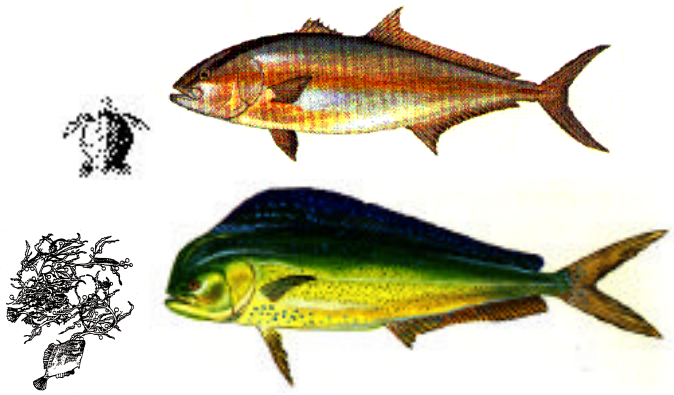
SECOND REVISED FINAL

FISHERY MANAGEMENT PLAN FOR PELAGIC *SARGASSUM* HABITAT OF THE SOUTH ATLANTIC REGION

INCLUDING A FINAL ENVIRONMENTAL IMPACT STATEMENT, INITIAL REGULATORY FLEXIBILITY ANALYSIS, REGULATORY IMPACT REVIEW, & SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT



NOVEMBER 2002

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Prepared by the
South Atlantic Fishery Management Council

NOVEMBER 2002

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LIST OF ACTIONS IN THE FISHERY MANAGEMENT PLAN FOR PELAGIC *SARGASSUM* HABITAT

PELAGIC *SARGASSUM* PLAN COVER SHEET

This integrated document is the Final Environmental Impact Statement (FEIS) for the Fishery Management Plan for Pelagic Sargassum Habitat. Also included are the Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). Separate Tables of Contents are provided to assist readers and the NMFS/NOAA/DOC reviewers in referencing corresponding sections of the Plan. Introductory information and/or background for the FEIS, IRFA, RIR, and SIA/FIS are included within the separate table of contents for each of these sections.

RESPONSIBLE AGENCIES

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NAME OF ACTION

(X) Administrative ( ) Legislative

SUMMARY

The Council is establishing a fishery management plan for pelagic *Sargassum* habitat and is proposing the following actions to meet the habitat-related requirements of the Magnuson-Stevens Act: Specify the management unit for pelagic *Sargassum* as throughout the South Atlantic EEZ and State waters; Specify Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* as 100,000 metric tons (220,460,000 pounds) wet weight per year; Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year; Specify an overfishing level to meet Magnuson-Stevens mandate for pelagic *Sargassum.* Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY. The Maximum Fishing Mortality Threshold (MFMT) is 9.0 to 18.0 units per year. The Minimum Stock Size Threshold (MSST) is 25,000 metric tons (55,115,000 pounds); Identify Essential Fish Habitat for pelagic *Sargassum*; Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*; and Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude). Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight. Require that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

Public hearings were held on June 15-16, 1998 at the Ponce De Leon Conference Resort in St. Augustine, Florida; on June 22, 1998 at the Town and Country Inn in Charleston, South Carolina; on June 23, 1998 at the Carteret Community College in Morehead City, North Carolina; on June 24, 1998 at the Holiday in Richmond Hill, Georgia; on June 25, 1998 at the Holiday Inn Express in Ft. Pierce, Florida; and on June 26, 1998 at Hawk's Cay Resort in Marathon, Florida. The Council reviewed public comments and informal review comments during the September 21-25, 1998 meeting in Charleston, South Carolina. After approving the management unit, definition of essential fish habitat and essential fish habitat-habitat area of particular concern for pelagic *Sargassum*, the Council deferred action on approval of the plan and the prohibition of harvest or possession until the December Council meeting. An additional public comment period was held during the full Council session on December 3, 1998 at the Ramada Inn in Kill Devil Hills, North Carolina. The Council finalized the Fishery Management Plan and voted to submit the plan for formal review by the Secretary of Commerce.

