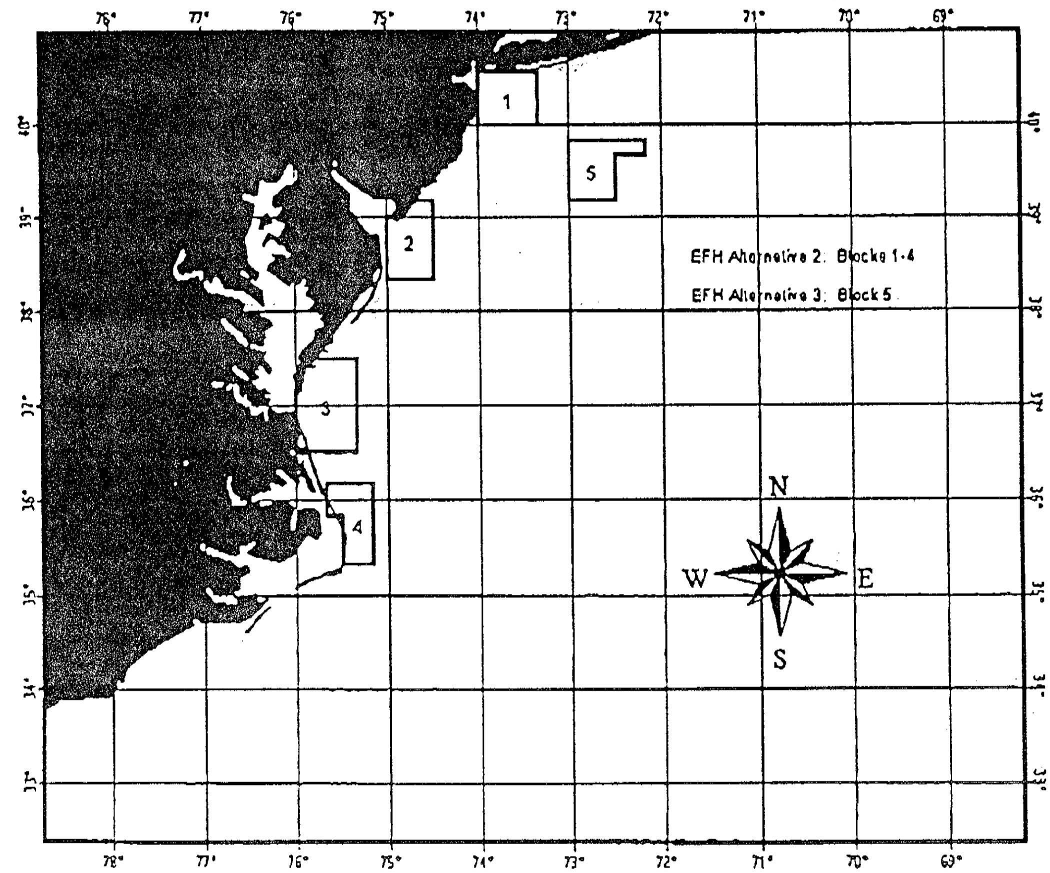
EFH Alternative 2

Prohibit bottom tending mobile gear from the nearshore areas surrounding the estuaries

Alternative 2 would prohibit fishermen from using bottom tending mobile gear in the nearshore areas of Albemarle Sound, Chesapeake Bay, Delaware Bay, and New York Harbor. Bottom tending mobile gear in these areas include: bottom otter trawls, clam dredges, and scallop dredges.

This alternative was included because these estuaries are important nursery areas and EFH for summer flounder, scup, and black sea bass. Additionally, the closed areas include important summer flounder spawning habitat, and are areas where all three species congregate in warmer months. Many states currently restrict trawling in estuaries. This alternative would extend the restriction from the 3-mile line to offshore areas. In addition, this alternative includes reef areas and structured habitat in federal waters, which are considered EFH for scup and black sea bass, thus complementing the Special Management Zone (SMZ) program.

It was suggested by the EFH Steering Committee that the Council consider implementing a SMZ as an alternative to protect habitat. Amendment 9 established a process that allows the Council to develop management measures to control fishing on specific artificial reefs on a case by case basis. The intent of the SMZ program, as stated in Amendment 9, is to protect artificial reefs from: "a) entanglement of other boating and fishing gear: b) entanglement in reef structure ('ghost gear'); and c) damage to or movement of reef structure." Structured habitat, such as reef habitat is more complex and thus more vulnerable to fishing gear. Since the implementation of Amendment 9, no specific SMZs have been established. Because SMZs were established to protect a user group's right to a particular structure (e.g., recreational fishermen) it is currently impractical to establish SMZs as a mechanism to protect habitat.



EFH Alternative 3

Prohibit bottom tending mobile gear in the area surrounding the head of the Hudson Canyon

Alternative 3 would prohibit fishermen from using bottom tending mobile gear in area surrounding the head of the Hudson Canyon, between the 200-foot and 500-foot isobaths. Bottom tending mobile gear in these areas include: bottom otter trawls, clam dredges, and scallop dredges.

This alternative was included for public consideration because this is an area that has been identified as an important overwintering area for summer flounder, scup, and black sea bass in NRDC (2001). A portion of the proposed closed area has been identified as tilefish EFH and tilefish burrows may be vulnerable to mobile gear. As such, a potential benefit associated with closing this area would be the impact on tilefish.

should be prohibited all bottom trawls should be prohibited

EFH Alternative 4

Roller rig and rock hopper gear restrictions

Alternative 4 would restrict the size or prohibit the use of roller rig and rock hopper gear in the EEZ, from Maine through North Carolina. Alternatives for roller rig gear would include 8", 12", or 18" for maximum roller size, or a complete prohibition of roller rig gear. Alternatives for rock hopper gear include 8", 12", 18", or 22" for maximum roller and rubber disk size, or a complete prohibition of rock hopper gear. Specific regulations would prohibit the use of this gear or the use of roller rigs or rock hoppers with rollers and disks larger than the maximum size.

The summer flounder, scup, and black sea bass FMP currently restricts vessels issued moratorium permit for scup and/or black sea bass from using roller rig trawl gear equipped with rollers greater than 18" diameters. As such, a restriction on the diameter of rock hopper gear is reasonable as well. An 18" diameter corresponded to the maximum roller diameter limitation imposed by the states of Massachusetts and North Carolina to regulate this gear in state waters. In the Gulf of Maine rock hopper gear is restricted to a maximum 12" diameter. Information is needed on the size of rollers that are currently used, the habitat types in which they are used, and the extent of the use.

ban roller rig + hopper gear

This alternative is included because limitations on roller size will make some areas of the ocean inaccessible to trawls by preventing fishermen from trawling in the harder, rough bottom areas. As a result, habitat in these areas would be protected. However, information is lacking as to the relationship between roller diameter and the size of the habitat obstruction that it can clear. In general, 10" to 12" diameter rollers can be used for fishing over rough bottom that includes ledges and cliffs (MAFMC 1996).

Roller diameter also correlates with vessel size and the ability of vessels to fish rough, hard bottom areas. Larger roller sizes require larger engine sizes to pull the net. An engine size with an associated horsepower of 800-900 hp is required to tow a net with 18" to 24" rollers, whereas 10" to 12" rollers can be pulled by a boat using a 175 to 200 hp engine (D. Simpson pers. comm.).

EFH Alternative 5

Prohibit street-sweeper gear

Alternative 5 would prohibit fishermen from using street-sweeper gear in the EEZ. Street-sweeper gear is a newly developed trawl gear that is constructed of a series of rubber disc spacers and bristle brushes, as found in actual street sweepers. The distinguishing component of this sweep is the brushes made of stiff bristles mounted on a cylinder core. The brush cylinders are up to 31" in diameter and have smaller diameter rubber disc(s) placed between them. The discs are strung on a cable or chain and aligned in series forming the sweep of the trawl net.

This alternative is included because it may afford additional protection to structured habitat. Structured habitat is more complex and thus more vulnerable to fishing gear. Preliminary evidence suggests that this prohibition will make some areas of the ocean inaccessible to trawls by preventing fishermen from trawling in the harder, rough bottom areas.

Additionally, the New England Fishery Management Council prohibited street sweeper gear as a precautionary measure. They prohibited this type of gear because they received testimony from the public that this gear was more effective at catching flat fish than a typical trawl. Prohibiting this gear would make regulations consistent along the coast.

More information needs to be collected on the relative use of this gear and its effect on habitat. There is the possibility that this gear is not currently in use, thus the implementation of this alternative may not result in any benefit to EFH.

EFH Alternatives Considered but Rejected for Further Analysis

Prohibit all bottom tending mobile gear — yes

Prohibit bottom tending mobile gear from the nearshore corridor (from Long Island Sound, New York extending south to Cape Fear, North Carolina) from the shore extending to 22 miles offshore. — yes

Prohibit the use of bottom tending mobile gear in submerged aquatic vegetation (SAV) beds (summer flounder habitat area of particular concern [HAPC]) — yes

Require a reduction in fishing effort to minimize impact on bottom habitats — yes

Prohibit bottom tending mobile gear from summer flounder, scup, and black sea bass offshore overwintering areas, from Lydonia Canyon east of Cape Cod, MA to Cape Hatteras, NC between the 200-foot to 500-foot isobaths. yes

Modify otter trawl footrope to raise the net off the bottom, using a 42 inch long chain connecting the sweep to the footrope, which results in the trawl fishing about 18-24 inches above the bottom — yes

Prohibit trawling in estuaries — yes

Biological, Economic and Social Impacts of Alternatives

The draft amendment/EIS document contains a complete analysis of the effects of each alternative on the environment. These analyses include, biological impacts, economic impacts, social and community impacts, effects on marine mammals, sea turtles, and sea birds and effects on essential fish habitat.

There will be impacts from the black sea bass commercial management measures and EFH alternatives proposed in this amendment. However, none of the proposed commercial management alternatives would change the manner in which the annual black sea bass quota is derived. Therefore, a change in the overall amount of black sea bass landings is not anticipated. The bulk of the commercial management alternatives deal with quota allocations across time and/or space. These proposed actions could result in a higher probability of achieving the target exploitation or mortality rate and should result in a more rapid rebuilding of the stock with the associated positive long-term impact of a sustainable fishery.

To date, improving stock status for summer flounder, scup, and black sea bass is evidence of positive biological impacts resulting from the current management system. In addition, the Council has implemented many regulations, that have indirectly acted to reduce fishing gear impacts on EFH. Cumulatively, many of the current regulations have restricted fishing effort and thus reduced gear impact on bottom habitat. Such regulations include restrictive harvest limits, gear restricted areas, and restriction on roller rig gear to 18" for scup and black sea bass. These measures helped to improve the status of the stocks while conserving marine habitat. The addition of any specific EFH actions could add protection to the physical aspects of the environment. Some of the EFH alternatives will result in economic losses, although these losses may be offset by benefits to the stock by protecting habitat. However, it may be impracticable to implement a habitat protection alternative that has costs to the fishing industry for some unknown or unquantified habitat benefit.

All FMP actions are implemented for the purpose of meeting the requirements of the Magnuson-Stevens Fishery Conservation and Management Act as amended by the Sustainable Fisheries Act. The human aspect of the environment are protected under National Standard 8 (ports and communities) and National Standard 10 (safety at sea). The biological aspects of the environment are protected under National Standard 1 (overfishing definition) and National Standard 9 (bycatch), and the Marine Mammal Protection Act. The physical aspects of the environment are protected under the EFH requirements of the Magnuson Act.

The proposed alternatives and their effects are fully detailed in the draft amendment/EIS document. If you wish to obtain a copy of the complete document, you may contact the Council office at 302-674-2331.

If we want truly sustainable - we need to cut back the commercial fishermen 800% + NOW!

JAMES E DAWSON

3008 Ridge RD
CHINCOTEAGUE ISLAND VA 23336

Phone 757-336-6590

March 18, 2002

Dear council members,

I recently sent out a letter addressing the concerns of small vessel exemptions when upgrading a vessel less than or equal to 30 feet. I have on file a document that was originally sent out for public comment several years ago for both New England and Mid Atlantic councils. In this literature it read that the ultimate goal was to remain consistent among the fisheries up and down the coast. Today we have an inconsistency within the system!

My objective is to solve a problem **without** creating more problems. My last letter did not touch on how this was possible, so here is what I see as was stated in a part of Amendment 13. Amendment 13 had a particular section that pertained to license classification. I believe that this would be a great solution to ***ANY*** problem concerning upgrading. As with other fisheries, **it would be a very simple thing to classify a license according to a particular vessels catch history.** Only those vessels that would have a **"class A"** permit would qualify for a potential vessel upgrade without regards to horsepower and size. " Class A" as in the Sea Bass Amendment 13 would therefore limit the qualifications to 52 vessels instead of the entire 1838 permitted vessels as stated on page 292. Hold capacity would also not be a concern as this upgrading procedure should ***ONLY*** be implemented when a particular species is regulated such as Sea Bass where you have ***QUOTA'S AND TRIP LIMITS*** in place. These particular trip limits are now so low that even the smallest of vessels could land them. **The issue now becomes one of safety!** No one should have a right to argue this case with exception to those of us who are out there every day and are classified as **"full time fisherman"**

It does not seem right to tell a full time fisherman that he has to keep that same old boat forever! It has been done for multispecies and I believe with certain set standards, it should be made uniform throughout the coast. Classifying license types is a good thing and can be done very simply by NMFS data base with regards to mandatory reporting. Starting in 1997all vessels became federally regulated fishing in the EEZ. Classification of the Sea Bass license therefore should start beginning 1997 unless that vessel was mandatory reporting before that date. Criteria should be as stated in Amendment 13 "class A" permit holders who have averaged over 10,000 pounds of Sea Bass landings per year for a three year period.

With quota's and trip limits set, what impact does it make other than an unsafe condition for the fisherman! If we go to ITQ, again, what impact would a vessel upgrade have? Many changes and advances have been made within the fisheries to eliminate the possibility of overfishing by anyone. These rules and regulations were made in an effort to reduce effort. The question to you all from me and many others is "what good do these rules do today?" Do they apply for the same reasons anymore? I am tired of being held to such a small vessel in a huge ocean because I started fishing when I came out of high school and could afford nothing else. I have almost come close to capsizing several times in that period due to the stinking weatherman being wrong! Safety is what I wish to be the issue here, so please look seriously at what I have stated.

THANK YOU,
JIM DAWSON

F. V. Ella
7605 Worcester Hwy.
Newark, MD 21841-2161

3/20/02

Amendment 13 comment

We prefere alternative 3a, allocation by permit catagory. This would allocate the most quota to the people who, untill recently, made a living from sea bass fishing. No other alternative does this. 3a is overwhelmingly favored by Maryland fishermen.

Under 3a, the quota could further be allocated by gear type, alternative 8a, which would stop the unfair competition between gear types. Trip reports could determine whether a fisherman was a handliner or a potter.

3a prepares for future allocation by individual quotas, which would solve the problems of closures, overages, trip limits, etc., that have plagued the current system.

We are opposed to alternative 5, state by state quotas. Instead of solving problems, this would creat more. Besides the confusion of different state regulations for the many fishermen who land in more than one state, it restricts fishermen from landing or moving from state to state, creats dealer monopolies and makes it difficult to sell a boat.

Captain Tom Smith has landed sea bass in Maryland for 29 years. Last year, he landed sea bass in Virginia and Maryland. He owns property in both states and rents slips in both states. He would like to move to Virginia, but state quotas would, probably, prevent him from landing sea bass in Virginia. If Virginia has individual state quotas, he might not qualify for enough quota to make a living. We believe Captain Smith has the only bass pot boat between Chincoteague and Cape Charles, Virginia, an area of high unemployment and low per capita income. The economic benefit his business brings to the area would end with state quotas.

Many boats are bought in one state to use in another. There is a better market for a boat that can land coast wide, than one that can only land in one state.

The only person at the Maryland hearing to speak in favor of state quotas was a Virginian, who had bought a boat originally from New Jersey. He would be in for an unpleasant surprise if he got state quotas, since his boat has no Virginia landings. Many fishermen who think they want state quotas have no idea how restrictive they are, nor do they understand the loop holes that allow the Commission to adjust landings and revise shares.

In Maryland, fisheries management has become consumed with conflict. If Maryland handled sea bass like it has rockfish, shad, trout and horseshoe crab, no one would make a living sea bass fishing.

State quotas alone would not address the problem of excessive numbers of permits. State quotas combined with 3a would give Maryland fishermen less quota than 3a alone.

Many Delaware and Maryland fishermen catch fish closer to Virginia, than Maryland ; they should be allowed to land in both states, creating competition between dealers. Delaware does not have a sea bass dealer and commercial dockage is limited. One man has landed most of Delaware's sea bass, but he has quit due to regulations. What happens to Delaware's quota?

A fisherman should be allowed to take his landings history with him, from state to state. Sea bass are, primarily, caught in federal waters and should stay under federal management. There are commercial fishermen on the Council, but no state manager is a commercial fisherman.

We prefere status quo for alternative 10, wet storage of pots. The reports of dead fish in pots are exagerated. It takes a severe storm to kill fish in pots. Such storms also destroy pots; so most fishermen try not to have as much gear out during the storm season.

It takes 12 days of calm weather for a 35' boat to set about a thousand pots. It takes longer to bring them in, when they are wet and heavier. In bad weather, pots can not be moved at all. Fishermen would have to risk their lives to comply with 10b or 10c. The labor of stacking pots, moving anchors and weights and drying rope is incredible. This has been explained to the concil repeatedly.

Although there is no observer data in the plan to verify lost fish in pots, there is observer data that shows an incredible 54% discard rate for sea bass in the trawl fishery. Yet the Council seems to be preoccupied with the insignificant losses in the pot fishery!

We prefere status quo for alternative 11, trap tags. This creates more labor and expense for the fisherman. The pots are already permanently tagged and data on numbers of pots is on the trip reports. The pot fishermen are dieing; do you want to tag their coffins?

We are opposed to alternative 12, trap limits. Handliners, part timers and bureacrats do not know how many pots pot fishermen need to make aliving; only experienced pot fishermen know that. The human body limits the number of pots a two man captain and crew can handle. A thousand pots sounds like a lot to a bureaucrat who lifts nothing heavier in his work than Amendment 13. No one lifts 2,500 pots these days. That is an unimaginable amount for today's crewmen. Young people are not getting into this and old backs can not lift large numbers of pots. There is also the costs to consider. A thousand wire pots would cost $50,000. Rope, anchors and bouys add to the cost of a rig. There is no justification for large rigs anymore.

800 or fewer pots would destroy the full time pot fishermen. 400 or 800 pots; these numbers would be suitable to the millionaire hobbiest or the handliner, not people who make a living pot fishing.

Pot fishing is not destructive to habitat in the Mid-Atlantic. Juvenile fish escape uninjured from vents and grates. It is the most resource friendly method of sea bass fishing, yet the Council has created such hardships for the pot fishermen, many are going out of business. State quotas, pot limits, pot tags, removing gear during closures, would be more hardship on these fishermen, who have only accounted for about 23% of all sea bass landings, recreational and commercial since 1988.

The fishermen did not create the closure problem, the Council did when it allowed people who had never participated in the fishery to obtain permits. The only alternative that definately addresses that problem of excessive permits is alternative 3a, allocation by permit catagory. Any fisherman who has not landed atleast 10,000 pounds of sea bass per year for three years is not a full time sea bass fisherman.

Sincerely,

Beverly R. Lynch

Edward T. Smith

Chair

3/22/02

97 Ray Street
Fall River, MA 02720
March 20,2002

Dear Sir,

In regards to the seabass issue in Massachusetts, I would like to say that I feel very strongly that a state by state quota would be grossly unfair.

Why should MA be penalized for catching only 19-24% of the quota? That's so unfair!

If MA had a 10-11" size limit over the past several years, our numbers would be much greater. Another reason for the low numbers would be that the scup fishery was thriving, and many guys were fishing that. Others were lobstering. Numbers should be based on current landings and statistics. I also find it ironic that we can catch our quota in such a short period, even with weekly pound limits. That tells me that there is an abundance of fish, as I'm sure any rod and reeler will agree.

I only fish 80 traps on the average in the fall, and catch 1200-2000 pounds after three days set. If the fish don't look 12" they're over the side. On that note, the size limit should also be increased to 14" throughout and let the small fish grow up.

MA has always been the leader in conservation of seabass, as I'm sure you're aware, as is the Council.

The correct way to manage the fishery is consistency up and down the coast. Same amount of traps, same size limit (14"0, and night closures. Do this, and you won't have to manage the fishery because there will be plenty of fish. I personally feel the fishery is doing well.

Stephen J. Pertinha

Date : 21MAR2002

To : Daniel T. Furlong
Executive Director
Rm. 2115, Federal Bldg.
300 S. New Street
Dover, DE 19904

From : Edgar S. Palmer
Hot Seat Tickets
2647 Haddonfield Rd.
Pennsauken, NJ 08110
(856) 665-3669

Subj. : Amendment 13 to Summer Flounder, Scup, and Sea Bass Fishery Mgmt. Plan

Dear Mr. Furlong:

As a sport fisherman with a strong interest in conserving our natural resources, I am again voicing my concerns on these matters.