On September 23, 1999, the Council received public comment during the open comment period on the notice of availability for the *Sargassum* FMP. These comments and a letter from the Council's Habitat and Environmental Protection Advisory Panel were included with the Council's October 21, 1999 letter commenting on the notice of availability.

The original Sargassum Fishery Management Plan was disapproved by NMFS on November 24, 1999. The Habitat Committee revised the plan during the March 2000 meeting. The Council received addition public comment during the full Council session on March 9, 2000 in Tybee Island, Georgia. After considering the committee's recommendations, additional public input, and the NMFS's rationale for rejection, the Council approved a revised fishery management plan for formal review by the Secretary of Commerce.

The Council resubmitted the Revised Final FMP document to the NMFS on September 13, 2000. During the initial review for completeness of the document the following determination was made by NMFS: "The Council has incorporated a revised FEIS into the integrated document. Several actions have changed in the revised FMP compared to the original submission. Most importantly, the FMP would now allow a limited annual harvest on a continuing basis; the original FMP banned harvest after 2001. Because of this change, and others, NMFS has determined that the public would be better served if they had the opportunity to provide additional comment on the Environmental Impact Statement (EIS). Therefore, although the Council titled the document as a Final EIS, NMFS believes it is more appropriate to submit the attached documents as a Draft EIS for public consideration and comment."

Several meetings were held between Council and NMFS staff and it was agreed that the document would be returned to the Council for revision. The NMFS stated that the FMP be refiled as a DEIS prior to submission to the Secretary for formal review. The NMFS prepared a Supplemental DEIS and it was filed with EPA on January 4, 2002. Comments were due on February 25, 2002.

A public hearing was held during the Council's March 6, 2002 committee meeting and public comment was scheduled during the March 7, 2002 Council meeting. The Council reviewed public comments, letters, faxes, and comments presented during the public hearing (there were no public comments during the Council meeting on March 7th) and approved this Revised Final *Sargassum* FMP for formal review by the Secretary of Commerce.

FINAL ENVIRONMENTAL IMPACT STATEMENT

This integrated document contains all elements of the Fishery Management Plan for pelagic *Sargassum* Habitat, Final Environmental Impact Statement (FEIS), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). The table of contents for the FEIS is provided separately to aid reviewers in referencing corresponding sections of the plan.

( ) Draft (X) Final

SUMMARY

The National Environmental Policy Act (NEPA) requires Federal agencies to consider the interactions of natural and human environments. Issues and concerns (or problems) to be addressed in the Final Environmental Impact Statement (FEIS) are:

1. No management structure exists to protect pelagic *Sargassum* habitat.

2. Harvest represents removal of essential fish habitat for other federally managed species including threatened sea turtles.

3. Potential conflicts could arise if harvest occurs where recreational fishing is occurring.

4. Limited information exists on the distribution, production, and ecology of pelagic *Sargassum* habitat.

The following objectives are addressed in the pelagic *Sargassum* habitat plan:

1. Establish a management structure to regulate pelagic *Sargassum* habitat.

2. Reduce the impact of the pelagic *Sargassum* fishery on essential fish habitat.

3 Reduce the potential for conflict.

4. As a federally managed species/habitat, direct needed research to better determine distribution, production, and ecology of pelagic *Sargassum* habitat.