I strongly believe that, in order to restore the populations of the fish in question, it is imperative that both recreational and commercial fisherman be subject to the same restrictions. Not only will this be of direct benefit to the fish themselves, but both the Council and the Commission will be able to more easily monitor regulatory compliance, thus better ensuring that the measures taken to protect these these fish are effectual.

In particular, I offer the following suggestions for your consideration:

1) Fishing for these fish during their spawning seasons *must* be banned. Without this restriction, there is no assurance that the minimum breeding population required for the survival of the species will continue to exist.

2) Both recreational and commercial fishermen should be restricted to using Rod and Reel only. The use of *all* "commercial" gear, e.g. Trawls, Pots/Traps, Gill Nets, Roller Rigs, Rock Hoppers, Long Lines, etc. should be *banned*. These fish are *endangered* to the extent that drastic measures are required if we are to save them. This will allow for for more accurate monitering of commercial catches, will reduce the ancillary harvesting of other species, and greatly reduce the destruction of habitat that some of the commercial gear presently causes.

This will of course require an increase in the number of people employed by commercial fisherman, to the benefit of the local economies. Any resulting decrease in demand for said fish, owing to the increased market price for such, will accrue to the benefit of the fish populations.

3) Both recreational and commercial fishermen should be subject to the same minimum size requirments:

a) Fluke 18 in..
b) Scup 10 in..
c) Sea Bass no minimum size. (These fish are fatally wounded when lifted from the depths at which they live, and will not survive even if returned to the water.)

4) Recreational daily quotas should be:

a) Fluke 10
b) Scup 30
c) Bass 25

5) Commercial fishermen should be subject to per-trip landing limits. These limits should be adjusted annually based on the subject fish populations.

While these measures may to some seem to be too burdensome, such are required if we are to ensure the long term survival of these species. Without them, neither the recreational nor the commercial fishermen can expect to continue to be able to fish for them. It would be better for all if all parties, the recreational and commercial fishermen, along with those responsible for regulating fishing, were to unite in working toward a common goal, namely that of helping these fish to survive for the long term

I strongly urge you to give these suggestions full consideration.

Sincerely,

Edgar S. Palmer

837 Hathaway Road
New Bedford, Massachusetts 02740
March 26, 2002

Mr. Daniel T. Furlong
Executive Director
Mid-Atlantic Fisheries Council
Room 2115 Federal Building
300 S. New Street
Dover, Delaware 19904

Dear Mr. Furlong:

This is an Amendment 13 Public Comment. I am the holder of a Massachusetts "Small Boat" commercial permit with a Black Sea Bass hook and line endorsement. I would like to be recorded in favor of Alternative 2b to the subject Amendment 13 with the following added modification: change the base years for the allocation formula to 1998 through 2001.

Massachusetts Sea Bass fishermen have been participating in a conservation-oriented Sea Bass fishery in this state for over the past ten years. We have had to endure a twelve inch minimum size limit and a trap reduction down to 200 traps per permit holder. In addition, there is a moratorium on the issuance of new pot permits in this state. I would love to have one for myself, but I can't have one due to the moratorium. I have to settle for what I can catch on hook and line. Exclusion of some citizens in favor of others from a public resource like this really discriminatory, but it was steps like this that were necessary to preserve the fishery in Massachusetts. Until recently, the Massachusetts Sea Bass conservation measures have put Massachusetts fishermen at a distinct disadvantage over those from more southern Atlantic sea board states. In the past few years, however, they have begun to pay dividends. Southern states involved in this fishery, which have not had a twelve inch minimum size limit and allow an unlimited number of traps, now find that they are at a disadvantage and want you to change the rules favoring them over Massachusetts. That is exactly what a state by state quota would do. Please leave the quarterly quota system currently in effect in place, and do not penalize Massachusetts fishermen for their efforts in restoring that fishery in their waters. Your efforts would be better directed at getting the southern states to follow Massachusetts lead and adopt a sensible conservation plan for themselves. No pain – no gain! Thank you for your consideration in this matter.

Sincerely,
Paul L. Tomasik
Paul L. Tomasik

RECEIVED
MAR 28 2002
MID-ATLANTIC FISHERY COUNCIL

March 25, 2002

I have been a commercial black sea bass pot fisherman from Massachusetts for 15 years, and these are my thoughts regarding amendment 13.

Allocation: alternative 3A seems to be the fairest and most inclusive, easiest to figure out and enforce. All the alternatives appear to be based on some form of landing history,3A is the only one that considers the participants of that history.3a recognizes fishermen that followed the rules and regulations. A similar system has worked for sea scallops.

9B seem like common sense to me.

10 B a closure longer than 2 weeks would lead to waste of fish

11B tags are extra effort, they do make guys think twice about breaking the law

12B 400 traps are plenty

EFH #2 would be the easiest to enforce.

Joseph Smith
F/V Alison Lee
Edgartown Mass02539
508 627 4280

RECEIVED
MAR 29 2002
MID-ATLANTIC FISHERY COUNCIL

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE DEPARTMENT
STATE HOUSE • BOSTON 02133
(617) 727-3600

JANE SWIFT
GOVERNOR

September 13, 2001

The Honorable Donald L. Evans
Secretary of Commerce
U.S. Department of Commerce
Office of the Secretary, Room 5854
14th & Constitution Avenue, N.W.
Washington, D.C. 20230

Dear Secretary Evans:

I am writing to ask you to give special attention to development of the next amendment to the Black Sea Bass Fishery Management Plan. Although not as prestigious as striped bass that is a mainstay of recreational fisheries in the Commonwealth, black sea bass is abundant in our waters and supports valuable commercial and recreational fisheries in southeastern Massachusetts.

For this reason, I ask you not to support the adoption of any plan to allocate a small portion of the black sea bass commercial quota to Massachusetts without regard to the Commonwealth's many years of strong conservation measures for sea bass. Potentially, the next amendment would reward many states, especially those in the mid-Atlantic region, for their many years of overfishing sea bass by giving them large percent allocations based on high landings of bass, including juvenile fish. Unlike Massachusetts, those states never adopted strategies and regulations designed for sea bass conservation.

I find this approach advocated by the Mid-Atlantic Council to be harmful to the cooperative spirit required of Massachusetts to make the Mid-Atlantic Council's and the Atlantic States Marine Fisheries Commission's (ASMFC) management of migratory sea bass effective. Legitimate concerns of important fisheries management partners should be taken seriously; otherwise, conflict will occur to the detriment of the entire fisheries management process.

The Commonwealth's Division of Marine Fisheries (DMF) already has made our concerns known to the Mid-Atlantic Council. Working with the Massachusetts Marine Fisheries Commission, DMF has an outstanding record of black sea bass conservation reaching back to 1986 when a 12" minimum size was adopted. Elsewhere, with little if any protection afforded, the result has been an overfished resource and continued overfishing with Massachusetts recreational and commercial fishermen suffering the consequences of a depleted stock and low catches.

I am particularly concerned that this next amendment does not address sea bass overfishing. It is an amendment only for allocation purposes that permanently disadvantages the Commonwealth.

I hope you agree that whatever amendment the Mid-Atlantic Council develops, and complementary approach that ASMFC eventually adopts, it must deal with continued overfishing first. In a recent letter to DMF's Director, Paul Diodati, Council Executive Director Dan Furlong acknowledged that the amendment would be "complex and politically sensitive." His characterization certainly was correct, but it should not be if improved black sea bass conservation is the real objective.

Please feel free to call Robert Durand, Secretary of the Massachusetts Executive Office of Environmental Affairs, at (617) 626-1100, if you have any questions or concerns.

Sincerely,

Jane Swift

cc: Senator Edward Kennedy
Senator John Kerry
Congressman Barney Frank
Congressman William Delahunt

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

I AM AGAINST ALTERNATIVES 3a, 3b, 3c and 3d BECAUSE

Northeast Weighout Data does not take into account different size limits and gear used historically in various parts of the country.

Northeast Weighout Data does not accurately account for fish shipped to dealers in different states or parts of a state for sale.

Northeast Weighout Data does not account for fish sold by state licensed fishermen whose landings did not have to be reported in the federal system.

Northeast Weighout Data does not account for fish sold before the advent of commercial food fish licenses.

I AM AGAINST ALTERNATIVES 4a and 4b FOR ALL THE ABOVE REASONS AND BECAUSE

Allocations along political regional boundaries do not take into account stock movement, fishing fleet movement and geological changes in fish habitat.

I AM AGAINST ALTERNATIVES 5a, 5b, 5c, 5d and 5e FOR ALL THE ABOVE REASONS AND BECAUSE

State-by-state quotas are not based on fishing history. They are based on state-by-state data-collection efforts.

State-by-state quotas discriminate agains individual fishermen in violation of National Standard 4 of the Magnuson Stevens Fishery Management and Conservation Act.

State-by-state quotas have proven to be a source of contention, inaccuracy and political power mongering by their use in the summer flounder fishery.

I AM AGAINST ALTERNATIVES 6a, 6b, 6c, 7a and 7b FOR ALL THE ABOVE REASONS.

I AM AGAINST EFH ALTERNATIVES 1, 2, 3, and 4 BECAUSE

"Essential Fish Habitat" for Black Seabass has not been adequately defined and proven.

Adverse Impact to the delineated areas has not been adequately defined and proven.

I AM FOR ALTERNATIVES 12b and 12c BECAUSE

I believe current maximum trip limits can be caught with 400 or fewer bass pots or traps.

There are already too many abandoned pots littering the ocean floor.

I AM FOR ALTERNATIVE 10b BECAUSE

After a two-week closure, fish in pots begin to die.

I SUPPORT a more seasonably equitable quota system that would allow for stock movement and de-emphasize historical landings because of the above reasons. I also believe different gear sectors can function more efficiently with gear-specific regulations.

NAME [signature] ADDRESS P.O. Box 1195 Montauk N.Y. 11954

DATE: 3-30-02

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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NAME Evan Duncan ADDRESS NO 4 Duryea Ave
DATE: 4/29/02 Montauk

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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Bonnie Brady

NAME: Bonnie Brady
DATE: Apr 1, 02

ADDRESS: 5 Midland Rd, ~~P.O. Box 1061~~
Montauk, NY

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

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I AM AGAINST ALTERNATIVES 4a and 4b FOR ALL THE ABOVE REASONS AND BECAUSE

Allocations along political regional boundaries do not take into account stock movement, fishing fleet movement and geological changes in fish habitat.

I AM AGAINST ALTERNATIVES 5a, 5b, 5c, 5d and 5e FOR ALL THE ABOVE REASONS AND BECAUSE

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After a two-week closure, fish in pots begin to die.

I SUPPORT a more seasonably equitable quota system that would allow for stock movement and de-emphasize historical landings because of the above reasons. I also believe different gear sectors can function more efficiently with gear-specific regulations.

NAME Peter Fagan ADDRESS POBX 443, Montauk, NY
DATE: 3/29/02

RECEIVED
APR - 3 2002

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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NAME Thomas Williams ADDRESS 6 Rhody Dr. Westerly R.I. 02891
DATE: 3/28/02

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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NAME Thomas W. Williams
DATE: 3/28/02

ADDRESS 190 Washington St
S. Kingstown, RI 02879

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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NAME [signature]
DATE: 3/26/02

ADDRESS P.O. Box [illegible]

RECEIVED
APR - 3 2002
MID-ATLANTIC FISHERY COUNCIL

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Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

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NAME Charles Weimar ADDRESS PO Box 2017 Montauk NY 11954
DATE: 3/28/02

Charles Weimar

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

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NAME ______________________ ADDRESS ______________________

DATE: ______________________

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NAME [illegible] ADDRESS 67 [illegible]
DATE: [illegible] [illegible] 1175[illegible]

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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NAME [signature] ADDRESS P.O. Box 1212
7 Washington Ave
Montauk, N.Y.

DATE: 3/26/02

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

RE: Amendment 13 Public Comment, Proposed alternatives for the black sea bass commercial fishery

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NAME Patricia Weiman ADDRESS 49 Fairlawn Dr Montauk NY 11954
DATE: 3/30/02

TO: Daniel T. Furlong, Executive Director
Room 2115 Federal Building, 300 South New Street, Dover, DE 19904

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NAME Capt. C. S. TAIT ADDRESS BOX 1285 MONTAUK NY 11954
DATE: 4/2/02

Robert Reynolds
148 Tirrells Way
S. Chatham, MA 02659

21 March 2002

Attention:

Daniel T. Furlong
Executive Director
Room 2115 Federal Building
300 S. New Street
Dover, DE 19904

Re:Amendment 13
Public Comment

After attending the public hearing in Bourne, MA on March 19th, and receiving the summary document to Ammendment 13, I have the following comments:

In order to obtain a true and accurate picture of fishing mortality and landings, regulations have to be uniform throughout the range of the resource. Differences in size, i.e. 10" in some states, 11" in others, and 12" in MA will obviously favor a larger landing in states with the smaller landing size. Number of pots fished also is a major factor in total landings for any given state. Even required escape vent size plays a role in mortality as well as wet storage.

Only by achieving uniform regulations can an accurate quota system be applied to a "state by state system." From that year forward base years would give an accurate account of landings for each state in the pot/trap fishery. A uniform mesh size and regs prohibiting street sweeper gear in EFH areas from Maine to N.C. would also give and accurate landing total state to state for mobile gear. Also included with those regs would be that no mobile gear would be fished in state waters, i.e. 3 miles seaward from any coast.

In my opinion, this is what every fishery should first be striving to achieve. Once this is done, you now have a level playing field in which to set realistic state or regional quotas.

A moratorium of licenses at the time of uniformity would also have to be imposed by all states to insure a true account of landings. The current quota system, for the above reasons, should be considered capricious and arbitrary with no real science involved in reaching those totals.

I would be remiss in choosing any alternative proposed in the Public Hearing Summary Document due to the current difference in regulatory enforcement. Even the status quo is not close to an accurate amount of sea bass landings.

Massachusetts has a 12" minimum size, a 200 trap limit, an escape vent size of 2 ¼ " square or 3.1" circular that is fastened with biodegradable fasteners. A moratorium is also in place regarding issuance of new pot/trap licenses. I am not implying that all states should necessarily meet this criteria, but Massachusetts is leading all states in conservation management of the resource.

2002 (886) total not included pot fishery
1024 drag and rod & reel (primary & secondary gear)
2001—68 pot licenses

In Massachusetts our sea bass pot fishery is not active until the 1st or 2nd week in May. We have no first quarter fishery. The 2000 2nd quarter was closed June 8th, allowing only 38 days to land fish. Of those 38 days I haulef pots 14 days and landed 3,031 pounds. June 6th and 8th being my best period with 1243 and 1129 pounds respectively. The third quarter was closed 7/26 and my days hauling were 14 with 6568 pounds landed. The fourth quarter was closed 10/26 again hauling 14 days with 5059 pounds landed. A total of 17,782 pounds was landed in 42 days of hauling. The maximum number of pots I fished that year was 180 since losing 15 pots to draggers during the course of the year. If state quotas were set for the years based on 1988-1997 or any combination of years to 1997, it could possibly put every fisherman out of business in Massachusetts.

Thank you for your time and consideration.

Robert Reynolds
Chatham, MA

Dear Sir:

I have just read the proposed plans for sea bass and immediately realized that I had better comment. I own and operate an offshore lobsterboat out of Point Judith, Rhode Island. In the fall and winter we catch sea bass as well as lobsters. We do not target bass, but they pass through my gear on their southerly migration. Generally, 500 lbs would be a large amount of sea bass for one of my weekly trips. I have probably never caught over 1000 lbs. That would have been in December when the 4^{th} quarter has always been closed.

My little history is important to know because of an important problem with one of your proposals. Offshore lobsterboats presently have an 1800 trap limit. These traps would be considered sea bass traps, and so I would guess that no offshore lobsterboats would qualify for sea bass permits. I would hope that the sea bass trap limit will not pass for this very reason. Many lobsterboats catch and land sea bass, but none of the boats up this way try to. They are in our gear and they usually die if thrown over. Naturally, the idea of removing my lobster traps from the water because they are also sea bass traps would not work well either.

Given a choice, I guess the idea of weekly or monthly quotas would be the lesser of evils. I realize that sea bass are not a major part of my income, but it all helps. I have noticed a definite increase in bass the last two years. I do not want to be shut out.

Trap caught sea bass are a high quality and therefore high priced fish. My dealer loves my fish. It would be great if I just had my own 500-1000 lb weekly limit so I could always land some. In the 4^{th} quarter of 2001, the quota was full before I caught a single fish.

I guess I just wanted you to know that I am here and I do not want to be left out. I am sure that this trap limit problem was only an oversight, and not intentionally directed at the offshore lobster fleet. Please think about it.

Thank you,

John Peabody
F/V Lady Clare
171 Legend Rock Rd
Wakefield, RI
02879-7708
(401)789-0452

Scooch Too
Joseph R. Golden, owner/operator
10343 Keyser Point Road
Ocean City, MD 21842

April 5, 2002

Daniel T. Furlong, Executive Director
Room 2115 Federal Building
300 S. New Street
Dover, DE 19904

RE: COMMENTS ON AMENDMENT 13

Dear Sir:

Alernative 3 - I like Alternatives 3a or 3b but believe entry level of 10,000 pounds is low. Traditional bass fishermen with landings in the criteria years far exceeded these numbers.

Alternative 10 - I believe with any of the quota alternatives in place and the 11-inch size limit, large closures will not happen. If any action is taken, 10c would be the best alternative.

Alternative 12 - I believe Alternative 12c would be the best alternative. I also believe that the 11-inch size limit for Black Sea Bass is going to cause a greater mortality rate for the black sea bass; especially as that in the pot or trap fishery, 9-inch fish and above blow their bladder when the traps are pulled. Discarding dead fish back is not conservation.

Very truly yours,

Joseph R. Golden

Joseph R. Golden, owner/operator

AMENDMENT 13

DEN LOVGREN
306 SUDBURY RD.
PT. PLEASANT, N.J
08742

TO MID-ATLANTIC FISHERY COUNCIL
DANIEL T. FURLONG,

I WOULD JUST LIKE TO MAKE A FEW COMMENTS ON ADMENDMENT 13, SPECIFICALLY THE SEA BASS ALLOCATIONS.

I HAVE OWNED AND OPERATED A 70 FT. DRAGGER OUT OF PT. PLEASANT, N.J. FOR THE LAST 15 YEARS CATCHING SEA BASS MOSTLY AS A BYCATCH SOMETIMES AS A DIRECT FISHERY.

I THINK THE PROPOSED ALLOCIATIONS IN ALTERNATIVE 3 ARE UNFAIR. ALLOCATING 82% OF THE QUOTA TO 52 VESSELS IN 3A OR 90% TO 102 VESSELS IN 3B ARE CONSOLIDATE THE RESOURCE TO A FEW VESSELS.

TAKING MY OWN FISHING HISTORY INTO ACCOUNT I KNOW I HAVE TWO YEARS WERE I CAUGHT OVER 10,000 POUNDS BUT I BELIEVE MY OTHER YEARS WERE BELOW 4000 POUNDS. THIS CURRENT FISHING YEAR I HAVE LANDED OVER 10,000 POUNDS, MOSTLY BECAUSE OF SPENDING A LOT OF TIME FISHING FOR SCUP. THE REBOUND OF THE SCUP FISHERY WILL LEAD TO AN INCREASE IN SEA BASS BYCATCHS. THEE'S PROPOSALS WOULD LEAD TO LARGE DISCARD PROBLEMS.

I AM IN FAVOR OF EITHER ALT. 6 OR ALT 8 WHICH I THINK ADRESSES THE GEAR DIFFERENTAL FAIRLY. YOUR LANDING FIGURES BEAR OUT THE IMPORTANT TIME FRAMES FOR MOST MAJOR GEAR TYPES.

I AM ALSO IN FAVOR OF ALT. 10B AND ALSO IN FAVOR OF SOME TYPE OF TRAP LIMITS.

THANK YOU,
DENIS LOVGREN

SFD

March 31, 2002

Eric Rodegast
Warren Doty
P.O. Box 2685
Oak Bluffs, Mass. 02557
Tel. 508-693-5868

Patricia A. Kurkul
Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, Ma. 01930-2298

Re: Amendment 13 to the Black Sea Bass, Scup, Summer Flounder Management Plan

Dear Ms. Kurkul:

Amendment 13 is now before the Mid Atlantic Fisheries Management Council and the Atlantic States Marine Fisheries Commission. This Amendment contains several changes to the present coast wide quarterly quota system for Black Sea Bass. The reason for these changes is to lessen the impact caused by short fishing seasons and long fishing closures. The Commission favors a state by state allocation based on historic landings. Since there is no provision to increase the total quota, dividing the quota between states will result in several states increasing their catch while others, most notably Massachusetts, would take a large decrease.

This proposal does not address conservation. States that would benefit from this amendment have high historical landings simply because restrictions on their fishing practices have been few to none. In the year 2001, New Jersey, Maryland, Virginia, and North Carolina, which show large landings, have only a 10-inch minimum size limit as their conservation, which was only recently enacted. In comparison, Massachusetts has had a 12-inch legal limit for fifteen years(since 1987). In addition, Massachusetts has had a moratorium on new Sea Bass pot permits since 1985. The other states do not even require a special permit. Massachusetts limited the amount of pots allowed per license to 400 in 1988, and subsequently reduced that to the present 200-pot limit. The amendment proposes a limit of 800 pots for those states without limits. That would be the first pot limit restriction ever faced by Mid Atlantic fishermen. Many of them presently fish between 1200 and1800 pots. Massachusetts also has had numerous restrictions on its dragger fleet as well, including limited entry, vessel size limit, mesh size limit, area closures, and night fishing closures.

Massachusetts took these steps in order to rebuild the fish stocks. The Massachusetts' fishermen that suffered great losses in order to conserve these stocks have been rewarded in recent years with abundant catches without lessening any of the restrictions. (Sea Bass were so plentiful last summer, recreational fishermen complained of having a hard time catching fluke, scup and even bluefish without hooking Sea Bass instead).

The proposed options for changing quota allocation in Amendment 13 contain nothing that will help to rebuild the Black Sea Bass stocks. The proposals only are there to take fish from one group and give them to another. The ASMFC has used state allocation in other fisheries and it has severely hurt Massachusetts' fisheries. Our Scup pot fishery, considered by many one of the cleanest and environmentally friendliest fisheries was reduced from a 5 month fishery in 1999 to a fishery that lasted only14 days in the year 2000. The Summer Flounder fishery took a hard hit in the late 1980's when the council favored their member states over Massachusetts with their state allocations.

The members of the Massachusetts Pot Fishermen's Association and the Martha's Vineyard Commercial Fishermen's Association are against any change in the present Sea Bass plan. The Massachusetts Division of Marine Fisheries does not support any of the proposals offered in Amendment 13 other than keeping the status quo. The Governors Office has promised its backing. Congressmen William Delahunt and Barney Frank will support Massachusetts's fisherman. Senators John Kerry and Ted Kennedy will not accept any plan which treats Massachusetts unfairly. Massachusetts Division of Marine Fisheries promises to take legal action against NMFS if Massachusetts quota is severely cut.

Everyone agrees the Sea Bass plan needs improvement but that improvement must come in the name of conservation, not allocation. Rebuilding fish stocks will result in raising quotas, which is in the common interest of all participating states. Re-allocating quota will not benefit the fish stocks at all. It will only pit one group against another, putting far-reaching strain and cost on the already stressed industry and management.

Massachusetts has led the way in conservation efforts and should be a model to other States, not a victim. Unless the Mid Atlantic States are willing to make the short term sacrifices that result from conservation restrictions we will be fighting over the same small quota for a long time. We urge you to do the right thing and not endorse any thing other than a status quo allocation in the Black Sea Bass Plan. We are asking you to help us move toward a more conservation minded policy from the Atlantic States Marine Fisheries Commission and oppose their efforts towards a biased state allocation.

We believe it is important to all concerned parties to have an open discussion with you regarding this very important development. We look forward to meeting with you at your earliest convenience to resolve this issue.

Sincerely yours,

Eric Rodegast

Warren Doty

Martha's Vineyard Commercial Fishermen's Association

Capt. Monty

From: Capt. Monty <mhawkins@siteone.net>
To: <tberger@asmfc.org>; Bob Pride <bob@ebusinc.com>; Sue Foster <sue@oysterbaytackle.com>; Steve Doctor <Mata-Fish-2@dnr.state.md.us>; Sherman B <bonefish@dmv.com>; Sally Mcgee <sally.mcgee@mail.house.gov>; Marty Gary <mlgary@dnr.state.md.us>; <mark@bigsharks.com>; Ken Lewis <klewis@bcpl.net>; <JStevenson@dnr.state.md.us>; <info@ccamd.org>; Henry <barck@erols.com>; <FishMSSA@aol.com>; <ESchwaab@dnr.state.md.us>
Sent: Sunday, April 07, 2002 10:15 PM
Subject: Comment on Amendment 13 Flounder, BSB, Scup.

This is a comment on the Public Hearing Summary Document to Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan.

Essential Fish Habitat (EFH) Alternative 1, the "No Action" alternative, states that ".. *Additionally, the majority of (benthic) habitat in the Mid-Atlantic region is sandy bottom. Current research shows that bottom tending mobile gear has a short-term impact on this type of habitat. As such, further EFH regulations may not be necessary at this time.*"

This statement demonstrates the need to protect and enhance reef-like environments in the Mid-Atlantic Bight. Clearly, the reef associated fish species have an important impact on the economies of commercial and recreational fishermen as well as their surrounding communities. Since sand represents the majority of bottom habitat, it follows that the areas of reef-like environments, such as naturally occurring hard bottom, glacial rock deposits, fossilized hard pans and manmade artificial reefs, both purposeful and accidental, must be an important component of the Mid-Atlantic's marine ecology. The fact that these areas are not prolific, in conjunction with the current and growing knowledge of damages caused by various bottom tending gears to certain of these bottom types, should lead the Council to mandate policies that prevent further damage to non-sand bottoms.

Furthermore, the Council should seek to ascertain the historical, as well as current, distribution of these areas. Only with a solid base of knowledge can the council maximize the benefits of these bottom types. These benefits would include: Greatly enhanced juvenile settlement success for filter feeders, coral, crabs vital to the food web as well as lobsters, and many species of fish; Larger areas of habitable bottom prevent the overfishing common to single site habitat (such as a well known shipwreck); Increased opportunities for dispersal of traps thereby preventing, or at least minimizing, disputes over "bottom rights"; With solid scientific data (first collected from fishermen then confirmed by scientific field work) areas of sand bottom within regions of harder substrates could be opened to bottom tending gear. Finally, the scientific work would very likely demonstrate that some areas have indeed been lost to gear impacts and mitigation strategies could then be developed.

At present, the reduction of gear impacts has been due to declining effort caused by increases in regulations. While fishermen have traditionally relied to some degree on "luck", trusting to luck in the elimination of gear impacts on important habitat hardly represents the intentions of the Magnuson-Stevens Act. Ignoring the long-term economic repercussions of the reduction of valuable benthic ecologys can not be what was envisioned by the Act either.

EFH Alternative 2. While I applaud the intentions of this alternative, that is closing the areas surrounding the mouths of bays to bottom tending gear in order to conserve habitat, I suspect that the drawbacks are numerous. Among them: An immediate increase in effort outside of these areas where there are certainly susceptible bottom types also; No protection is offered for overwintering habitat; Ignores areas well known to fishermen to be reef-like substrate; and the strong potential for lawsuits as there are certainly "clean" tows that can be made within these regions.

EFH Alternatives 4 and 5. With the knowledge at hand it makes sense to restrict trawling, scalloping, clamming and quohoging to sand and mud bottoms. So much sense in fact that Canadian scallopers have spent millions developing charts that allow them to tow without disturbing viable habitat.

The first section of the Summary Document deals with ways to minimize the economic impact of regulations now implemented in the commercial black sea bass fishery.

A state by state landings quota that incorporates both long-term data and estimated results of stringent management measures should be incorporated into the plan. States could then deal with the division of quota to suit local needs.

Effort should continue to shift away from the trawl industry to favor less damaging gear types. Non-traditional traps such as "drop pots" cause unnecessary tension between commercial and recreational users compared to traditional methods of deploying trap gear types. Drop pots currently are left on site preventing access to recreational and commercial hook and line fishers. At the very least, this gear should be moved off station while not in use.

Trap/pot limits and gear tags are traditional management measures and should be utilized. 800 pots fished with skill in a recovering fishery may be enough. Additionally, the reduction in gear would minimize conflicts within the user group over "bottom rights".

Ideally, good management will soon preclude the need to have closures. Until then, rather than "freight gear" (or, pull all the traps and set them on the dock) during prolonged closures, trap fishermen could simply pull the doors on the gear or fasten it open depending on trap type. The traps should be allowed to start fishing again prior to the next quarter, perhaps 10 days, in order to prevent inequities in the ability of trawls and hook and line gear to land fish immediately. The lag time inherent in the trap fishery could prove economically burdensome otherwise.

Nowhere in the document was the issue of trap discards mentioned nor releases for hook and line fishers. Current knowledge of black sea bass indicates that the fish remain very localized except for over-winter migration. It is in the best interests of all fishers to release alive as many undersized fish as possible. Given their rapid growth rate, it is possible that many dead discards could become landings during the same year if released alive. On an artificial reef site 13 NM SE of

Ocean City, MD. there was a large increase in the number of juvenile fish using the relatively new construction. The reef site was flourishing. One trap boat set a number of rigs in the area. This particular boat did not utilize a culling grate and instead sorted fish dead on the way home. Over a 2 year period the reef site was noticeably degraded. It lies in 60 to 75 feet of water.

There are many trap fishermen that utilize live culling methods, and they will reap the rewards of their efforts. Live release needs to be required! Hook and line fishermen should utilize hooks that minimize the likelihood of dead discard. The issue of how deep sea bass can be released from and have a reasonable survival rate must be taken care of. Many fishers still believe there is no live release possible. Tagging data suggests otherwise. Collect the information, create studies to fill in the knowledge gaps and get the information out to the users!

Thank you for your time,

Capt. Monty Hawkins 4/7/02

Hard Copy to MAFMC

4/7/02

John S. Stephens
RR1 Box 319-E
Vineyard Haven, MA 02568

April 9, 2002

Dan Furlong, Exec. Dir.
Mid-Atlantic Fishery Management Council
Room 2115, 300 S. New Street
Dover, DE 19904

Dear Mr. Furlong,

I'm writing to you because I am a concerned Massachusetts Pot Fisherman.

You are well aware of Mass. Pot Fishermen's points on Amendment 13 (Bourne Meeting). However, I wasn't able to attend, so just wanted to add this letter.

I am opposed to state-by-state quotas, primarily because of the minimum size discrepancy. Obviously, if other states can catch juvenile fish, along with adults, their historical weights will be larger.

On a trip up the coast ten years ago, I remember we pulled into Cape May for the night. The following morning we wandered into a fish store, just to look. I could not believe that the Sea Bass in the case were legal! Having filleted 12-inch fish, I feel that 12" is too small, much less 10" (where you are now), or 7" or 8", or whatever you were at. If all the states were at 12" or 14", we wouldn't be in this predicament.

I realise that there's a lot of political maneuvering involved, but these fish spawn in our waters, are here over one-half of the year, and are fished cleanly and conservatively by us. So the case could easily be made these are our fish, not your fish.

However, what we want is a fair percentage of the quota. Basing the quota on low landing years for Massachusetts is morally and ethically wrong, and I think you know that.

Sincerely,

John S. Stephens

John S. Stephens
Owner/Operator
F/V ROYAL

04/09/02

MR DANIEL T FURLONG
EXECUTIVE DIRECTOR
MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

RE: BLACK SEA BASS
AMENDMENT 13

DEAR MR. FURLONG

LET ME BEGIN BY RESPECTFULLY REQUESTING THAT THE COUNCIL REJECT ALTERNATIVES 3 THROUGH 8 INCLUSIVE OF AMENDMENT 13.

FOR EXAMPLE → ALTERNATIVE 3A WOULD PUT 92% OF THE BLACK SEA BASS FISHERMEN OUT OF BUSINESS BY ALLOCATING ALMOST 82% OF THE BLACK SEA BASS QUOTA TO LESS THAN 3% OF THE FISHERMEN.

LETS DO THE MATH FOR THIS OPTION.

2002 BLACK SEA BASS QUOTA 3,332,000#

52 VESSELS (2.83% OF 1838) GET 81.7% OF THE QUOTA OR ROUGHLY 52,350# OF SEA BASS PER YEAR FOR EACH VESSEL.

98 VESSELS (5.33% OF 1838) GET 12.8% OF THE QUOTA OR ROUGHLY 4,352# OF SEA BASS PER YEAR FOR EACH VESSEL.

MR DANIEL T FURLONG
EXECUTIVE DIRECTOR MAFMC

1688 VESSELS (91.84% OF 1838) GET 5.5% OF THE QUOTA OR ROUGHLY 109# OF SEA BASS PER YEAR FOR EACH VESSEL.

ITEM 3 IGNORES THE FACT THAT FISHING VESSEL TRIP REPORTING REQUIREMENTS DID NOT BEGIN UNTIL 1994 AND N.Y. STATE FISHERMEN (WITHOUT FEDERAL PERMITS) DID NOT HAVE TO REPORT THEIR SEA BASS CATCHES UNTIL 1996.

FOR THE PERIOD PRIOR TO 1996 - WOULD YOU BE WILLING TO ACCEPT DIRECT SALES TO FISH MARKETS RESTAURANTS AND LIVE FISH BUYERS.

WHAT TYPE OF DOCUMENTATION WOULD YOU REQUIRE?

ALL OF THE ITEM 3 ALTERNATIVES ARE A BAD IDEA AND ALTERNATIVES 4-8 SHOULD ALSO BE REJECTED.

MY PREFERENCE IS FOR ALTERNATIVE 2B BUT ALTERNATIVE 2A OR ALTERNATIVE 1 ARE FAR BETTER THAN 3-8.

I AM A COMMERCIAL HOOK & LINE FISHERMAN AND THE FOLLOWING COMMENTS ARE FROM EARLIER LETTERS I WROTE ON BLACK SEA BASS

MR DANIEL T FURLONG
EXECUTIVE DIRECTOR MAFMC

1- LETTER OF 07/27/00 TO MR ROBERT E. BEAL ASMFC
A - WE RESPECTFULLY ASK THAT THE COMMISSION WITH THE ASSISTANCE OF THE STATES STRUCTURE THE TRIP LIMITS ON BLACK SEA BASS SO THAT IN THE FUTURE THERE IS NO CLOSED SEASON

B - WE DONT HAVE A PROBLEM WITH OTHER GEAR TYPES CATCHING THE LIONS SHARE OF THE QUOTA BUT PLEASE TRY TO IMPLEMENT MORE MODEST AND FLEXIBLE TRIP LIMITS IN THE FUTURE - SO THAT THE BLACK SEA BASS FISHERY CAN REMAIN OPEN THROUGHOUT THE YEAR.

2 LETTER OF 03/16/01 TO MR CHRISTOPHER M. MOORE MAFMC
A STARTING AT A LOWER TRIP LIMIT IN EACH QUARTER WILL GIVE THE COUNCIL MORE TIME TO EVALUATE LANDING DATA AND DETERMINE WHETHER AN ADJUSTMENT OF THE TRIP LIMIT IS NECESSARY BEFORE AN EARLY CLOSURE OF THE FISHERY BECOMES A CERTAINTY.

3 LETTER OF 07/08/01 TO MR DANIEL T FURLONG MAFMC
A IF THE DAILY TRIP LIMITS WERE SET AT A LEVEL THAT WOULD ALLOW THE FISHERY TO REMAIN OPEN THROUGHOUT THE YEAR - PRICES WOULD STABILIZE AT HIGHER LEVELS AND ALL GEAR TYPES WOULD HAVE AN OPPORTUNITY TO PARTICIPATE IN THIS FISHERY

MR DANIEL T FURLONG
EXECUTIVE DIRECTOR MAFMC

4- LETTER OF 01/28/02 TO MR MICHAEL LEWIS ASMFC

A- BY MAINTAINING OPEN SEASONS AND MINIMIZING OR HOPEFULLY ELIMINATING THE NEED FOR CLOSURES THE COMMISSION WILL INSURE THAT ALL GEAR TYPES HAVE AN OPPORTUNITY TO PARTICIPATE IN THE FISHERY.

B- AN EVEN DISTRIBUTION OF BLACK SEA BASS THROUGHOUT EACH QUARTER WILL ALSO RESULT IN RENEWED ACCEPTANCE OF BLACK SEA BASS BY CONSUMERS AND HIGHER PRICES FOR FISHERMEN.

I AGAIN URGE THE COUNCIL TO SET MODEST BLACK SEA BASS TRIP LIMITS SO AS TO MAINTAIN AN OPEN SEASON THROUGHOUT THE YEAR AND THUS ALLOW ALL GEAR TYPES TO PARTICIPATE IN THIS FISHERY.

RESPECTFULLY

John G. Mihale
153 California Place North
Island Park, NY 11558

FISHERMEN'S DOCK COOPERATIVE, INC.
PO BOX 1314 - 57 CHANNEL DRIVE
PT.PLEASANT BEACH, N.J. 08742
OFFICE 732-899-1872 *DOCK 732-899-1697*
FAX 732-899-3294

Dan Furlong
Executive Director
M.A.F.M.C.

From;
John Cole
President
F.D. Co-op

4/10/02

COMMENTS ON AMENDMENT 13

Dear Dan;

The following comments are the consensus opinion of the members of the Fishermens Dock Co-op of Point Pleasant, N.J. There are presently 12 owner operated vessels fishing from our dock on Mid- Atlantic multi species fisheries. All but one of them are trawlers. These vessels depend on their ability to be able to switch from one fishery to another as species availability changes. This is the historic way of fishing in the New York Bight area, because all of our fisheries are seasonal. Therefore it is of great concern to us when we see the possibility of having more of our fishing rights taken away from us because we might not qualify with a certain amount of landings in a certain time period. From the mid 1980's to only a few years ago the stocks of Black Sea Bass were so depressed that our boats only occasionally encountered them, and rarely directly fished for them. The last few years has seen an increase in the size of the stock and this has led to an increased availability to our fishermen. We do not want to be shut out of this fishery by being relegated to an incidental bycatch allowance, but that is what would happen to most of our boats if the proposed criteria in all three versions of Alternative three were chosen. We understand the need to limit participation to prevent overharvesting of our resources and the associated problems such as closed seasons, derby fishing and low prices, but many of our fishermen were fishing thirty years ago and their rights and Landings in fisheries from then do not count. Presently there is a public hearing to be held in New Jersey regarding Fishery regulations for next year. Black Sea Bass is not just a Mid Atlantic problem. locally, our long time Sea Bass potters have been faced with the problems that have been described to the Council by

The potters from many states. They have seen an increase in effort from people displaced from dogfish and monkfish, and this has resulted in early closures to their fishery and poor prices because of derby fishing. New Jersey has proposed creation of a landing license that would be based on historical participation. They have proposed a Cumulative total landings amount of 10,000 pounds from 1988 to sometime in 2001. This addresses the concerns of trawlers who admittedly are at best only occasional or part time harvestors of B.S.B. while limiting new entrants into the fishery. In Alternative 3 b 94 % of B.S.B. permit holders would be reduced to an incidental fishery. We do not support any of alternative 3 at present, but if in the future categories are required we suggest a cumulative total such as New Jersey's proposal.

Our members strongly support alternative 6 , the Hybrid quota system. We feel that this most accurately represents historical fishing practices, Jan. to April dominated by trawling, and the rest of the year dominated by pots. This proposal would be similar to a gear sector allocation which would better address the problems that have been created by over capitalization, but would not require as much micro managing. This will also eliminate some of the problems posed by Alternative 5 where some states will definitely feel like they got screwed, and bad feelings [and probably lawsuits] will result. If either state by state system is adopted a methodology should be developed to adjust landings to account for the different size limits in various states. As for what years should the allocation percentages be based ? Being trawlers we support the best five years from 1980 to 1997 for the hybrid quota. But we also would support using 1988 to 1997. Either of these options utilize a fairly long time frame that takes into account changes in species availability.

In regard to subregional quota's, we think problems could develop from some states accidentally on purpose filing late reports , and causing their region to overrun the quota. We also favor a limitation on the number of pots to be used, and requiring them to be tagged, and also to be removed from the water for closures longer then three weeks. Perhaps a method could be developed that would set two different levels of pot allowances based on fishing history, [landings, plus records of how many pots historically fished, for example , 300 and a higher qualifier of 800 pots].

Lastly we support the status quo in regard to E.F.H. protection.

There are enough regulations, gear restrictions, and closed areas already. Thanks for the opportunity to comment, and we compliment the council and staff on presenting such a wide variety of choices.

Sincerely;
John Cole

John Cole

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

April 10, 2002

Mr. Scott B. Gudes
Deputy Undersecretary for Oceans and Atmosphere
National Oceanic and Atmospheric Administration
NOAA/SP
14th and Constitution, NW
Room 6121
Washington, DC 20230

RE: **EPA Review of NOAA/NMFS DEIS for "Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan," CEQ No. 020075**

Dear Mr. Gudes:

Consistent with our responsibilities under Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has reviewed the referenced Draft Environmental Impact Statement (DEIS) on Amendment 13 to the Fishery Management Plan (FMP) for the summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*) and black sea bass (*Centropristis striata*). The DEIS was prepared by the Mid-Atlantic Fishery Management Council (MAFMC) in cooperation with the Atlantic States Marine Fisheries Commission (Commission), the New England Fishery Management Council and the South Atlantic Fishery Management Council (SAFMC) for the National Oceanic and Atmospheric Administration / National Marine Fisheries Service (NOAA/NMFS). The EIS (Amendment 13) considers 12 alternatives with or without subalternatives that address allocations for black sea bass management as well as five alternatives with subalternatives for gear effects on black sea bass, scup and summer flounder designated as essential fish habitat (EFH). Amendment 13 does not propose to modify the quotas established in the FMP.