The Council is establishing a fishery management plan for pelagic *Sargassum* habitat and is proposing the following actions to meet the habitat-related requirements of the Magnuson-Stevens Act: Specify the management unit for pelagic *Sargassum* as throughout the South Atlantic EEZ and State waters; Specify Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* as 100,000 metric tons (220,460,000 pounds) wet weight per year; Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year; Specify an overfishing level to meet Magnuson-Stevens mandate for pelagic *Sargassum.* Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY. The Maximum Fishing Mortality Threshold (MFMT) is 9.0 to 18.0 units per year. The Minimum Stock Size Threshold (MSST) is 25,000 metric tons (55,115,000 pounds); Identify Essential Fish Habitat for pelagic *Sargassum*; Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*; and Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude). Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight. Require that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

DEIS to NMFS on: May 12, 1998 DEIS filed with EPA on: July 2, 1998
DEIS comment period ends: August 24, 1998

FEIS to NMFS on: December 14, 1998 FEIS filed with EPA on: October 5, 1999
FEIS comment period ends: November 15, 1999

DEIS to NMFS on: October 9, 2001
SDEIS Prepared by NMFS on: December 2001 SDEIS filed with EPA on: January 4, 2002
SDEIS comment period ends: February 25, 2002

The *Sargassum* FMP was originally incorporated in the Comprehensive Amendment Addressing EFH in the Fishery Management Plans for the South Atlantic Region (EFH FMP). A Draft Environmental Impact Statement (DEIS) was filed with the Environmental Protection Agency (EPA) in July 1998 for the *Sargassum* FMP. On advice from the National Marine Fisheries Service (NMFS), the Council subsequently removed the *Sargassum* FMP from the EFH FMP and created a stand alone *Sargassum* FMP.

A Final Environmental Impact Statement (FEIS) was filed with the Environmental Protection Agency (EPA) in October 1999 for the *Sargassum* FMP. The NMFS rejected the Council's plan and advised the Council to consider alternatives to a total prohibition and resubmit a modified FMP.

On advice from the National Marine Fisheries Service (NMFS), the Council prepared a DEIS which was then modified by NMFS into a SDEIS in order to give the public an additional opportunity to comment on the proposed actions. For this reason, no preferred alternative was chosen for any of the actions in the SDEIS. Preferred alternatives are identified in the Final Environmental Impact Statement.

The following comments on the SDEIS were received (Appendix C):

1. **State of North Carolina**, Department of Environment and Natural Resources, Division of Marine Fisheries (dated 1/8/02) - "The North Carolina Division of Marine Fisheries has reviewed the subject document. We have no comments at this time."

Council's Response: None necessary.

2. **State of Georgia**, Coastal Resources Division (dated 1/24/02) - "Staff of the Coastal Management Program has reviewed your December 28, 2001 letter and attached SDEIS referenced above. The SDEIS proposes to establish a Fishery Management Plan for Pelagic Sargassum Habitat of the South Atlantic Region. The Program concurs with the applicant's consistency determination. This determination ensures that the proposed project has been designed to comply to the maximum extent practicable with the applicable enforceable policies of the Georgia Coastal Management Program."

Council's Response: None necessary.

3. **Mr. John W. Duren** (dated 1/29/02) - "As a member of the SAFMC Environment and Habitat Advisory Panel, I have reviewed the subject document dated December 2001. After careful reading and thoughtful consideration, I recommend the following actions. (1) Allow harvest (TAC) of 50,000 wet pounds annually. (2) Require all participants to report their harvest monthly. (3) Declare the EEZ as the EFH. (4) Restrict harvest to zones far enough off shore to minimize bycatch. (5) Restrict harvest to specified seasons to minimize bycatch."

Council's Response: The Council considered a 50,000 pound TAC in Rejected Option 3 which would have allowed the largest quantity harvested annually with the exception of the 200,000 pounds in 1990 when the intent was to stockpile product. The Council rejected this option because removal of pelagic Sargassum habitat constitutes a net loss of essential fish habitat in the South Atlantic region. The Council would have preferred to allow no harvest but this was rejected by NMFS. The Council is specifying a TAC of 5,000 pounds to minimize the impacts

of essential fish habitat removal. The Council's preferred action will have observers on every trip and they will provide the harvest information. In addition, the trip ticket program in North Carolina will also provide monthly landings data. The Council's preferred action for EFH does include the EEZ but it also includes state waters. This is important because *Sargassum* present in state waters is also essential fish habitat. Finally, the Council's preferred action restricts harvest to 100 miles offshore of North Carolina and limits harvest to the months of November through June to minimize bycatch.