The fishery management unit for these three fish species is the federal Atlantic waters from essentially North Carolina to New England, although they exist in reduced numbers further north to Canada and also exist south of North Carolina where the black sea bass is managed by the SAFMC as a separate stock under a different FMP. The three species have similar migration patterns and appear to prefer structured habitat as adults which complicates their harvest.

The objectives of the proposed Amendment 13 are excerpted (pg. 6) as follows: 1) reduce fishing mortality in the summer flounder, scup and black sea bass fishery to assure that overfishing does not occur; 2) reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass; 3) improve the yield from these fisheries; 4) promote compatible management regulations between state and federal regulations; 5) promote uniform and effective enforcement of regulations; and 6) minimize regulations to achieve the management objectives stated above.

EPA offers the following comments on the DEIS for consideration by NOAA/NMFS and the MAFMC and other councils/commissions in the development of the Final EIS (FEIS):

NEPA PROCESS

* Noticed Improvements - We note and appreciate the fact that the DEIS is much more readable than those EPA has reviewed in the past. We particularly note the inclusion of a summary of past amendments to the FMP to update the reader and also provides a helpful rationale as to why most of the presented alternatives were considered in the document.

* Recommended Improvements - Despite improvements, the DEIS remains complex overall. We continue to recommend that a "List of Acronyms" be included (e.g., TAC, FMP, F, EFH, etc.) in FMP EISs to assist the public with technical aspects of the document. We also note that a large number of alternatives are presented, which may overwhelm the average reader. While we support the alternatives analysis and consider it the "heart" of the NEPA process, it may be possible for NOAA/NMFS to initially list these alternatives in the EIS but then screen some of them in order to carry forward a shorter list of the most realistic action alternatives in the EIS.

* Contact Information - Although the DEIS provides an enclosed cover letter stating the contact and address for submittal of written comments, there apparently is no phone number or email address of such a contact nor is there a contact for additional information. The FEIS and future NOAA/NMFS EISs should provide such contact information for the public.

* Preferred Alternative - In addition to a long list of alternatives, no preferred alternative was identified in the DEIS. Although not required, we do recommend that NOAA/NMFS select a preferred alternative at the DEIS stage so that the public can focus on what the federal lead agency expects to implement from a technical and practical perspective. We agree, however, that no final decision should be made until after public comments on the DEIS and FEIS are fully considered and the NOAA/NMFS Record of Decision is produced.

Also in this regard, it is somewhat unclear as to how many preferred alternatives will ultimately be selected by NOAA/NMFS in the FEIS. We assume that a preferred alternative will be selected for each alternative or set of alternatives with a no-action (status quo) option. If so, a preferred alternative would be selected for Alternatives 1-8 (where Alt. 1 is the no-action alternative) concerning black sea bass fishery management, a preferred alternative for each set of subalternatives presented for Alternatives 9-12 (where subalternative "a" is the no-action alternative in each case) also concerning black sea bass fishery management, and a preferred alternative for the EFH Alternatives 1-5 (where Alt. 1 is the no-action alternative) concerning scup, summer flounder and black sea bass EFH habitat management. On the other hand, more alternatives may be selected or various aspects may be combined into a hybrid alternative. Although this will become clear in the FEIS since a preferred alternative(s) will be selected, we suggest that a preferred alternative(s) already be identified at the DEIS stage in future EISs. At a minimum, future EISs make this clearer in the alternatives chapter.

* Federal Lead Agency - We acknowledge the value and expertise of the non-federal fishery management councils in the preparation of the FMP NEPA documents. However, consistent with the NEPA process, NOAA/NMFS remains the federal lead agency responsible for completion of the NEPA documentation, even if preparation of the NOAA/NMFS NEPA documents for FMPs may be internally delegated to the Councils. Accordingly, we believe that the cover of the DEIS should have also – in fact primarily – included approval of the DEIS by NOAA/NMFS as opposed to only listing approval by the MAFMC (i.e., "Draft adopted by MAFMC: August 8, 2001").

* Amendment 13 Objectives - It is unclear why gear effects and protection of EFH, consistent with the Sustainable Fisheries Act, was not listed on page 6 as an "objective" of Amendment 13 since five alternatives are dedicated to this subject (i.e., "Summer Flounder, Scup and Black Sea Bass EFH Alternatives"). The FEIS should include gear effects and protection of EFH as an objective.

* No-Action Alternative - For no-action/status quo alternatives, we note that the document typically states (e.g., pg. 16 for Alt. 9a) that "[t]his alternative is required by the National Environmental Policy Act." For clarity, we suggest that this be modified to "[t]he no-action alternative is required by the National Environmental Policy Act" or "[t]he status quo alternative is required by the National Environmental Policy Act," since it is the existing condition that must be considered per NEPA as opposed to Alternative 9a per se.

ALTERNATIVES

We offer the following comments on the DEIS-presented alternatives:

o Black Sea Bass Commercial Alternatives

Alternative 1 - Quarterly quota system currently in effect: status quo. EPA will defer to NOAA/NMFS regarding the need to change the existing allocations. Given the development of the Amendment 13, however, we assume such a potential change has technical merit. We note, however, from pages 28, 42 and 51 that the stocks of all three species appear to be recovering under the existing system. Unless this status quo alternative is selected, the FEIS should summarize why reallocations are needed (e.g., is the apparent recovery information only due to a one-year good recruitment year as opposed to a sustainable trend of recovery?). Editorially, it is also unclear why the great precision of the existing allocations to two decimal places is needed (e.g., 38.64 % for January to March) and if such precision is realistic.

Alternative 1 Summary - EPA defers to NOAA/NMFS since we assume that NOAA/NMFS has reason to believe that existing quotas should be modified and the status quo not continue.

Alternative 2 - Quarterly quota system with a rollover provision.

Alternative 2a. Quarterly quota system with a change in the allocation formula based on 1988-1997 landings data and a rollover provision. We agree with the rollover aspect of this subalternative since it compensates for unused quotas (and presumably any overage of quotas) in the next quarter of the *same* year as opposed to the next year when fishery conditions may be quite different. This assumes, however, that such changes would not substantively affect the reproductive potential or other fishery statistic of the species in the rollover quarter. The rollover aspect should also reduce the derby-style approach to harvesting which will provide a more even harvest and market value. Use of 1988-1997 landings data as opposed to 1993-1997 data (see Alternative 2b) appears preferable to us since it is a larger database time frame, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery. EPA will defer to NOAA/NMFS on the selection of the appropriate database.

Alternative 2b. Quarterly quota system with a change in the allocation formula based on 1993-1997 landings data and a rollover provision. As discussed above for 2a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 2 Summary - EPA defers to NOAA/NMFS, but agrees with the rollover management approach. We slightly favor Alternative 2a which uses a larger landings database time frame.

Alternative 3. Quota allocation by permit category.

Alternative 3a. Quota allocation by permit category - 3 separate categories based on landings data from 1988-1997. Dividing the management unit into three permit categories or sectors based on landings "tonnage" appears reasonable since various amounts of effort are represented along the coastline within these fisheries. Use of 1988-1997 landings data as opposed to 1993-1997 data (see 3b) appears preferable since it is a larger database, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery. We will defer to NOAA/NMFS on the selection of the appropriate database.

Alternative 3b. Quota allocation by permit category - 3 separate categories based on landings data from 1993-1997. As discussed above for 3a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 3c. Quota allocation by permit category - 2 separate categories based on landings data from 1988-1997. Division into two sectors as opposed to three (3a & 3b) would reduce the NMFS management burden. For consistency, it is unclear as to why no additional subalternative (3d) for 1993-1997 database was presented as for the three-sector options (3a & 3b).

Alternative 3 Summary - EPA defers to NOAA/NMFS, but agrees with this management approach since division into permit categories is based on landings tonnage and could be more equitable to the different levels of fishing effort. If implemented, we favor Alternative 3c since it has only two permit categories (simpler) and uses a larger landings database time frame.

Alternative 4. Quota allocation to separate subregions.

Alternative 4a. Quota allocation to separate subregions based on 1988-1997 landings data with additional period allocations January through April and May through December. Because the DEIS suggest that there may be geographic differences within the fishery management unit, division into a northern and southern region appears reasonable. Use of 1988-1997 landings data as opposed to 1993-1997 data (see 4b) appears preferable since it is a larger database, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery. Although the use of additional time period allocations may also be useful if based on fishery statistics (such as reproductive potential, spawning, migrations, etc.), the FEIS should discuss the rationale for such additional time period subdivision. In general, area or time period subdivisions could become a NMFS management burden and could be confusing to fishers fishing the boundaries of a subregion or at the end of a time period.

Alternative 4b. Quota allocation to separate subregions based on 1993-1997 landings data with additional period allocations January through April and May through December. As discussed above for 4a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 4 Summary - EPA defers to NOAA/NMFS, but agrees with division into north/south subregions based on reported geographic differences in the fishery. However, we request information on the rationale for additional time period allocations. Assuming these time period allocations are based on fisheries data, we slightly favor 4a which uses a larger landings database time frame.

Alternative 5. State-by-state allocations.

Alternative 5a. State-by state allocations based on 1988-1997 landings data. While we agree that a state-by-state allocation would account for by-state differences within the fishery management unit and would likely provide greater allocation equitability among fishers, it would present a significant management burden to monitor and enforce these multiple allocations. This burden could, however, be shared by the states. This approach could also be confusing compliance burden to fishers fishing state boundary waters. Use of 1988-1997 landings data as opposed to 1993-1997 data (see 5b) appears preferable since it is a larger database, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery.

Alternative 5b. State-by-state allocations based on 1993-1997 landings data. As discussed above for 5a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 5c. State-by state allocations based on the best five landing years for each state during the period 1988-1997. Selection of the five best landing years may not necessarily be the best management approach since use of all fishing years within a longer time frame would seem to be more representative. However, we will defer to NOAA/NMFS since landings data may show gaps or other reasons for the selection of the five best years. The FEIS should further discuss the quality of the landings data and the basis for the proposed use of the five best years.

Alternative 5d. State-by-state allocations based on the best five landing years for each state during the period 1980-1997. Use of 1980-1997 landings data as opposed to 1988-1997 data (see 5c) appears preferable since it is a larger database, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery. However, the option of using the 1980-1997 database is unclear since only choices of 1988-1997 and 1993-1997 have been offered in above alternatives. It is unclear as to why the 1980-1997 option was offered and the 1993-1997 option was not for the best five year scenarios. The FEIS should discuss the reason for this inconsistency.

Alternative 5e. *De minimus* specifications. EPA agrees with this option for all the state-by-state subalternatives (5a-5d) for those states where it is determined that landings are indeed *de minimus,* so that the burden of full commercial management for those states would not be needed.

Alternative 5 Summary - EPA defers to NOAA/NMFS, but generally does not favor the state-by-state allocation approach since it appears more complicated in terms of fishery management (although it could be eased by state assistance) as well as fisher compliance. If implemented, EPA slightly favors 5b in association with 5e since it is not limited to the five best years of data, uses a larger landings database time frame, and allows for a state de minimus classification.

Alternative 6. A hybrid system: coastwide quota from January through April and state-by-state quotas from May through December.

Alternative 6a. A hybrid system based on 1988-1997 landings data: coastwide quota from January through April and state-by-state quotas from May through December. Although the rationale for such management appears sound (mobile trawl gear is used in January-April while stationary pots/traps are used in May-December which respectively lend themselves to coastline versus by-state management), although this hybrid approach could result in a management burden similar to Alternative 5. Use of 1988-1997 landings data as opposed to 1993-1997 data (see 6b) appears preferable since it is a larger database, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery.

Alternative 6b. A hybrid system based on 1993-1997 landings data: coastwide quota from January through April and state-by-state quotas from May through December. As discussed above for 6a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 6c. A hybrid system based on the best five years in the 1980-1997 landings data: coastwide quota from January through April and state-by-state quotas from May through December. Selection of the five best landing years would not necessarily be the best management approach since use of all fishing years within a longer time frame would seem to be more representative. However, we will defer to NOAA/NMFS since landings data may show gaps or other reasons for the use of the five best years. The FEIS should further discuss the quality of the landings data and the basis for the proposed use of the five best years. The option of using the 1980-1997 database is unclear since only choices of 1988-1997 and 1993-1997 have generally been offered in above alternatives. It is unclear as to why the 1980-1997 option was offered for Alternative 6, or why it was not offered previously. The FEIS should discuss the reason for this inconsistency.

Alternative 6 Summary - EPA defers to NOAA/NMFS, EPA does not favor the coastwide/state-by-state hybrid allocation approach because it appears complicated from a fishery management an compliance perspective, similar to Alternative 5. If implemented, EPA slightly favors 6a since it is not limited to the five best years of data and uses a larger landings database time frame. The use of the 1980-1997 database for 6c (and not in 6a & 6b) should be explained in the FEIS.

Alternative 7. A hybrid quota system: coastwide quota from January through April and subregional quotas from May through December.

Alternative 7a. A hybrid quota system based on 1988-1997 landings data: coastwide quota from January through April and subregional quotas from May through December. The rationale for this hybrid approach appears sound (mobile trawl gear is used in January-April while stationary pots/traps are used in May-December which respectively lend themselves to coastline versus by-state management). The subregional approach as opposed to the state-by-state approach (Alt. 6) may be less cumbersome from a management perspective. Use of 1988-1997 landings data as opposed to 1993-1997 data (see 7b) appears preferable since it is a larger database, unless there is reason to believe that the more recent landings data or their collection methodology are more representative of the fishery.

Alternative 7b. A hybrid quota system based on 1993-1997 landings data: coastwide quota from January through April and subregional quotas from May through December. As discussed above for 7a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 7 Summary - EPA defers to NOAA/NMFS, but agrees with the coastwide and subregional hybrid approach due to the different fishing gear used during different times of the year. Although presumably less complex than Alternatives 5 & 6, this approach may still be a management burden. EPA slightly favors 7a since it is not limited to the five best years of data and uses a larger landings database time frame. The minimum size of possession and other relevant existing criteria would still apply.

Alternative 8. An allocation system by gear type.

Alternative 8a. Quota allocation by gear based on 1988-1997 landings data. EPA agrees with this management approach since it is based on historic gear usage. The FEIS should, however, list the percent allocations for pots, traps and hook-and-line gear in addition to the listed gill nets (0.40%) and trawls (45.82%). The FEIS should also preferably discuss the need for 2-decimal precision for these allocations.

Alternative 8b. Quota allocation by gear based on 1993-1997 landings data. As discussed above for 8a, we will defer to NOAA/NMFS regarding the appropriate database.

Alternative 8 Summary - EPA defers to NOAA/NMFS, but agrees with this approach since it is based on historic gear usage. EPA slightly favors 8a since it uses a larger landings database time frame.

Alternative 9. Modify the permit requirements for fishermen that have both a Northeast Black Sea Bass commercial permit and a Southeast Snapper/Grouper permit.

Alternative 9a. Status Quo. EPA disagrees with the continuance of this permit requirement since it may prevent fishers to continue earning a living during a northern closure (i.e., fishers holding a Northeast Black Sea Bass permit currently need to relinquish the permit for 6 months in order to fish for black sea bass south of Cape Hatteras during a northern closure). The impact on the fishery is likely minimal since there are two stocks of black sea bass (north and south of Cape Hatteras). We defer to the NOAA/NMFS, however, to determine if the additional impact on the southern stock would be significant. If so, we would agree with maintaining the status quo. The FEIS should estimate how many fishermen/vessels could additionally fish south of Hatteras during a northern closure.

Alternative 9b. Remove the permit requirement that restricts fishermen from using a Southeast Snapper/Grouper permit during a northern closure. EPA agrees with this approach unless it significantly impacts the southern stock of black sea bass during a northern closure.

Alternative 9 Summary - EPA defers to NOAA/NMFS, but agrees with the removal of the permit requirement unless the southern stock of black sea bass is significantly impacted during a northern closure. The FEIS should attempt to quantify the additional fishing effort south of

Cape Hatteras during a northern closure.

Alternative 10. Prohibit the wet storage of black sea bass pots/traps during a closure.

Alternative 10a. Status quo. EPA strongly disagrees with the current management approach that allows pots/traps to stay in the water during a closure since they would continue to catch target and bycatch fish. Entrapped fish would either die (wasted) or be harvested en mass after the closure expired (such "padded" numbers would quickly impact the quota for that quarter). In any case, the purpose of the closure would not be served since pots/traps would continue to fish. Although we are not aware of the mechanics involved regarding the time and storage needed to pull the pots/traps, we suggest that traps/pots be retrofitted with a closure mechanism that will allow wet storage but no fish entrapment.

Alternative 10b. Prohibit the wet storage of black sea bass pots/traps during a closure of longer than two weeks. Allowing the pots/traps to continue fishing during the period of closure would be counterproductive to the determined need for the area closure. Impacts for two weeks of continued fishing would be less than for four weeks (see 10c).

Alternative 10c. Prohibit the wet storage of black sea bass pots/traps during a closure of longer than four weeks. Allowing the pots/traps to continue fishing during the period of closure would be counterproductive to the determined need for the area closure. Impacts for four weeks of continued fishing would be more than for two weeks (see 10b).

Alternative 10 Summary - EPA defers to NOAA/NMFS, but strongly supports prohibition of wet storage of pots/traps during closures of 4 weeks (10c) and probably as short as 2 weeks (10b) to reduce bycatch and possible black sea bass mortalities occurring by entrapment during the closure and thereby be consistent with the determined need of the area closure. Unless pots/traps can be physically retrofitted with a closure mechanism that will allow wet storage but no fish entrapment, EPA would not support wet storage.

Alternative 11. Initiate a black sea bass pot/trap tag program

Alternative 11a. Status quo. We disagree with the current condition where no pot/trap tags are required since the number of pots/traps would not be quantified or controlled for management purposes.

Alternative 11b. Trap tag requirements for federal permit holder fishing with black sea bass pots/traps. We agree with the addition of this requirement to enumerate the pots/traps used for fishing.

Alternative 11 Summary - EPA defers to NOAA/NMFS, but agrees with the institution of a tag requirement for pots/traps for quantification and fishery management tool.

Alternative 12. Restrict the number of pots and traps used by fishermen.

Alternative 12a. Status quo. We agree with regulating the number of pots/traps since an excessive number of pots/traps can result in additional bycatch and disruption of bottom habitat even if the quotas and allocations are not exceeded.

Alternative 12b. Restrict fishermen to no more than 400 black sea bass pots or traps. We conservatively prefer limiting the number of pots or traps to 400 as opposed to 800 (see 12c), but will defer to NOAA/NMFS. The FEIS should further discuss the numeric basis for the two options (400 vs. 800). We understand that some fishers use up to 1,200 pots or traps.

Alternative 12c. Restrict fishermen to no more than 800 black sea bass pots or traps. We conservatively prefer limiting the number of pots or traps to 400 (see 12b) as opposed to 800, but will defer to NOAA/NMFS. The FEIS should further discuss the numeric basis for the two options (400 vs. 800).

Alternative 12 Summary - EPA defers to NOAA/NMFS, but agrees with the restriction of the number of pots or traps per fisher to a reasonable maximum number. We conservatively prefer 400 versus 800 but look to NOAA/NMFS to provide a basis for the number selected.

o **Summer Flounder, Scup, and Black Sea Bass EFH Alternatives**

EFH Alternative 1. Current management measures (status quo). Page 22 indicates that "the majority of the Mid-Atlantic region is dynamic sandy habitat." For the harvest of groundfish such as the summer flounder, the impact of otter trawls on such sandy substrate would be relatively minimal compared to structured habitat.

EFH Alternative 1 Summary - EPA defers to NOAA/NMFS, but notes that gear restrictions are less important for the sandy bottoms as opposed to the less common structured bottoms in the Mid-Atlantic. However, structured habitat does exist in apparently critical areas such as spawning ground EFH that should be protected from damage by fishing gear.

EFH Alternative 2. Prohibit bottom tending mobile gear from the nearshore areas surrounding the estuaries. This alternative proposes to prohibit the use of bottom tending gear in nearshore estuarine EFH areas such as Albemarle Sound, Chesapeake Bay, and New York Harbor.

EFH Alternative 2 Summary - EPA defers to NOAA/NMFS, but agrees with closure of these nearshore areas from the use of bottom tending mobile gear in an effort to protect structured EFH critical to spawning for scup and black sea bass.

EFH Alternative 3. Prohibit bottom tending mobile gear in the area surrounding the head of the Hudson Canyon. This alternative proposes to prohibit the use of mobile bottom tending gear in EFH portions of Hudson Canyon.