4. United States Department of State, Bureau of Oceans and International Environmental and Scientific Affairs (dated 2/6/02) - "As this document does not contain an international component, we have no comment."

Council's Response: None necessary although the Council's action to establish EFH states that: "Because of the importance of the extra-jurisdictional pelagic *Sargassum* occurring in the Sargasso Sea outside the EEZ, the United States should pursue all other options under the Magnuson-Stevens Act and other laws to protect *Sargassum* in international waters."

5. United States Environmental Protection Agency, Region 4 (dated 2/19/02) - "EPA has the following comments, concerns and questions following review of the subject SDEIS.

a) EPA believes that designation of *Sargassum* as a habitat, specifically an EFH, should not automatically preclude some level of *Sargassum* harvesting. However, some means of protecting federally-managed fin fish species and federally-protected sea turtles needs to be discussed. Current harvesting methods using trawls would entrain and drown sea turtles, especially the young; the final SEIS should explore strategies for reducing post-hatchling turtle mortality. Prohibiting *Sargassum* harvesting from July to October, when the turtle hatching season is over, is an obvious strategy that might be explored. We do not know, however, for how long the post-hatchlings are likely to remain within the floating algal mats and subject to capture and damage in the harvest process.

b) EPA supports establishing a Management Unit for *Sargassum* throughout the South Atlantic Exclusive Economic Zone, and recommends that State waters be included as part of the Management Unit. While the majority of *Sargassum* habitat occurs beyond 12 miles, and thus outside of State jurisdictional waters, EPA believes that management plans affecting State and federal waters should be consistent to provide maximum protection of the resource. The presence of sea turtles in floating *Sargassum* mats is independent of political jurisdictions. Because post-hatchling sea turtles migrate from on-shore beach nesting areas through State jurisdictional waters on their way to a pelagic existence, the *Sargassum* mats first encountered by the baby turtles are likely to be situated in State waters. *Sargassum* habitats found in State waters should be protected to the same degree as those found in federal waters.

c) EPA supports the Council's establishing a Management Unit as large as is feasible so that the geographical boundaries of the fishery will not have to be redefined at some future date in the event an increased interest in *Sargassum*-based products expands the fishery. Up to now, the *Sargassum* harvesting has been modest, averaging slightly more than 20,000 lbs/year in the period 1976 to 1997, but Aqua 10's dramatic increase in proposed annual

harvest suggests a potential increased interest in seaweed-base products that may have long-term impacts on the resource. Establishing a comprehensive Management Unit at this time would provide the Council the authority to monitor and adjust stock harvest levels without having to provide additional NEPA documentation on redefining stock geographic boundaries.

d) EPA's earlier concerns for the commercial harvesting of *Sargassum* weed remain largely unresolved because harvesting destroys most of the bycatch inhabitants due to their small size and camouflage. The DSEIS should explore means to reduce mortality of managed fin-fish species entrapped in the *Sargassum* during harvesting operations.

e) The DSEIS notes that natural beach stranding of *Sargassum* on North Carolina shores alone is estimated to be 500 metric tons which far exceeds amounts being contemplated for commercial harvest. Harvesting beach stranded instead of offshore *Sargassum* eliminates most if not all of the EFH and related protected species concerns. The final SEIS should explain why beach stranded *Sargassum* cannot be used by Aqua-10 in their production processes.

Based on this review EPA rated the subject DSEIS "EC-2", that is, environmental concerns about the proposed management plans have been identified and more information is needed to fully assess environmental impacts to fully protect aquatic resources. Mortality of managed fin fish and protected sea turtles remains problematic."