EFH Alternative 3 Summary - EPA defers to NOAA/NMFS, but agrees with closure of the head of Hudson Canyon from the use of bottom tending mobile gear in an effort to protect this overwintering EFH area for summer flounder, scup, and black sea bass.

EFH Alternative 4. Roller rig and rock hopper gear restrictions. This alternative would prohibit the use of roller rig and rock hopper gear or limit their size to 8", 12", or 18" rollers for roller rigs and 8", 12", 18", or 22" for rock hopper gear in EFH structured habitat.

EFH Alternative 4 Summary - EPA defers to NOAA/NMFS, but agrees with the prohibition of such gear to the extent that it would result in certain EFH structured habitat being closed to fishing by such bottom gear. If such gear is allowed, we believe the roller diameter size should be tailored to the roughness of the bottom habitat so that the gear will clear most irregularities and the roller widths would do minimal damage. We also note that smaller roller sizes (up to 12") would reduce the boat engine size needed to make the tows, which would reduce the fishing effort and thereby reduce the potential for overfishing.

EFH Alternative 5. Prohibit street-sweeper gear. The alternative would prohibit the use of street-sweeper gear. This gear is already restricted in New England since it is too effective in the harvest of flat fish and presumably may also damage structured bottom.

EFH Alternative 5 Summary - EPA defers to NOAA/NMFS, but agrees with the prohibition of such gear if it is too successful in harvesting summer flounder (unless the level of effort was further restricted to compensate) and could damage EFH structured habitat.

SUMMARY

In general, EPA favors fishery management techniques that are based on recent and adequate fishery data (catch-effort, fecundity, size of first maturity, species range, etc.), management tools that arise from such data (possession limits, size limits, gear type, area and time closures, record keeping, bycatch reduction, etc.), and protection of spawning grounds and bottom habitat through designations of EFHs and HAPCs within EFHs. We also prefer a more simplistic management approach to facilitate both compliance and enforcement of FMPs to the extent these complicated issues can be simplified.

Because it is unclear how many preferred alternatives will be selected by NOAA/NMFS in the FEIS, it is somewhat difficult to comment on alternatives. In addition, aspects of certain alternatives and subalternatives are unclear (e.g., the significance of limiting the number of pots or traps to 400 versus 800 versus another number, and the differences between 1988-1997 versus 1993-1997 databases). Other alternative aspects involve more societal and economic criteria than environmental criteria such as EPA's water quality mandate. Therefore, EPA has provided more generic comments on the alternatives, emphasizing favorable and unfavorable aspects.

Although EPA defers to NOAA/NMFS, we request that alternatives or aspects thereof favored by EPA be considered during the NOAA/NMFS decisionmaking process. Based on the DEIS, EPA generally *favors* allocation based on one or more of the following: use of rollover provisions within the same fishing year (as in Alternative 2a) to avoid "fishing derby" style harvesting; allocation by permit categories into two sectors (as in 3c) or two subregions (as in 4a) based on landings with a large database since such allocations are based on regional stock differences and are managerially less complex than three categories or subregions; inclusion of a *de minimus* specification (5e) if a state-by-state allocation is implemented to avoid the burden of full management for states with *de minimus* fishing effort; a hybrid quota system combining coastwide and subregional quotas (as in 7a) since this hybrid is based on differences in fishing gear usage during different time periods of the year; allocation based on historic gear use (as in 8a) based on such historic usage; removal of the permit requirement (9b) that requires fishers to relinquish their Northeast Black Sea Bass permit for six months in order to fish for the species south of Cape Hatteras during periods of northern closure since two separate stocks of black sea bass are involved (assuming the southern stock is not thereby substantively impacted); prohibition of the continuance of wet storage of pots/traps during a fishing closure of 4 weeks (10c) and probably as short as 2 weeks (10b) to reduce bycatch and possible black sea bass mortalities occurring by entrapment during the closure and in order to remain consistent with the determined need for the area closure (unless pots/traps can be physically retrofitted with a closure mechanism that will allow wet storage but no fish entrapment); initiation of a tag program (11b) for pots/traps as a fishery management tool; restriction of the number of pots or traps per fishers to a reasonable number (conservatively limit to 400 per 12a, or to 800 per 12b); and prohibitions of various bottom tending gear (e.g., roller rigs, rock hopper gear, street-sweepers, etc.) to protect structured habitat in EFH areas (e.g., head of Hudson Canyon, nearshore estuarine areas such as Chesapeake Bay, etc.) for black sea bass, summer flounder and/or scup.

In contrast, EPA generally does *not favor* allocation rollovers into the next fishing year since the fishery conditions of the next year may be substantively different; state-by-state allocation (as in 5) due to the complexity of compliance and enforcement unless state participation (commissions) is successful; and a hybrid system of coastwide and state-by-state allocation (as in 6) also due to the complexity of the allocation unless state participation is successful. EPA also emphasizes that we do not favor the continuance of wet storage of pots/traps during a closure period (10a) and the continuance of fishing with bottom tending gear in structured habitat, particularly in areas designated as EFH (EFH Alt.1). Given that fishery data may be limited at certain decision points within Amendment 13, we recommend that data should either be gathered to the extent feasible or an adaptive management approach be taken to where tried management techniques are adjusted as appropriate based on monitoring.

EPA DEIS RATING

Because no preferred alternative(s) was selected, any of the presented alternatives could conceivably be selected by NOAA/NMFS in the FEIS. While we have a lack of objection for most of the alternatives, we do not favor certain alternatives or aspects thereof such as the current wet storage of pots/traps during area closures and the no accountability requirement (tags) on pots/traps. Therefore, EPA has assigned a rating of EC-2 to this DEIS (i.e., EPA has environmental concerns and requests additional information) in the event such alternatives/aspects are selected as a preferred alternative(s) in the FEIS.

We were pleased to review the DEIS. Should you have questions regarding our comments, feel free to contact Chris Hoberg of my staff at 404/562-9619.

Sincerely,

John Hamilton for

Heinz J. Mueller, Chief
Office of Environmental Assessment
Environmental Accountability Division

cc: Mr. Daniel Furlong
Executive Director
Mid-Atlantic Fishery Management Council
Room 2115 Federal Building
300 South New Street
Dover, DE 19904-6790

Dean Isaacson
F/V Papa-Si
800 13th St Apt B
Virginia Beach VA 23451

April 11, 2002

Daniel T. Furlong
Executive Director
Room 2115 Federal Building
300 S. New Street
Dover, DE 19904

RE: "Amendment 13 Public Comment"

Dear Daniel T. Furlong:

I would like to make a few comments on the amendment 13, as pertaining to black sea bass.

First and foremost is my concern with Alternative 10. I favor 10A. Anything else would put most of the southern potters in jeopardy of going out of business.

Our vessel fishes between 800 and 1000 pots, most of them 40 to 60 miles offshore. To bring our pots to land, we can carry 80 pots safely on a calm day, and only 60 if the water is choppy. Our boat makes 8 knots, so if you were to do the math, you can see that it would take two weeks to a month (depending again on the weather) to bring in our pots, and a like amount of time to take them back again. This amount of time, plus the expense of fuel and paying the crew would make it economically unfeasible to do this. Also, in the third and fourth quarters our pots have to soak at least two weeks to have a decent catch.

The only solution to this problem that I see would be to remove the doors during closures. This would be a hardship, but one I could live with economically, if we had to.

My other comment is we favor some type of state-by-state or regional quota system.

I also favor using the reporting figures from 1997-2000. These figures could be checked by federal and state agencies, therefore eliminating forged reports.

Respectfully,

Dean Isaacson

JAMES E DAWSON

3008 RIDGE RD
CHINCOTEAGUE ISLAND VA 23336

Phone 757-336-6590

April 11, 2002

To all council members,

After attending meetings at both Ocean City MD and Norfolk VA, the general feeling that I saw, was a feeling that we could not possibly stay status quo without having some serious changes to regulate the fisheries to the north. There has been a huge influx of new fishermen coming from an instate fishery that, as of today, we have no way to stop from overtaking the whole fishery. I believe that if something is not done soon, they will put everyone out of business! (This is shown statistically in all tables throughout the Amendment 13 plan.) It is unfair and unjust to allow new fishermen to put the historical fisherman out of business; after all, these fishermen were the ones who made the landings that have lead to the quotas we have to fish for today. While the historical fisherman is getting cut and put out of business, the new fishermen prosper with the extra income that they never had before! My own personal income has been cut 50%. Is this right? Of course not! The question is: What can you all do about it?

There are several options proposed with the new Amendment 13. It is my belief that if some of these ideas were meshed together, they could possibly work. I speak from over 20 years fishing experience for Sea Bass. **We have a very serious data problem: The only accurate data in the fishery starts from 1997 until today.** This is pure 100% fact! **Reporting landings was not mandatory for Sea Bass until 1997, so therefore the statistical data base used to distribute the quota by quarters was and is severely inaccurate.** The system that we have in place today would work if it were to be divided proportionally using updated accurate statistics via mandatory reporting. Using the only figures that I have had in front of me on pg. 15 of the public hearing document; For the year 2000 the bottom trawl fishery was only 29.88% for the whole year. 38.64% of the entire quota is given to quarter one, and for the year 2000, landings were 9% less ***FOR THE ENTIRE YEAR!*** Years prior to this, quarter one caught no where near the quota that was allocated to it by "historical" landings. This is one of two areas we all need to concentrate our efforts. **Redistribute the quota per quarter by the methods used today!**

You absolutely cannot use data prior to 1997 due to the fact that so many fishermen (that fished historically for Sea Bass) were not a part of this statistical data to distribute the quota by quarter equally and fairly! **This will be challenged if the subject is not addressed.** Why do you think this system does not work today? From 1997 to 2000 quarter 1 was 4-500,000 pounds off! Why? Could it be that the council used the only data for Sea Bass that it had, ***AT THE TIME***, that was based on landings of trawlers and those few others that held other federal licenses? ***ABSOLUTELY IT WAS!*** This could be excused years ago, but not now that everyone knows about it and is loosing 50 to 80% of their income because of it! What about all of us full-time Sea Bass fishermen who did not hold any other federal license until 1997? **Why do you all think that quarters 3+4 close so quickly?** The distribution is horribly lopsided! **How about the fact that all of us full-time Sea Bass fishermen who were not accounted for fish during these periods!** The four to five hundred thousand pounds that quarter one was under for all of those years should have been and should be given to those who have traditionally and historically fished for them. Today quarter one is being caught up from a bunch of trawlers and fishermen that used to fish for dogfish! **My conclusion is that the quarterly allocations should be updated to match the fishery in how it is being fished *TODAY* not yesteryear!** Use the updated figures that you now have via mandatory reporting. You have no excuse not to! **The fishery is different now, the new data statistically proves it!**

This brings us to the second thing that must be done. **Contain the northern fishery.** It is spreading like a killer virus. A virus that will kill off all the historical full-time Sea Bass fishermen that we have. If you look around, it has already started! **All we have to put our faith in, are you few council members who are reading this letter today, that have a chance to do something about it!** I am quite sure that landings were also not accurately assessed within the northern states, much as they were also not collected from full-time Sea Bass fishermen like myself. Therefore, once again we must use the only accurate data that we have today, and that would start from 1997 when 100% of the landings were reported. **Data given on pg. 10 and 15 of the hearing document should be looked at very closely by everyone!** Pay particular attention to the statistics for the landings by state for the years 1998 and 1999. (This also favors the states from the north to show that I do not favor any region!) It is plain as day to see that new statistics favor everyone! This is 100% accurate as to how Black Sea Bass are landed today.

If this data was to be used, I personally feel that a three year average starting from June 1997 to June of 2000 would give the most accurate data possible for all state landings. There were no major closures until July of 2000. Remember also that trip limits during this period were much higher than today. Please also note that the system the council has in place today, worked back then! The problem is with the huge influx of new fishermen ONLY!

What can we do about this problem? I believe that meshing several of the ideas from Amendment 13 together could see a very positive result:

#1) Use the ONLY accurate data that we have from 1997 to date, via mandatory reporting forms.

#2) Classify permits by category as suggested A1, A2, A3. This could be put to use in ***many*** ways! CLASSIFY ONLY!

#3) Keep the quota system the same by 4 quarters. It worked 1997 - June 2000 with no closures.

#4) Adjust quotas by quarter using most recent landing data from 1997 to date. (Records are totally inaccurate and outdated.) Much like the percentages for year 2000 on pg. 15 of hearing document.

#5) Allow classification A1 permit holders to land full trip limits within the quarters.

#6) Allow classification A2 and A3 permit holders to land a partial trip limit within the quarters. (Much like what was done for Tilefish.)

#7) Instate fisheries must receive X amount of pounds according to data starting from June 1997 to June 2000. This would give an accurate 3 year average of catch results to allocate an in-shore quota. (Much as flounder is done today.) Ref. Table 61. **Give the inshore fisheries an inshore quota to fish for.**

#8) **Update the quota system every five years for fair distribution of poundage per quarter.**

I personally feel that any system will not work unless data will be used starting from 1997 when mandatory reporting started. **The mandatory reporting system tells the real truth on the way that Sea Bass are truly caught today. (Ref. Table 9)** This is the real problem with any of the options that we are given to choose from as fishermen, however, we must do something to try and stop the virus of new fishermen that are knocking off the historical fishermen. **Classifying the license types is a good start.** We need to follow the example of the Tile fishery. **There will be no argument with mandatory reporting.** Instate fisheries will not argue, if each state is given their perspective average of poundage caught. Averages for fishermen and fisheries should be computed on a three year average starting from 1997. This is the only fair way to calculate numbers.

** I must also ask that the council allow for a full-time Sea Bass fisherman to upgrade to 30 ft with only hold capacity restrictions and no size or horsepower restrictions to follow National Safety Standard 10. A 30 FT vessel will have no greater ability in 30 KT winds other than safety. Hold capacity is the issue. Keep this at the minimum trip limit of 2000 pounds. Any full-time fisherman has a boat that is capable of carrying this weight. This is a matter of safety concern. Vessel owners must prove history via mandatory report forms of a 10,000 pound or greater landing average for three years or more and or "class A1" permit holders only should qualify.

Sincerely,

Jim Dawson

Congress of the United States

Washington, DC 20515

April 11, 2002

Dr. William T. Hogarth
Assistant Administrator for Fisheries
National Marine Fisheries Service
1315 East-West Highway SSMC3
Silver Spring, MD 20910

Dear Dr. Hogarth,

We write to offer our comments regarding Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan, which proposes to adopt a state-by-state allocation plan for black sea bass. Sound fishery conservation and management policy counsels that any such plan must recognize and give credit to states like Massachusetts that adopted early voluntary conservation measures to reduce landings and rebuild stocks.

Today the Commonwealth's commitment to rebuilding the black sea bass fishery finds Massachusetts landing almost 560,000 pounds, or 20 percent, of all black sea bass in the region. Massachusetts was the first state to implement a 12-inch catch limit in 1987, which exceeds that of any other state. In 1993 Massachusetts set a 200-pot limit for fishermen. In addition, Massachusetts implemented the 12-inch size limit nearly a decade before many of the Mid-Atlantic states, which are slated to receive the most quota under the proposed Amendment 13 allocation plan.

Our fishermen believe that the black sea bass fishery is robust precisely because of their early action to conserve the stocks. Despite having made these tough sacrifices, they believe the allocation system in the plan would punish them by potentially reducing landings from between 50 and 90%. We are very much concerned that such treatment of our fishermen will send a strong anti-conservation signal to fishermen everywhere.

Although the black sea bass fishery is a small, $6 million industry, Massachusetts fishermen have done more than their fair share to protect the resource and rebuild our stocks. Any state-by-state allocation system must give them credit, such as awarding additional quota for having sacrificed and endured lower landings in order to help rebuild the resource.

We are well aware that the Administration supports allowing the moratorium on Individual Fishing Quotas (IFQs) to expire. You have testified before Congress that the agency is capable of fairly implementing quota-based management in our fisheries on an individual basis. We trust that you will see fit to ensure that a fair and equitable allocation system is adopted for Amendment 13.

Dr. William T. Hogarth
April 11, 2002
Page 2

Please make this letter part of the public record on Amendment 13.

Sincerely,

John F. Kerry
United States Senator

Edward M. Kennedy
United States Senator

William D. Delahunt
Member of Congress

Barney Frank
Member of Congress

cc: Pat Kurkul
Dan Furlong MAFMC
Michael Lewis ASMFC

DAVID L. PORTLOCK
1657 NANNEYS CREEK ROAD
VIRGINIA BEACH, VA 23457
(757) 426-7641

April 12, 2002

Mr. Daniel T. Furlong
Executive Director
Mid-Atlantic Fisheries Management
Room 2115 – Federal Building
3005 S. New Street
Dover, DE 19904

Re: "Amendment 13 Public Comment"

Dear Mr. Furlong:

I am a full-time waterman. I have a sea bass and other Federal permits. 100% of my income has been made from commercial fishing since 1976.

I have reviewed Amendment 13 and my comments are regarding Alternative 3. I am opposed to any and all parts of this section.

I feel that Alternative 3 will penalize fishermen that try to remove some of the year-round pressure off sea bass by fishing. Catching other species (dog shark, smooth dogs and conchs), off and on during the year has helped this.

I feel that I have a right to an equal share of the quota just as anyone else.

Sincerely,

David L. Portlock

RECEIVED
MID-ATLANTIC FISHERY COUNCIL

Commonwealth of Massachusetts
Division of Marine Fisheries
251 Causeway Street • Suite 400
Boston, Massachusetts 02114
(617) 626-1520
fax (617) 626-1509

Paul J. Diodati
Director

Chris
[handwritten initials] 4/26/02

RECEIVED
APR 24 2002
MID-ATLANTIC FISHERY COUNCIL

April 12, 2002

Mr. Daniel Furlong, Executive Director
Mid-Atlantic Fishery Management Council
Room 2115 Federal Bldg.
300 S. New Street
Dover, Delaware 19904

Dear Dan:

Thank you for coming to Massachusetts to explain Amendment 13 to the Black Sea Bass FMP and to listen to the many fishermen who stridently oppose aspects of the plan. As you know the Mid-Atlantic Council's decisions on black sea bass, scup and summer flounder have enormous impact on our state's fishermen, and local fishermen rarely have the opportunity to interact with Council members or staff. This meeting was an excellent opportunity for Massachusetts's fishermen to give their views first hand to you as a Council representative.

DMF and the commercial fishermen in Massachusetts have vehemently opposed one of the Amendment's purposes - perhaps its primary purpose: to respond to increased landings in Massachusetts by establishing percent shares. The hearing summary document states: "Possible inequities have also been created by the current management system as landings have shifted to the north..."

Public hearing attendees were well aware that proposed percent shares (ranging from 1.8-8.5%) will seriously and unfairly disadvantage sea bass commercial fishermen who have abided by Division of Marine Fisheries (DMF) sea bass conservation regulations for many years. They recognized that Amendment 13 is to allocate sea bass and not to enhance conservation. They felt this purpose to be especially frustrating because DMF regulations have historically constrained their potential landings in the interest of sea bass conservation. Since 1986 these fishermen have been ruled by a 12" minimum size limit promoted by the fishermen themselves. Other notable restrictions implemented by DMF have been:

April 1988 - moratorium on issuance of sea bass pot fishery permits and a 400 pot limit
March 1992 - Night closure to mobile gear fishing in all waters south of Cape Cod and 4 ½" minimum mesh size adopted for trawlers fishing from June through October south of Cape Cod
January 1994 - Moratorium on new mobile gear permits for state waters fishing
April 1994 - pot limit dropped to 200 per vessel and permits not fished from 1988-1993 were revoked.
April 1995 - Maximum mobile gear vessel size decreased to 72 feet and limited entry established for trawlers to fish in state waters

These regulations were described in a March 15, 2002 letter to you from the Massachusetts Pot and Trap Fishermen's Association. The Association highlighted the lack of - or lax - regulations in other states over many of the years used to determine options for state-by-state quotas. In another correspondence given to you at the hearing, this same Association concluded that quarterly quotas should be maintained unless the Commonwealth's state share was increased to 30-40% to account for Massachusetts fishermen's conservation efforts and lack of conservation elsewhere. A similar position was take by the Cape Cod Commercial Hook Fishermen's Association, Inc. You have those comments, as well as similar comments from Warren Doty, a Martha's Vineyard fish buyer and representative of the Martha's Vineyard Commercial Fishermen's Association.

The history of black sea bass management in Massachusetts should not be a surprise to the Council because DMF already has forwarded comments describing our proactive longstanding sea bass fishery restrictions developed with fishermen's support. A copy of May 7, 2001 DMF comments on the Council's options for the Amendment 13 public hearing draft was sent to the Council and ASMFC last year. Many of those same comments were made in 1994 - about 7 years earlier.

One of our conclusions continues to be that the root cause of problems with the quarterly quota approach is small quotas due to past overfishing, especially on juvenile sea bass, including the discard mortality attributed to small-mesh trawl fisheries. This mortality is not evidenced in Massachusetts where the fishery is prosecuted primarily with pots and hooks in relatively shallow waters

Our latest set of comments was sent to the ASMFC Sea Bass Management Board on December 9. This letter announced DMF analyses with percent shares that would have resulted if all states had been at a 12" minimum size during the base period. We indicated that Massachusetts' share would increase to 38% with New Jersey being second at 22% with a base period of 1988-98. By adding current years, our share rises to about 45%. New Jersey would be at 19%. The ASMFC Technical Committee will review these analyses this month. Regardless of the outcome of that review and even though the exact percentages might be debatable, we insist that the logic is sound.

Regarding these last few years when Massachusetts' landings increased, we find it necessary to explain that increased landings were a function of abundance and not effort - a critical aspect of the allocation debate. Our staff has analyzed Massachusetts pot fishery catch data DMF has recorded since 1992. The attached figures make it clear that effort has been relatively constant, fluctuating between about 400-500,000 pot-days. The burst in landings especially from 1998 to 1999 and 2000 was due to increased bass abundance and availability. This is evident in the other attached figure depicting pot fishery pounds/pot versus landings. Landings rose because catch-per-unit-effort increased. In fact, an examination of pot landings versus CPUE reveals an extremely high correlation (see attached figures).

Increased sea bass abundance in Massachusetts waters is also obvious from our spring bottom trawl survey of state waters south and east of Cape Cod. Our indices have risen to levels not witnessed since the beginning of our 23-year survey time-series. Consequently, we expect fishermen will continue to encounter abundant black sea bass all the while being restricted by DMF regulations and Council/ASMFC commercial fishery quotas.

The focus by mid-Atlantic fishermen, the Council, and mid-Atlantic ASMFC states on increased numbers of Massachusetts' permits is misguided. At the hearing a member of my staff noted that recent years' increased numbers of permitted sea bass fishermen in Massachusetts was not due to increased effort. It was due primarily to our requiring all commercial fishermen landing any sea bass by any gear type to acquire a special authorization. Pot fishery permits have been limited for many years, but for quota notification and other purposes, we had to identify who is currently landing sea bass.

The real issues are the decades of over-fishing, especially on juvenile fish, and the poor track records of other states not constraining black sea bass harvest. For example, while fishermen landing bass in Massachusetts must wait until sea bass grow to 12 inches before fishing any year-class, fishermen landing in mid-Atlantic states have had an additional two years or so to target and land that year-class. That's the way it has been. Of course, now other states and the Council are doing more, but this has been a long time coming. At least the minimum size finally has reached 11 inches.

The Amendment would restrict the number of pots fishermen can fish and would require trap tags. We applaud the Council for these actions, and we encourage implementation of the lower limit. Massachusetts has a 200-pot limit. We appreciate the need for offshore fishermen to fish more gear. Nevertheless, in the interest of restraining catch and reducing mortality of sea bass released due to the minimum size and/or amounts exceeding trip limits - especially for bass brought up from great depths and likely to die when released - we support the lower limit. Furthermore, set a large limit, and fishermen will tend to fish up to the limit.

If 400 traps represent a major decrease in what fishermen are now fishing, i.e., 1,000 traps or more, we suggest these fishermen already are fishing far too many pots, and a large reduction is appropriate. Perhaps a trap limit of 600 pots is a reasonable compromise for offshore waters. For state waters and nearby, no more than 200 pots should be allowed. You might consider that enforcement burden of this proposal: the greater number of pots fished, the greater the task for enforcement to find and check pots for tags. It's a formidable problem that all fishery managers face in enforcing pot limits.

Prohibiting the wet storage of black sea bass pots/traps during a closure is appropriate. We already have experienced the problem of wet storage in state waters when a closure is lengthy, although that problem was minimized by local fishermen who reported they left their gear in the water but with open doors. To minimize the disruption of fishermen's operations, wet storage should be prohibited during a closure longer than four weeks (alternative 10c). Alternative 10b with its 2-week criteria is not supportable.

We appreciate the benefits of a state-by-state quota system allowing each state to management their sea bass fisheries as they see fit. For example, such a system would prevent the Commonwealth from losing our spring fishery if April landings are high from offshore winter/early spring fishing thereby triggering the trip limit decrease before sea bass even reach our waters. Nevertheless, a state-by-state quota system, with Massachusetts receiving an inappropriately low share (e.g., less than one-third) of the annual commercial quota, is a far worse alternative. The Council, ASMFC, and NMFS are now well informed about our past and current sea bass conservation actions, and we anticipate a favorable response.

The Amendment acknowledges NMFS concerns that implementation and administration of state-by-state quotas would be difficult due to the small quota that would be allocated to some states. Therefore, as stated in the Amendment, state-by-state quotas would require cooperative programs initiated by the states to track landings. We cannot agree to any cooperative program required to make this approach a success unless our concerns are satisfactorily addressed. Making reporting an ASMFC compliance criteria is no solution because the Commonwealth would be forced to administer a quota we could not adopt for reasons identified above.

The Amendment will not resolve an alleged equity issue identified in the Plan, i.e., landings shifting to the north. It will create inequities and unfairness and only satisfy the desires of the interests of those who resent increased landings in Massachusetts, even most of the critics have done little for sea bass conservation over the past 15 years or so. An overarching consideration for the Council, and ASMFC, must be that Massachusetts landings have increased in response to increased abundance. Overall effort has not increased in Massachusetts waters.

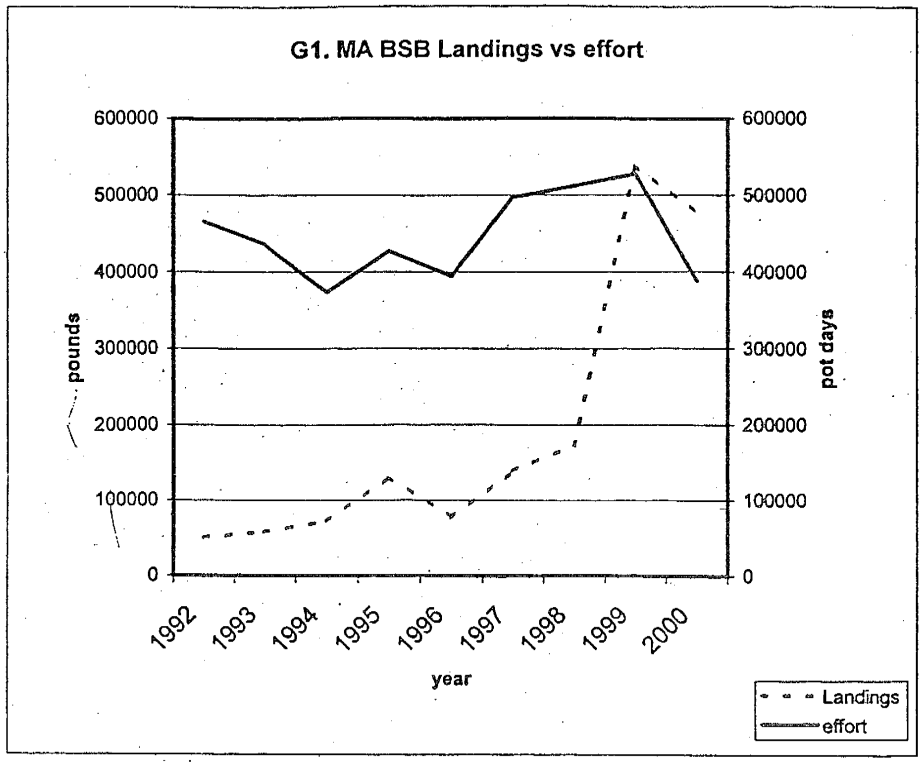
Sincerely yours,

Paul

Paul J. Diodati
Director

Attachments: Figures (2pp.)

CC: Bob Beal
Paul Howard
Pat Kurkul
Mass. Marine Fisheries Commission


G1. MA BSB Landings vs effort
600000
500000
400000
300000
200000
100000
0
pounds
pot days
1992
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1994
1995
1996
1997
1998
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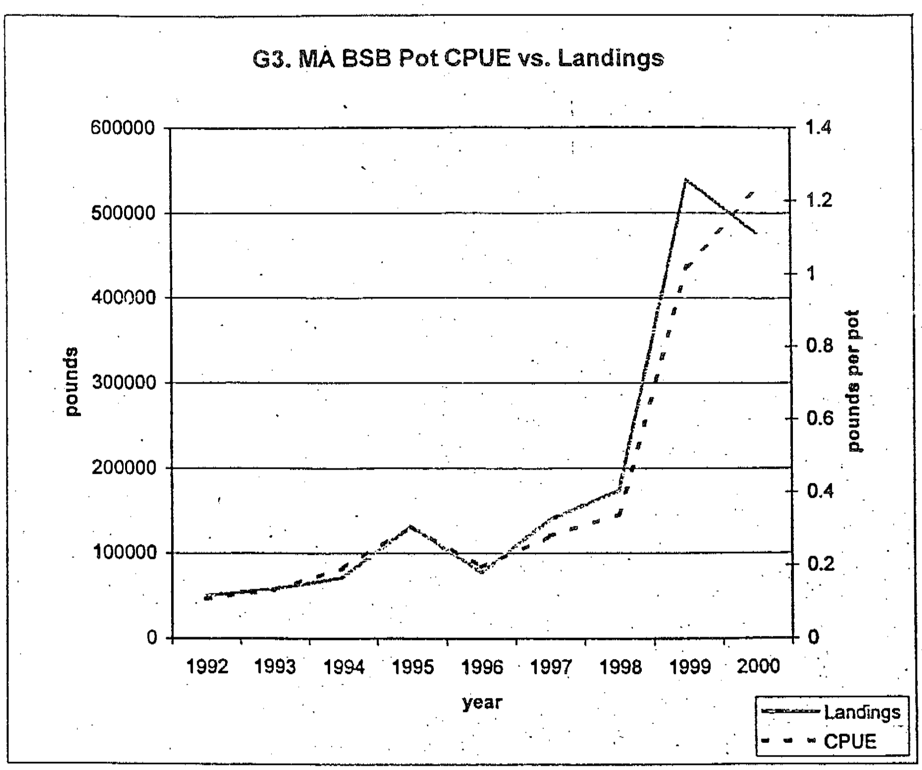
year
Landings
effort


G3. MA BSB Pot CPUE vs. Landings
600000
500000
400000
300000
200000
100000
0
pounds
1.4
1.2
1
0.8
0.6
0.4
0.2
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pounds per pot
1992
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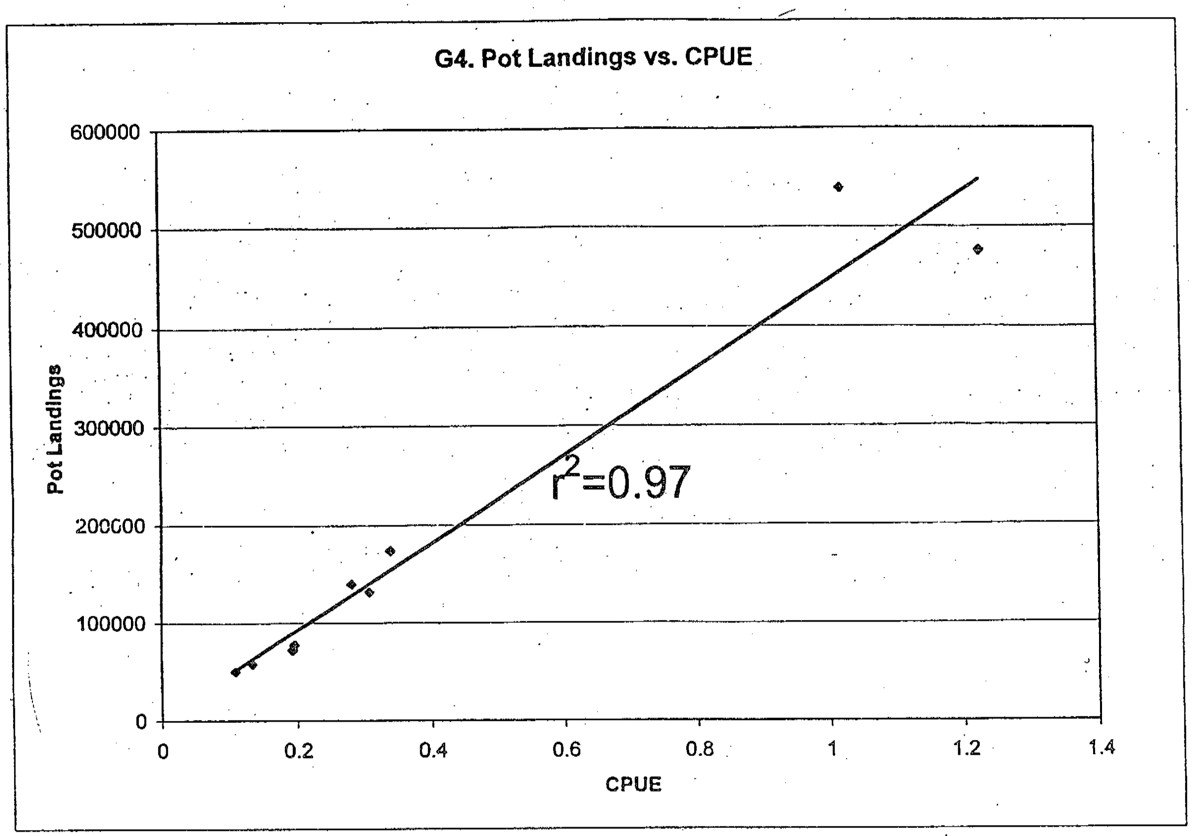
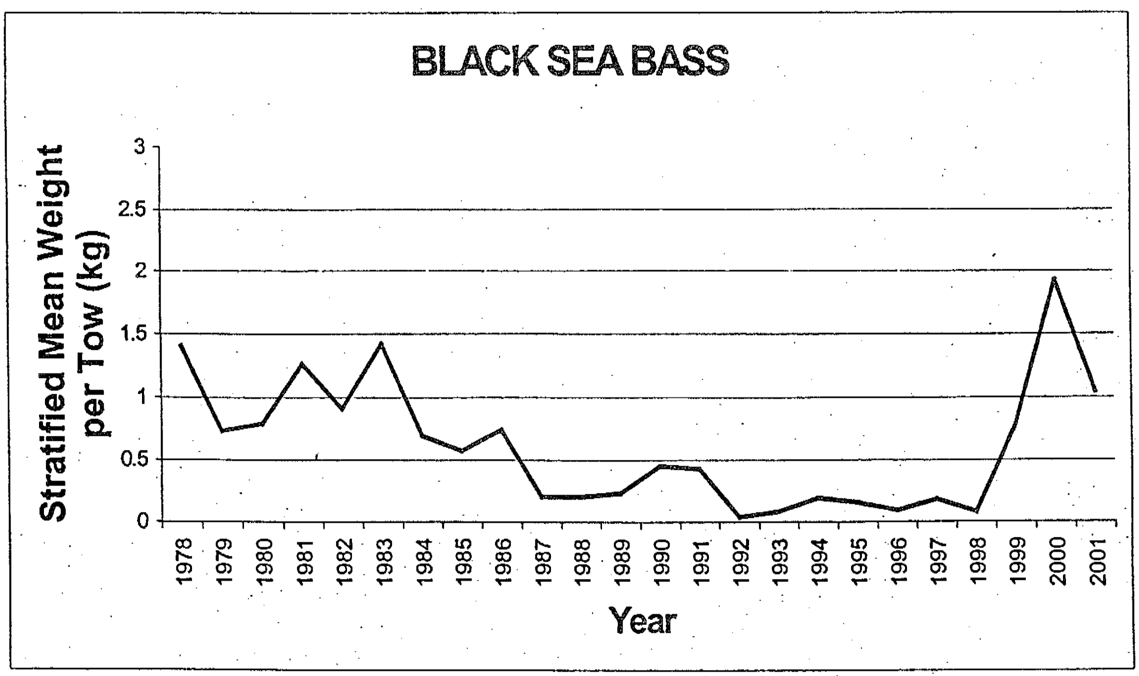
year
Landings
CPUE





Source: MDMF Spring Trawl Survey, South and East of Cape Cod.

4/12/02

John A. Mason
53 Ocean Ave
Hampton Bays
N.Y. 11946

Amendment 13
Public Comment
ATT Mr. D.T. Furlong

RECEIVED
APR 15 2002
MID-ATLANTIC FISHERY COUNCIL

Alternative 1 - NO good
Alternative 2-2A-2B NO
" 3 AB CD NOT Fair To All (NO)
" 4-4A-4B NO good (NO)
Alternative 5 NO good 5A NO good (NO)
5 BCD NO good
5E Deminimos is ok

Alternative 6 A6C NO

Alternative 7 A NO
7B NO NOT AT All
Alternative 8 A. NO
8B This is better but
with Global warming Fish are moveing North, and To give one Type of Gear mostly pot Fisherman in The South big amounts of The Quota could prove in The Future To be wrong

If you go to state by state quotas with current landings 97-2001 this would be Fair + Equitable as to changing conditions. In New York State we fish for mixed fish and every time a state gets a quota allocation that targets and kills the most, they get the biggest share.

This whole Amendment 13 sounds like the southern states have friends in high places.

I have worked on the water for 40+ yrs and I would like to have my share of the pie

Alternative 9-12 I can't say as I have little experience in this area

Alternative (1) EFH yes status quo

(2) EFH no

3 EFH no

4 EFH yes

5 EFH no

Best Regards

John A. [signature]

Montauk Inlet Seafood Inc.   Inlet Seafood Property LLC

East Lake Drive PO Box 2148 Montauk, NY 11954
Ph 631.668.3419 fax 631.668.1225 inletfish@aol.com

April 12, 2002

Daniel T. Furlong, Executive Director
Mid-Atlantic Fisheries Management Council
Room 2115 Federal Building
300 South New Street
Dover, DE 19904

RE: Amendment 13 Public Comment

Dear Mr. Furlong:

The state-by-state and regional quota systems in the proposed sea bass management plan will not work because there is no way to efficiently measure aggregate historical participation in a fishery along geopolitical lines. This is precisely why the summer flounder plan has a legacy of bitter divisiveness that consistently overshadows its success in rebuilding a stock through quota management. It would seem that certain geographic regions that have lost an advantage in the sea bass fishery due to natural stock movements are trying to recoup their loses through the imposition of unjustified boundary-driven allocations.

The Northeast Weighout Data upon which state or regional quotas would be based measured the pounds of fish landed at weigh stations that recorded stock being sold at the dock to dealers in that state. It did not measure: the impact differing size limits and gear restrictions had on the poundage of the catch; black sea bass boxed at sea and shipped across state lines before being reported by a dealer; black sea bass sold by state-licensed fishermen whose landings did not have to be reported in the federal system; black sea bass landed before the advent in some states of a food fish license. The term "documented landings" in these proposed alternatives is used as though it is all-inclusive of fish caught and sold by all residents of all states. It is not.

State-by-state quotas are not based on fishing history. They are based on state-by-state data collection efforts. As soon as a fisherman is denied or granted the right to more or less quota by virtue of his state of origin, he is being discriminated against or unduly favored without fair and equal consideration of his participation in a fishery. I believe that Standard Four of the Magnuson Stevens Fishery Management and Conservation Act was written specifically to prevent this type of abuse.

I support the current quarterly allocation system and believe that greater equalization of the percentages will give different geographic areas comparable access to black sea bass as natural stock movements continue to change in response to cycles and water temperature. Alternative 2b comes closest to achieving this goal. Within each quarter, I believe trip limits should be set to maximize the length of the season and cumulative trip limits should be instated to minimize unnecessary discards.

I have come before the Mid-Atlantic Fishery Management Council several times during discussions of Essential Fish Habitat (EFH.) I have urged the council repeatedly to not allow 'habitat' to become synonymous with 'essential habitat' and then 'marine protected area' without demanding stringent proof that areas in which fishermen have interacted for hundreds of years are in some way currently being threatened. I am therefore opposed to the EFH alternatives because "Essential Fish Habitat" for Black Sea Bass has not been adequately defined and proven, nor has "Adverse Impact" to the delineated areas been adequately defined and proven.

Thank you for this opportunity to comment. I look forward to sharing my opinions with the full council as Amendment 13 comes up for further discussion.

Yours truly,

Sima Freierman
General Manager

<u>David Aripotch</u>
F/V Cory & Leah
F/V Samantha & Mairead

<u>Stuart Foley</u>
F/V Atlantis

<u>William Grimm</u>
F/V Jason & Danielle
F/V Perception

<u>Richard Jones</u>
<u>Kevin Maguire</u>
F/V Evening Prayer
F/V Pontos

<u>Charles Weimar</u>
F/V Rianda S

COASTAL CONSERVATION ASSOCIATION
NEW YORK
P.O. Box 1118
West Babylon, NY 11704

April 14, 2002

Daniel T. Furlong
Executive Director
Mid-Atlantic Fishery Management Council
Room 2115, Federal Building
300 S. New Street
Dover, DE 19904

Dear Mr. Furlong:

Coastal Conservation Association New York ("CCA NY") is taking this opportunity to comment on certain proposals contained in the Public Hearing Summary Document for Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan ("Draft Amendment 13").