Council's Response: The Council's proposed action does allow very limited harvest (5,000 pounds) off the State of North Carolina. Potential impacts with turtles are mitigated by prohibiting harvest off other States, by prohibiting harvest within 100 miles of the North Carolina coast, by limiting harvest to the months of November through June, and by requiring that an official observer be present on each harvesting trip. The Council concluded these actions will reduce the likely take of sea turtles to the maximum extent practicable and will monitor the harvest if any should occur. The Council will respond with more restrictions if turtle mortality becomes a problem.

The Council's proposed management unit includes State waters. The management unit specified covers all of the South Atlantic Council's area of authority. Attempting to expand the management unit to other Council areas would delay implementation of regulations by 3-5 years and was rejected by the Council.

The EPA's concerns for the commercial harvesting of *Sargassum* weed because harvesting destroys most of the bycatch inhabitants due to their small size and camouflage has been addressed by limiting harvest to 5,000 pounds. The Council concluded this action will reduce the likely take of bycatch inhabitants to the maximum extent practicable.

The EPA's suggestion to harvest beach stranded instead of offshore *Sargassum* is not feasible according to the one harvester/processor. Beach stranded weed is contaminated with pollutants such as oil, garbage, etc. Pelagic weed is pollutant free and provides the necessary quality for processing. In addition, the owner of Aqua-10 testified that the nutrients and chemicals being extracted from *Sargassum* are not contained in beach-stranded *Sargassum*. The desired components are lost in the process of wave generation on the beach and settlement on the beachfront.

6. The Reef Ball Development Group (email dated 2/20/02) - "The Reef Ball Development Group, Ltd, Reef Ball Foundation, Reef Innovations, Inc., Coastal Reef Builders, Inc., Eternal Reefs, Inc., Reef Ball Coalition, Inc., Advanced Coastal Technologies, Inc, and all of our combined memberships and affiliated companies OPPOSE and harvest of CRITICAL Atlantic (or any other seas) Sargassum Habitat. That ONE man would be allowed to destroy such VITAL habitat for the sole purpose of feeding livestock is not only abusive of the habitat and public resources…it's just plain insane. We strongly oppose any plan that allows ANY harvest of Congressionally Mandated Essential Fish Habitat."

Council's Response: The Council previously proposed a total prohibition on harvest but this was rejected by NMFS. The Council's current proposed action allows a minimal harvest off the State of North Carolina, which the Council hopes, will be acceptable to NMFS. This action will provide complete protection for the waters off South Carolina, Georgia, and the Florida east coast.

7. The Ocean Conservancy (dated 2/25/02) - "On behalf of the Ocean Conservancy (formerly the Center for Marine Conservation) and our more than 120,000 members nationwide committed to advocacy for wild healthy oceans, we are writing to express concern over the National Marine Fisheries Service's (NMFS) process for publicly noticing the availability and comment deadline for the Supplemental Draft Environmental Impact Statement for Pelagic Sargassum Habitat in the South Atlantic Region." ….. "there was not the usual posting in the Federal Register from NMFS or NOAA that this document was available for review and comment." "The Ocean Conservancy, in the short time period it has had actual notice of the SDEIS, has reviewed the SDEIS and has several substantial concerns regarding the adequacy of the DSEIS. We intend to provide further detail on these concerns in a letter to the SAFMC by its March 6th deadline. We urge you to extend the comment deadline to a reasonable date to allow for adequate public participation in the comment process directly to NMFS."

Council's Response: The Council noticed this comment period similar to notices in the past. Given the concern about lack of sufficient time, the Council indicated that the Sargassum plan has had extensive public input and comment. The scope of measures was previously noticed, reviewed, and commented upon during the prior comment periods.