CCA NY, as an organization primarily concerned with fishery conservation, will refrain from commenting on those proposals that deal merely with allocation and licensing issues. Thus, it takes no position on Alternatives 1 through 9.

Alternatives 10-12

Alternatives 10 through 12, dealing with the regulation of traps used in the black sea bass fishery, are closely related. CCA NY will therefore address them together.

Alternative 11 is the keystone of the three proposals for, unless enforcement authorities have some means of identifying the owners of traps used in the black sea bass fishery, it will be a practical impossibility to effectively police measures restricting the number of traps employed, the removal of traps during the off-season, escape-vent requirements, etc. Therefore, CCA NY urges the Mid-Atlantic Fishery Management Council (the "Council") to adopt Alternative 11b, requiring that all black sea bass traps be permanently marked with a valid tag.

CCA NY also requests that the Council limit the number of traps that may be employed by any permit holder. At the current time, there are no restrictions on the number of traps fished, and CCA NY understands that some black sea bass fishermen operating out of New York ports are fish in excess of 1,200 pots. Given the fact that black sea bass are a structure-oriented species normally found over hard bottom, wrecks, etc., and given the fact that such hard bottom is relatively scarce off the south shore of Long Island, permitting black sea bass fishermen to operate an unlimited number of pots concentrates too much effort on available hard-bottom areas and causes difficulty for other users of the resource, particularly recreational users, who must compete with the traps for meaningful access to underwater structure hosting concentrations of black sea bass. In order to control the number of traps in use, CCA NY asks that Alternative 12c, limiting permit holders to 400 traps, be adopted. At the same time, CCA NY recognizes that even Alternative 12b, limiting each permit holder to 800 traps, would be preferable to the status quo.

With regard to Alternative 10, CCA NY urges the adoption of Alternative 10b, requiring traps to be removed from the water within two weeks after the closure of the black sea bass fishery. CCA NY can give no better reason for its position than that already provided in Draft Amendment 13, "black sea bass and other species caught in the traps [left in the water during a closure] either die in the traps or are harvested at the beginning of the following quarter." At a time when the Council is endeavoring to rebuild and then maintain the black sea bass population, and is further attempting, in Alternatives 1 through 8 of Draft Amendment 13, to determine how to maximize the economic benefit of those black sea bass that are commercially harvested, permitting traps to fish during the closed season makes sense from neither an conservation nor an economic standpoint. CCA NY recognizes that the two-week time period envisioned by Alternative 10b may cause compliance problems for permit holders fishing large numbers of traps. However, if coupled by a cap on the number of traps fished, as described in Alternative 12, Alternative 10 should prove perfectly workable.

<u>EFH Alternative 3</u>

CCA NY requests that the Council adopt EFH Alternative 3, which would ban the use of bottom tending mobile gear near the head of Hudson Canyon. Hudson Canyon, as the largest submarine canyon on the east coast of the United States, provides valuable and unique habitat for a wide variety of fish, including winter habitat for summer flounder, scup and black sea bass and year-long habitat for tilefish. All of those species are, when concentrated in the Hudson Canyon area, particularly vulnerable to the gear types in question. A case can be made that concentrated trawling in the Hudson Canyon area, and in similar areas along the coast, which began in the late 1970s, contributed substantially to the decline of the summer flounder population and caused substantial hardship to both the recreational and inshore commercial fisheries. While subsequent management measures have led to a substantial recovery of the summer flounder population, prohibiting trawling over wintering aggregations of fish in the Hudson Canyon area can only be beneficial to both the resource and to fishermen.

<u>EFH Alternatives 4 and 5</u>

CCA NY strongly supports limiting or prohibiting the use of trawl gear that seriously degrades habitat and/or permits fishing over hard bottom areas that previously provided unfished, de facto sanctuary areas to structure-oriented species like black sea bass. Research conducted in New England, most particularly by Dr. Peter Auster of the University of Connecticut, has conclusively demonstrated that the repeated trawling of hard-bottom areas degrades habitat, reduces biodiversity and ultimately reduces the carrying capacity of the trawled bottom. To that end, CCA NY would support proposals within EFH Alternative 4 that would either outlaw roller rig and rockhopper gear, or restrict rollers to no more than 8 inches in diameter, and would also eliminate the use of street-sweeper gear. As an aside, CCA NY notes that such a prohibition would complement a similar prohibition that CCA NY is seeking in state waters, in legislation that has already been passed by the New York State Assembly.

Thank you for considering CCA NY's positions on the above matters.

Yours truly,

Charles A. Witek, III
Chairman, Fisheries Committee

Robert L. Hollowell
2045 E. Ocean View Ave.
Norfolk, VA 23503
757-587-4413

14 April 2002

Mr. Daniel Furlong
Exec. Dir. – M-AFMC
Room 2115 Fed. Bldg.
300 South New Street
Dover, DE 19904-6790

Subj: Comments on Proposed Amendment 13 to the Black Sea Bass FMP

Dear Mr. Furlong;

I have fished Commercially with hook and line for Black Sea Bass for more than 40 years. In fact, I was the first person to find at least 10 of the well-known wrecks in this area.

I have a 50-foot wooden boat which is over 80 years old and cruises at 8.5 knots. Except in the summer, in this area we have to travel 40 to 75 miles to get to waters holding large numbers of Black Sea Bass. Because of the speed of my boat, I have to plan a trip when the weather is going to be 'beautiful' for about 30 hours. Needless to say, I only get to make a couple of trips each winter when the big fish are plentiful for us. Most of my trips are in the summer when large hook and line catches cannot be made in this area because the fish are spawning and very finicky. This is when they are very susceptible to potting. Under the present system, pots have been fishing (and destroying untold amounts of marine creatures) every day of every month of every quarter since the Black Sea Bass FMP has been adopted. Other gear types have not had this luxury. It is time to level the playing field.

Prior to the qualifying period for a Moratorium Permit, many years I had landings in excess of 15,000 pounds and even had a few trips in excess of 4,000 pounds – yes – with hook and line. In the last 15 years or so I have not landed 10,000 pounds of Black Sea Bass in any 3 out of 5 year period.

If the Council had adopted a reasonable minimum qualifying criteria (between 1,000 lb. and 5,000 lb.) for a Moratorium Permit, we would not be having many of these problems. You folks are going to have to do more than just talk about keeping the seasons open longer and stopping pots from fishing unattended for extended periods. Also, you had better adopt a limit on the number of pots per Permit. Even 800 is way too many. It should be about 500.

Also, there is a need for a system whereby trip limits can be adjusted, down or up, within a quarter. Anything above a 50% trigger has been proven not to work. Have the Monitoring Committee, or appoint a sub-committee to, review landings when 50% of the quota is projected to be reached or, if later in the quarter, at the end of the first and second month of each quarter. Then, revise the trip limits appropriately to ensure the season stays open most of the quarter.

I feel hook and line commercial fishermen should be in a separate gear category with their own trip limits, i.e. 1,500 pounds November thru March and 800 pounds April thru October and not subject to closed seasons. After all, the number of fish we catch does not put a dent in the stock and we are unquestionably the most environmental friendly gear type i.e. least amount of dead discards, least amount of by-catch, least destruction to the habitat, highest quality product, etc.

Kindly consider my suggestions and put us hook and line commercial fishermen in a quota category by ourselves.

Very truly yours,

Robert L. Hollowell
Robert L. Hollowell

CC: Mr. Jack Travelstead, VMRC
Mr. Mike Lewis, ASMFC

Hodges Seafood Ltd
2456 Bullock Trail
Virginia Beach, VA 23454
Tele #: 757-463-5475
Fax #: 757-564-2893
Email: mhodges@cox.net

April 14, 2002

Mr. Daniel Furlong
Executive Director
Room 2115 Federal Building
300 S. New Street
Dover, MD 19904

Re: Amendment 13 Public Comment

Dear Mr. Furlong:

Please accept the following as my comments with regards to Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan:

Alternative 1 & 2 will not solve any problems.

Alternative 3A: This option could solve the problem within the fishery. The problem in the fishery is the federally uncontrollable state fisheries of NY, RI and MA. The quota allocation by permit category would reduce these state fisheries, because most of these state fishermen do not have federal licenses.

Alternative 3B: is basically the same as 3A.

Alternative 3C & D are not favored because we need the 10,000-pound license to reduce future efforts.

Alternative 4A & B: This would also solve most of the problems in the Black Sea Bass fishery because of quota allocations would greatly reducing the uncontrollable northern state fisheries.

Alternative 5A-D: This is the preferred method because with the extreme diversity of the fishery (within the states), the fishery can be better controlled by the state. I also feel that the later year landings (1996 to 2000) should be used for the base period. This alternative is the only choice we have to solve the many problems within the Black Sea Bass fishery.

Alternative 6A, B & C: I favor the hybrid system also but, with some minor changes. The coast wide quota period should be the first quarter only. The allocation should be based on 1996 to 2000 landings because of how the dragger fishery has changed over the past few years because of the net size changes, it has become a much more directed fishery instead of so many Black Sea Bass being caught while Flounder fishing. The later years reflect the fishery as it is today and will be in the future.

Alternative 7A & B: This is the same as alternative 6.
Alternative 8A & B: Could solve the problems within the Black Sea Bass fishery, but again the base years of 1996 to 2000 need to be used for the allocation to better reflect the fishery today. This alternative would also limit the state fishery problem.

Alternative 10: The wet storage of pots could be solved by state to state quota. In lieu of bringing the pots in the doors could be removed and replaced again at a later date

Alternative 11A & B: I favor the status quo for no pot tags required. State to state quota would eliminate this need also.

Alternative 12A, B & C: I favor the no pot limit. We have a size limit a trip limit or landing limit, so why is there a need for a pot limit. 400 traps would put all full time trap fishermen from NJ south out of business immediately. If we go to state to state quota, and catches are based on history, then 800-pot limit would disallow me from catching my qualifications. Pot landings are not the problem in the fishery; it is the uncontrollable state water landings The part-timers are pushing for a pot limit to drive the full-timers out of business.

In summation, I favor the 12 month state to state quota system based on years 1996 to 2000 landing, because this better reflects the fishery as of today. Thank you for your consideration in these extremely important issues.

Sincerely,

Mark

Mark L. Hodges
President

MLH/kah

P. O. Box 543
Amagansett, NY 11930
April 15, 2002

Mr. Daniel T. Furlong
Executive Director
Room 2115 Federal Building
300 S. New Street
Dover, DE 19904

Dear Mr. Furlong,

I recently read the Public Hearing Summary Document for Amendment 13 to the summer Flounder, Scup and Black Sea Bass Fishery Management Plan with great interest for it spoke of alternatives that could greatly affect my livelihood as an inshore trawl fisherman.

I was pleased to see that the Council recognizes that "long closures have obvious economic consequences to fishermen and processors" and as a result fishermen "are faced with the additional economic concerns of no or reduced income". Also, already imposed "restrictive harvest limits, gear restricted areas and restrictions on roller rig gear to 18 inches have helped improve the status of the stocks while conserving marine habitat". Since my earned income comes nearly entirely from the seasonal inshore trawl fishery, keeping the fishery open for as much of the season and not further restricting the use of bottom tending mobile gear is very important. The stocks of summer flounder and scup have rebounded substantially over the past two years even to point that it has been very difficult to get away from the fish when the fishery has been closed. I maintain that it is preferable to keep the fishery open by setting landing limits geared toward keeping the fishery open April thru October when all three species of fish are closer to shore.

I am concerned about several alternatives considered by the Council that would limit further or even prohibit the use of bottom tending mobile gear in the near shore areas. Several measures of gear restriction are currently in place to minimize impacts of fishing gear on essential fish habitat (EFH) for summer flounder, scup and black sea bass. Since "the majority of habitat in the Mid-Atlantic region is dynamic sandy bottom" and "research shows that bottom tending mobile gear has a short-term impact on this type of habitat". I believe that no further EFH regulations are necessary.

All the <u>EFH Alternatives considered by the Council but rejected for further analysis</u> would have a devastating effect on all near shore trawl fishermen. I am fishing in waters that have seen the use of bottom tending mobile gear by my family for nearly a century. The stocks of summer flounder, scup and black sea bass have been impact much more by the quality of the inshore water and the year round fishing efforts along the coast than the currently used trawl gear. I believe that this is supported by the recent increase in seasonal stocks of these fish inshore as new management efforts have been implemented.

I appreciate the opportunity to express my thoughts on this important matter and the Council's consideration of the enormous impact further restrictions of the use of bottom tending mobile gear would have on the inshore fisherman who like my forefathers have been making a living using this method on these fish stocks for generations.

Sincerely,

Norman C. Edwards, Jr.

Mr. Dan Furlong
Executive Director
Mid Atlantic Fishery Management Council

April 15, 2002

Dear Mr. Furlong,

After going through the Amendment 13 document, I would like to give the following comments.

My first comment is that I received the summary document the day before the meeting. Everyone else, DEC officials included had just received the document the day before too. I wish it had been sent out sooner for review to the affected parties.

My first comment on the document itself is that, on page two of summary document, the last paragraph states that because of restrictive fluke quotas the first quarter hasn't been taken in 1998, 1999, or 2000. It states that because of restrictive fluke management measures that this time period has not been filled. I am all for measures that protect one species but also protects others at the same time. But I don't want those fish taken out of the period they historically came from.

The larger offshore boats always have to take a bigger cut of the quotas. I'm willing to roll the unused quota from the first period into the next period or another period but I'm not willing to give it up. I'm catching the fish 70 miles offshore so to say that more restrictive trip limits have advantaged the north is not totally accurate, -page three paragraph one.

My recommendations are as follows:

Leave Alternative 1 in place. While a smaller trip limit at times might be advantageous to keeping the fishery open the distribution should remain the same, but with a rollover provision, this would be more fair and equitable. If the offshore trawl sector didn't fill the first quarter, it rolls over into the next quarter.

I'm against Alternative 2-A because of the adjustment of quota.

I'm against Alternative 3 because New York has always been short changed on quotas because of poor record keeping.

Of the three options, the only two that seem reasonable are Alts. 3A or 3D.

I'm dead set against Alternative 4 because New York always gets short changed on quotas.

I'm against Alternative 5 for the same reason.

Alternative 6 might be acceptable also but the offshore trawl fishery has already paid a huge price for management. We can't lose anymore. We must be protected.

Alternative 6-B is unfair to offshore vessels. You're using a time frame that disadvantages offshore boats.

Alternative 6C would be acceptable but only if the 1980-97 percentages are used. Look at when the fluke plan went into effect and it's easy to see what happens to the historical participants. The 1980-97 timeframe is the only one that's fair.

Alternative 7 is totally unacceptable.

Alt 8 is absolutely ridiculous. It is a totally transparent grab by people who didn't catch as much during the base years that are trying to reallocate percentage. The committee must have forgotten to include the landings percentages from 1980-97. Look, I'm not trying to hurt anyone here but this is a total resource grab.

Alternative 9A is ridiculous.

Alternative 9B does not hurt the stock, why make fishermen that have more paperwork and regulations to deal with than ever before, do more that won't conserve fish.

Alternative 10 I'd rather not comment on; I don't know someone else's fishery.

Alternatives 11A-B, again I don't know the fishery as well as Alternatives 12A, B, C. But, NMFS should have some CPUE data for pots that could tell how many pots are appropriate under these restrictive limits.

Under ***Alternatives considered but rejected***, the paper refers to the use of base years before 1988 and or after 1997 for allocation formulas was mentioned. It appears that these dates were not used but in Alternative 6C, the period was 1980-97. This was before restrictive mgt. measures were in place, that severely limited the offshore draggers.

Therefore a more accurate picture emerges, 50.18% in the Jan- April period showing catch before management measures creating an artificial fishery. Again larger vessels always pay a higher price for fishery mgt. than smaller vessels. If 1980-97 can be used for Alternative 6C, than it should be offered and analyzed for all.

Under *Alternatives for EFH*, I feel that Alternative 1 is more than adequate. The document states on page 18, that with mgt. measures already in place for the 32 stocks managed by NEFMC, MAFMC, and SAFMC, a huge reduction in effort is already in place.

Off of Montauk we have the restricted gear areas (lobster trap areas) Area 1 closed to mobile gear Oct 1- June 15; Area 2 closed to mobile gear Nov 27- June 15; Area 3 closed to mobile gear June 16-Nov 26th, and Area Four closed to mobile gear June 16- Sept 20.

We have artificial reefs at every south shore inlet on Long Island, which the mobile gear sector stays away from. We can't tow a net within 1 1/2 miles of any inlet on LI. Plus numerous natural rock areas and ledges. We are not hard bottom boats. The only time I put on a rockhopper sweep is in my squid net to get over (avoid) sea scallops and fluke.

I'm against Alternative 2 for the reasons that I've given for Alternative 1. Alternative 3 is one of the few productive are left for me to fish for Loligo squid, what with the Northern and Southern GRA's, the restricted gear areas, and other places we can't fish.

Alternative 4 is unfortunately one more example of some uninformed environmentalist jumping on the buzzword bandwagon screaming "Roller rigs bulldoze the bottom." I gave an example above where a rockhopper sweep is used in conjunction with a large mesh three bridle squid trawl, not to go over rocks, boulders, reefs, and small children but to eliminate discards of fluke and sea scallops. But the enviros will take the rockhopper sweep out of the tool box and then tell us to reduce discards further.

Alternative 5 is another example of making a move without the information. I myself don't know enough about the gear to make a determination. I would hope that the council looks into this situation using rock hopper sweeps to eliminate bycatch.

I would just like to add that under the environmental, economic, and social impacts the document says that some of the EFH alternatives will result in economic loss, but losses may be offset by benefits to the stock by protecting the habitat.

That trawls do damage to the habitat is far from proven, only now are the impacts of trawling being investigated. Some scientists even feel that productivity is improved by trawling an area.

The only thing that benefits from closing an area to bottom trawling is the fundraising campaigns of the environmental organizations and pot fishermen. If the Hudson Canyon area is closed my vessel, the Cory & Leah, will lose at least $150,000 in gross revenues per year, and based upon previous years' revenues, it could be more than that.

I have seven employees, some with families who depend on their income from my fishing operation. With GRA's, restricted seasonal gear areas, artificial reefs, inlets, and rock piles we don't have any options. The squid fishery is probably the most sustainable fishery on the East coast. Please don't fix it.

Thank you for your time.

Dave Aripotch
F/V Cory & Leah

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

APR 15 2002

Daniel Furlong
Executive Director
Mid Atlantic Fishery Management Council
Room 2115 Federal Building
300 South New Street
Dover, DE 19904

Dear Dan:

This letter provides comments (attached) on the Draft Environmental Impact Statement (DEIS) for Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP). Overall, the DEIS is a significant improvement from earlier drafts. Although largely qualitative, the analysis of impacts section provides the Council and reviewer with appropriate information that should influence their decisions. However, there remain some deficiencies in the analyses that will need to be addressed and I remain particularly concerned about the quota alternatives that divide the black sea bass quota into small quota shares and the Agency's ability to monitor these small shares. In addition, I am concerned about some of the descriptions of the proposed alternatives, discussion of essential fish habitat impacts, and conclusive statements in the DEIS that do not appear to be supported by quantitative or qualitative analysis.

These concerns will need to be addressed prior to completing the Final Environmental Impact Statement (FEIS). It is important that the FEIS contains all of the information that the Council will need to make an informed decision on Amendment 13 to the FMP, based on analysis of the range of alternatives. Ensuring that the FEIS addresses the attached comments will minimize any delays in Agency review occasioned by an incomplete document after the Council approves and submits the FEIS.

Additional editorial and technical comments, including comments relating to the analysis portions of the DEIS will be forwarded directly to your staff for consideration in the FEIS. My staff is available to answer any questions you may have.

Sincerely,

Patricia A. Kurkul
Regional Administrator

Attachment

RECEIVED
APR 15 2002
MID-ATLANTIC FISHERY COUNCIL

ATTACHMENT

COMMENTS ON AMENDMENT 13 TO THE SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN

Quota Monitoring

Several of Amendment 13's proposed quota management programs divide the relatively small black sea bass quota into even smaller subquotas. This is most significant in the hybrid quota programs, which combine a coastwide quota for a portion of the year with state-by-state quotas for another portion of the year. State-by-state quota shares under these programs would be the smallest of any alternatives. As I have commented previously, a quota with such small subquotas cannot be monitored effectively under the current quota monitoring system.

It is not appropriate for the DEIS to conclude that NMFS will initiate development of a monitoring program, given my prior comments. In a letter dated May 7, 2001, I urged the Council to consider in Amendment 13 the development of alternatives to the current quota system that the current quota monitoring system can accommodate. In that letter I also advised the Council that should the Council and states agree that a state-by-state quota system is the best alternative, then the Council, states, and NMFS should meet to discuss quota monitoring options and to determine whether it is possible to develop a monitoring system that could work through a joint state/Federal monitoring effort. Nevertheless, the DEIS (Section 2.1.5.1) states that "... this [state-by-state quota] alternative would require a cooperative program initiated by the states and NMFS to track accurately black sea bass landings."

The FEIS should contain the details of a quota monitoring system and changes to the reporting requirements associated with any new quota program to ensure that the Council and public are made aware of the changes that would be required. Information on a new quota monitoring system would also allow the FEIS to account for the costs and burdens associated with the new quota program. These details should not be developed unilaterally by the Council.

During the development of Amendment 13, my staff commented that quota allocations by permit category and gear sector could be monitored more effectively with vessel interactive voice response (IVR) reporting rather than dealer IVR reporting. However, since a vessel IVR system was not included in the DEIS, and, therefore, was not available for the public to comment on, it cannot be included in the FEIS as part of the alternatives. Should the Council select one of these alternatives as a preferred alternative, it should consider revisiting the monitoring program as soon as possible to ensure that vessel IVR system is used.

Essential Fish Habitat (EFH)

With respect to EFH, I am concerned about the characterization of impacts on EFH that is presented in the DEIS. It is critical that the statements and conclusions in the document are based on and supported by the best available science. There is literature that shows that the gear types discussed have a potential to impact adversely some bottom habitat. This information should be appropriately and consistently characterized in the FEIS. The FEIS should also include a better synthesis of the NMFS report "Workshop on the Effects of Fishing on Marine Habitats of the Northeastern United States" to help the Council determine if the adverse impacts of fishing gear on EFH are more than minimal and not temporary in nature.

The FEIS must provide a description of the effects of pot and trap gear on EFH based on available information. Some alternatives, such as the alternative for wet storage of pots, references the effects of pot/trap gear on EFH. However, without a thorough description of the effects of the gear, it is difficult to determine and analyze the extent of the effects of alternatives to manage pot/trap gear.

The effects of the management alternatives on EFH must include impacts on the EFH of all species, not just summer flounder, scup, and black sea bass EFH.

The FEIS needs to contain an appropriate description of the "status quo" condition of the fishery with respect to gear impacts on habitat and the effects of the current management program on EFH. The description contained in the DEIS regarding status quo impacts to EFH indicates that the current fishery may result in reduced or no additional adverse effects on EFH. As identified in the gear impacts section of the DEIS, most gears currently in use do have adverse effects on EFH. While recovering stocks may change the way the fishery effects EFH over time, those changing conditions should not be used to characterize the current, status quo effects of fishing on EFH. The analysis portion does not provide the reviewer with the ability to determine what the status quo effects might be. As a suggestion, the description of gear impacts could be considered status quo conditions and be described in the FEIS as such.

Practicability analyses must be included for all of the alternatives considered to prevent, mitigate, or minimize the effects of fishing on EFH. It should be clear to the Council when they receive the draft FEIS for consideration what the practicability of each alternative is with respect to EFH. This should include even the black sea bass quota alternatives if they are considered as a means of minimizing the adverse effects of fishing on EFH.

Shifts in Fishing Effort

The DEIS does not describe adequately potential shifts of fishing effort from current conditions. A better characterization of how effort may shift between areas, gear types, and seasons in the quota alternatives and the removal of the permit restriction alternative would provide the Council with a comparison to current conditions. It would also provide more ability to determine the impacts on habitat and protected species. There is inconsistency present in many of the alternatives with respect to both EFH and protected species where the document describes potential shifts of fishing effort, but the description of the effects on EFH and protected species imply that no shifts in fishing effort are expected. If the conclusion remains that there are no fishing effort shifts, information must be presented that supports that conclusion.

De Minimus Specifications

NMFS disapproved *de minimus* specifications for the summer flounder, scup, and bluefish fisheries. My staff provided comments during the development of Amendment 13 stating that the DEIS must describe, consider, and address prior NMFS disapprovals of *de minimus* specifications. However, the document includes a discussion of the *de minimus* measure that is identical to previous documents (most recently in Amendment 1 to the Atlantic Bluefish FMP) and does not mention prior disapprovals or any proposed remedies. Unless the Council can further develop the *de minimus* specifications measure and include revisions in the FEIS that alleviates NMFS's concern with the measure, my concern remains that it would not be consistent with National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as explained in previous letters to the Council for other actions that included the *de minimus* specifications measure.

National Standards

The DEIS states that discussion under each National Standard in Section 5.1 (pp 251-257) will be included after the Council and Commission choose a preferred alternative. However, discussion should be included in the draft FEIS to ensure that the Council is provided with the information that demonstrates that the alternatives in the amendment are consistent with the National Standards when it is considering selection of preferred alternatives to submit to the Secretary of Commerce. For example, the description of gear effects on EFH and all of the EFH alternatives are based on the best available science. Also, it would be useful to point out the scientific information (including some of the inconclusive nature of some of the information) that was used in the National Standard 2 discussion.

Also, throughout the development of this action, and during public hearings, the Commonwealth of Massachusetts and the State of Rhode Island, in particular, have raised concerns about the share of black sea bass quota that the states are proposed to receive under the state-by-state quota programs. The draft FEIS should include a discussion of the equity of the allocation of quotas with respect to National Standard 4.

Finally, the FEIS should include a description of the impact of the "wet storage of pots/traps" alternatives on safety of human life at sea under the discussion of National Standard 10. Both of the proposed alternatives would have similar safety issues. For example, requiring vessel owners to remove a potentially large number of pots/traps in a 10-day period would have potential safety issues.

e

ENVIRONMENTAL DEFENSE

finding the ways that work

April 15, 2002

Mr. Daniel T. Furlong
Executive Director
Mid-Atlantic Fishery Management Council
Room 2115 Federal Bldg.
300 S. New St.
Dover, DE 19904-6790
VIA FACSIMILE 302-674-5399

RE: Amendment 13 – Summer Flounder, Scup, Black Sea Bass Fishery Management Plan

Dear Mr. Furlong,

Please accept these comments regarding the above-referenced matter on behalf of Environmental Defense and our 300,000 members nationally. We have commented extensively on summer flounder management issues in the past, and are restricting our comments to the Essential Fish Habitat (EFH) alternatives and analysis in the document. We acknowledge that the purpose of the proposed EFH alternatives is to minimize adverse impacts of fishing gear on EFH and have directed our comments accordingly.

EFH Alternative 1 (Status Quo): Although we agree that regulations which restrict landings in order to meet a particular fishing mortality rate can indirectly protect EFH through reduced effort, we do not believe that such measures, in and of themselves, are sufficient to reduce gear impacts. As stocks recover, it is highly likely that effort will once again be allowed to expand. Furthermore, despite the decrease in landings noted over the past 10 years for summer flounder, scup, black sea bass and bluefish (Section 4.2.1, page 235), a reduction in landings does not necessarily translate into a reduction in effort as stated. Too much effort in the fishery is often the proximate cause of a decline in landings, as has been the case with summer flounder in the past. Therefore, we respectfully suggest that care be taken when drawing such conclusions from landings data. Also, as stated elsewhere (Section 4.2.2, page 238), restrictions in one fishery may redirect effort to another fishery that includes the same or similar habitat types being targeted for protection. Given the above, we strongly believe that additional proactive measures to protect EFH from gear impacts are warranted.

EFH Alternative 2 (Prohibit bottom tending mobile gear from the nearshore areas surrounding estuaries): We support this alternative as it will provide additional protection to fragile hard bottom habitat in the region. We recognize that some economic losses from the implementation of this alternative may be unavoidable, but believe that this measure would prevent significant gear damage from occurring in areas where recovery is likely to be slow. Furthermore, economic

North Carolina Office 2500 Blue Ridge Road · Suite 330 · Raleigh, NC 27607 · Tel 919 881 2601 · Fax 919 881 2607
New York, NY · Washington, DC · Oakland, CA · Boulder, CO · Austin, TX Project Offices · Boston, MA · Los Angeles, CA
www.environmentaldefense.org

losses have the potential to be regained through secondary benefits of habitat protection such as increased production.

EFH Alternative 3 (Prohibit bottom tending mobile gear in the area surround the Hudson Canyon): We support this alternative, and strongly believe that the potential benefits associated with proactively protecting some or all of this area, for at least a portion of the year, outweigh the economic impacts to the commercial sector. Despite the fact that net societal benefits are difficult to calculate, habitat protection is critical for the future of the fishery. The Hudson Canyon is one of the few locations in the mid-Atlantic region which contains hard bottom and is a logical choice for protection from gear impacts as such areas are typically high in biodiversity. Furthermore, this provides an opportunity to gather additional quantifiable evidence of the impacts of closed areas on fish production. The ancillary benefits to tilefish only provide further support for implementation of this option.

EFH Alternative 4 (Roller rig and rock hopper gear restrictions): We support restrictions on roller size with regard to both roller rig and rock hopper gear, and believe that consistency (i.e., same roller size from Maine to North Carolina) in the regulations would be a benefit for federal permit holders. However, we are not in a position to make a specific recommendation regarding roller size, but suffice it to say that a smaller roller size would likely have fewer lasting habitat impacts. We are not advocating an outright prohibition on the use of such gear in the mid-Atlantic given the distribution of hard bottom versus sand in the region.

EFH Alternative 5 (Prohibit street-sweeper gear): We support this alternative as a proactive measure to protect habitat, as well as to provide consistency in gear regulations throughout the mid-Atlantic and New England. Furthermore, because this gear may not be widely used throughout the Council's jurisdiction at this time, or even used at all, such a proactive measure will have a smaller economic impact if implemented as soon as possible. Too often fishery managers are in the "reactive" position of implementing gear restrictions to protect habitat after damage has already occurred and the gear is widely used. Taking action now would allow for the design of a statistically valid gear impact study to quantify the habitat impacts from street-sweeper gear.

In closing, we srongly urge the Council to be as proactive as possible in managing gear-related habitat impacts, as this approach will maximize protection of EFH and minimize potential economic impacts to the fishing community. As always, we thank you for your consideration of our views and for the opportunity to comment.

Sincerely,

Michelle Duval

Michelle Duval, Ph.D.
Scientist

Douglas Rader, Ph.D.
Senior Scientist

Daniel Whittle
Senior Attorney

North Carolina Fisheries Association, Inc.

P.O. Box 12303
New Bern, N.C. 28561
Phone: (252) 633-2288
Fax: (252) 633-9616

Website:
www.ncfish.org

Email:
ncfa@ncfish.org

April 15, 2002

Mr. Daniel T. Furlong, Executive Director
Mid Atlantic Fishery Management Council
Room 2115 Federal Bldg.
300 S. New Street
Dover, DE 19904

RE: Amendment 13 to the Summer Flounder, Scup and Black Sea Bass FMP
Via Fax and First class mail

Dear Dan:

On behalf of North Carolina's commercial fishing families, NCFA respectfully makes the following recommendations:

- Option 5d: State-by-state allocations based on the best five landing years for each state during the period 1980 to 1997.

- Option 9b: Remove the permit requirement that restricts fishermen from using a Southeast Snapper/Grouper permit during a northern closure.

Yours truly,

Jerry Schill
President

1 of 3

Harry L. Doernte
5 Saunders Dr.
Poquoson, Va. 23662
757-868-9559
4/15/02

Mr. Daniel Furlong
Exec. Dir. – M-AFMC

Subj: Comments pertaining to Amendment 13 to BSB FMP

I stated some of my views at the Public Hearings at Ocean Pines, MD and Virginia Beach, VA; however, I feel I cannot say too much or repeat myself too often to emphasize the pathetic job the NMFS and the MAC have done in administering the BSB FMP. The draft outlined or implied a pretty good plan i.e. qualifying criteria of more than one pound for historical participants, trip limits ensuring quarters would remain open for most of the quarters, etc. The Regional Administrator stated she feels the main problem is that there are not enough sea bass out there to go around! There are more out there today than I have seen in the more than 20 years I have been commercially fishing for them. However, maybe that is not enough to satisfy all the new (opportunistic) entrants allowed into the fishery.

State by state quotas is definitely not the answer. There is nothing wrong with the present quarterly quota system if the percentages were re-aligned slightly i.e. 30, 25, 20, 25% and provide means to carry forward any quota underage to the following quarter of the same year. Add flexibility to increase or decrease trip limits within a quarter after a trigger has been projected to be reached i.e. 50% or at end of first and/or second month, whichever comes first.

Trawlers have made many extreme sacrifices in the administering of the plan. Their season has been cut from 5 months to 3 months, their mesh sizes have increased, they now have a mesh size threshold, etc. Other than size limits (applicable to all of us) and almost worthless (too small) cull ring specifications, potters have not been impacted by gear restrictions i.e. number of pots per permit, size of pots, removal of pots during extended closed seasons, etc. Their pots get to accumulate (and destroy many) fish while the seasons are closed to only to flood the market and devastate the price at the start of the ensuing quarter after a closure.

I have attached two letters:

1. Mine to Dr. Moore dated 8/3/01 in which I specifically address many points and issues.
2. Nine of us to Dr. Moore on 0/4/01 in which we question the legality of the way the plan is being administered vs. the National Standards

I feel those in a rule making/approval capacity had better take a long hard look at the National Standards issues when considering provisions to be implemented in Amendment 13. The National Standards are in place. If the provisions of Amendment 13 fail to achieve the optimum yield, be fair and equitable to all fishermen, promote conservation, consider efficiency in the utilization of fishery (sea bass) resources, and minimize bycatch, then those of us adversely affected had better unite and initiate action necessary to force compliance.

I, for one, am going to do everything in my power to see that I do not sit home for extended periods 2 or 3 out of 4 quarters while unattended pots keep on fishing and devastating resources.

Very truly yours,

H L Doernte

Harry L. Doernte

Attachment (2)

CC: Mr. S. B. Gudes
Mr. Mike Lewis, ASMFC
Mr. Jack Travelstead, VMRC

Harry L. Doernte
5 Saunders Dr.
Poquoson, Va. 23662
757-868-9559
8/3/01

Dr. Chris Moore
Deputy Director
Mid-Atlantic FMC

Some of the issues which must be addressed when amending the Black Sea Bass (BSB) FMP are:

1. AN HONEST and ACCURATE STOCK ASSESSMENT so annual quotas are increased.

2. REVISE BSB PERMIT QUALIFICATIONS BASED ON BSB LANDINGS IN 1993-1997 i.e. if a permit landed more than 15,000 pounds in any 2 or more of the 5 years that would qualify for a FULL Trip Limit Permit; if a permit landed between 3,000 and 15,000 pounds in any 2 or more of the 5 years that would qualify for a PARTIAL (one-half ?) Trip Limit Permit, and if a permit landed up to 3,000 pounds in any 2 or more of the 5 years that would qualify for an INCIDENTAL (100 pounds ?) Trip Limit Permit. Review Income Tax Schedule C's if necessary. No exceptions!

3. IMPLEMENT SCALED OR TRIGGERED TRIP LIMITS: Start each quarter at about 75% of what the trip limit would have had to be to ensure the same quarter the previous year would have remained open for the duration. Average Daily Landings should equal about 1% on the Quarterly Quota. At the end of the first month or whenever 35% of the Quarterly Quota is projected to be landed, whichever comes first, adjust the daily trip limits up or down or initiate a weekly landing limit of 1,000 (?) pounds. Do the same at the end of the second month or when 70% of the quota is projected to be landed, whichever comes first. The people in Gloucester are getting better at estimating landings – even with so many late entries.

4. ELIMINATE THE WET STORAGE OF POTS in the event a season is closed 10 days or more.

5. LIMIT THE NUMBER OF POTS TO 1,000 PER PERMIT and decrease that number by 150 each year until the maximum is 400 per permit. Tag pots per No. 6 below and no one can increase after first year of tagging. NMFS Northeast Region has limits on lobster and red crab pots -- Why are BSB potters treated as primadonnas?

6. HAVE ENFORCEMENT PERSONNEL INSPECT AND TAG POTS ON SHORE similar to Gulf of Mexico regulations to assure pots are legal. I believe most pots are NOT legal... The South-Atlantic charges a per pot fee ($1.20) to cover the cost of the tag and administration.

7. LIMIT POT SIZE TO 2' X 2' X 4'. Some modem pots measure in excess of 2' X 5' X 5'.

8. Stipulate GHOST or DEGRADABLE PANELS must be placed in lower part of parlor section of pot or trap.

9. INCREASE ESCAPE VENT SIZE REQUIREMENTS at least to those published in Tables 49 and 50 of original proposed FMP. Specify sizes are INSIDE MEASUREMENT dimensions – even treated wood swells!

10. MAXIMUM ROLLER DIAMETER SHOULD BE 15 INCHES OR LESS - Save the habitat!

11. VESSELS RETAINING MORE THAN 100 POUNDS OF BSB SHOULD HAVE MINIMUM TRAWL MESH SIZE OF 4".

12. ELIMINATE THE RESTRICTION THAT M-A PERMIT MUST BE SURRENDERED IN ORDER TO FISH IN S-A DURING A M-A CLOSURE. Pots keep on fishing in the M-A during a closure; however, we are not allowed to fish in the S-A for a separate stock of fish without surrendering our M-A permit for at least 6 months.

13. UNUSED QUARTERLY QUOTAS SHOULD BE CARRIED FORWARD.

14. RE-DISTRIBUTE QUARTERLY SHARES TO 30-25-25-20%. The BSB fishery gear type landings started changing in the early 1980's and have continued to do so.

15. PROHIBIT TRANSFER AT SEA.

16. ALLOW ONLY <u>ONE LANDING</u> every calendar day (24 hour period).

H L Doernte

Dr. Chris Moore
Deputy Director
M-A FMC

8/4/01

Subj. Black Sea Bass (BSB) FMP vs. National Standards

National Standard

1. **"...management measures shall...while achieving, on a continuing basis, the optimum yield..."**

   Is closing 68, 61, 25, 20 and 76 days out of each of the last 5 quarters (250 days out of 457) ***'on a continuing basis'***? We don't think so...

2. **"...management measures shall be based upon best scientific information available..."**

   I quote from your letter of 7/25/01 to BSB Monitoring Committee: 'The best available information on stock status indicates that stock size has increased in recent years. In fact, 3-year average for 1999-2001 is 45% larger than the value for 1998-2000. In addition, the recruitment index for 2000 is the highest in the time series.' Per Table 8 of said letter, relative exploitation index based on landings has decreased at least 10% on each 3-year average period since Plan was adopted. Based on ***'best scientific information available'*** overall quota should be increased at least 5%.

3. **"...an individual stock of fish shall be managed as a unit throughout its range..."**

   Co-mingled with separate stock south of Cape Hatteras by prohibiting a few (5 or less) hook and line fishermen from fishing in South-Atlantic during Mid-Atlantic closed season while unattended pots keep on fishing and destroying BSB and other marine creatures in closed area. Trawl nets are not authorized gear for BSB directed fishery in South-Atlantic. Where do the significant enforcement costs come from?

4. **"Conservation and management measures...shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no...entity acquires an excessive share of such privileges."**

   Allowing unattended pots to keep on fishing (and destroying marine creatures) during a closed season is not ***'fair and equitable'*** to other gear type fishermen, it certainly does not ***'promote conservation'*** and it enables potters to ***'acquire an excessive share'*** of the market when the season opens.

5. **"Conservation and management measures shall...consider efficiency in the utilization of fishery resources..."**

   Allowing unattended pots to keep on fishing (and destroying marine creatures) during a closed season does not ***'consider efficiency in the utilization of fishery resources'***.

9. **"Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."**

   Allowing unattended pots (even when and if equipped with time and test proven too small vents) to keep on fishing during a closed season completely ignores this **STANDARD** and opens the door for litigation.

If, by now, someone does not understand the theme of our concerns and understand how the present **BSB FMP** is flagrantly violating the **NATIONAL STANDARDS**, then further informal comment will be a vain and useless act...

Very truly yours,

H L Doernte

by direction of and for all the BSB Commercial Fishermen listed hereon.

Harry L. Doernte
6 Saunders Dr.
Poquoson, VA 23662
757-868-9559

Harry R. Doernte
53 Odd Road
Poquoson, VA 23662
757-868-8856

Jack G. Stallings, Jr.	Joe W. Mizelle, Jr.	Jimmy A. Martens	James E. Dawson	Robert L. Hollowell	Mark West	R. J. Puchalski
611 Goldsboro Ave.	1409 Gabriel Dr.	1060 Casanova Dr.	3008 Ridge Rd.	2046 E Oceanview	1929 Tilane Rd	16 Pearl Street
VA Beach, VA 23451	Norfolk, VA 23502	VA Beach, VA 23454	Chincoteague, VA	Norfolk, VA 23503	Norfolk, VA 23518	Wachapreague, VA
757-491-0281	757-855-9102	757-427-0983	757-336-6690	757-587-4413	757-480-0219	757-789-3930
					679-6849	

END