8. The Ocean Conservancy (dated 3/6/02) - The Ocean Conservancy letter was received in the Council office on March 13, 2002. Their comments are as follows:

a) The Ocean Conservancy strongly opposes Sargassum collection for many reasons, particularly because it is EFH for federally managed finfish and is likely to involve the take of threatened and endangered sea turtles.
b) While a prohibition of Sargassum collection will financially affect one company to an unknown extent, since there is little economic information available and there has been no collection since 1997, many other fisheries regulations have financial and social impacts on the fishing community in the interest of conservation. This issue should not be held to a higher standard of scrutiny due to the limited number of participants.

c) Sargassum is an important habitat for a wide array of ocean wildlife. With insufficient information on regenerative capacity of Sargassum currently available and the known danger to threatened and endangered post-hatchling sea turtles from Sargassum collection, we believe the precautionary approach at this time dictates a phase out and ban on Sargassum collection.

d) We are concerned that this SDEIS fails to meet several basis standards required of all EISes according to federal regulations. First, there is an insufficient range of alternatives. The SDEIS also does not contain a proper impact analysis. This SDEIS also does not adequately analyse cumulative effects and impacts. Finally, the SDEIS does not identify any preferred alternatives. We urge NMFS and SAFMC to revise the SDEIS and prepare an adequate NEPA analysis that complies with the regulations.

e) The SDEIS states that NMFS is considering whether to "reinitiate" consultation on the June 2, 1999 Biological Opinion (SDEIS p.6). In our view, reinitiation is inappropriate because that Biological Opinion was for a proposed agency action that was never finalised, in that NMFS disapproved the Sargassum FMP. Therefore, rather than reinitiate consultation on a biological opinion that essentially became a dead letter with the disapproval of the proposed rule, the agency must conduct an entirely new formal Section 7 consultation on its new proposed action (whatever that may be). Furthermore, if the agency determines that its preferred course of action is to allow collection of Sargassum, it is highly unlikely that the agency will be able to avoid its obligations to conduct a formal Section 7 consultation analysis based on a "may affect, not likely to adversely affect" standard, given that the previous (but ineffective) Biological Opinion would have adverse effects on listed sea turtles by resulting in the lethal take of 31 post-hatchling turtles per 50,000 pounds wet weight of Sargassum collected. The Ocean Conservancy urges NMFS to identify the proposed agency action and to undertake formal consultation as soon as possible.

f) The only NMFS Federal Register notice that mentioned the SDEIS was published on February 19, 2002, for the public hearing on the SDEIS in Savannah. It therefore seems an unusually short deadline to have closed public comment on February 25, 2002 for NMFS and on March 6, 2002 for the SAFMC. The Ocean Conservancy urges the SAFMC to request NMFS to extend their comment deadline and publish public notice in the Federal Register to allow for meaningful public participation in the management of Sargassum.

g) The Ocean Conservancy is greatly disappointed to again be reviewing proposed action on Sargassum collection. We applaud the SAFMC for their past efforts to conserve Sargassum as important habitat. The Ocean Conservancy (then CMC) supported a prohibition on Sargassum collection when this issue was initially reviewed, and continues to support the implementation of no-take regulations because various ocean wildlife, including post-hatchling sea turtles and more than 100 fish species, are associated with Sargassum. We recognize that, in the interest of equity, a phase-out rather than an immediate prohibition on Sargassum collection was favored by many involved with this issue. The Ocean Conservancy supported that as an alternative to an immediate ban on take and still would. We urge the SAFMC to be strong in its convictions for protecting essential habitat and to recommend to NMFS a phase out with strict collection restrictions and ultimate prohibition on Sargassum collection.

Council's Response:

The Council previously proposed a total prohibition on harvest (after a phase-out) but this was rejected by NMFS. The Council's current proposed action allows a minimal harvest off the State of North Carolina, which the Council hopes, will be acceptable to NMFS. This action will provide complete protection for the waters off South Carolina, Georgia, and the Florida east coast. The Council concluded these actions would reduce the likely take of sea turtles and other marine organisms to the maximum extent practicable. The Council will monitor the harvest, if any should occur, and will respond with more restrictions if turtle mortality becomes a problem. This is the most precautionary management likely to be implemented and will provide protection for Sargassum, which is EFH for a number of species.

The Ocean Conservancy raises concerns about the range of alternatives which the Council concluded represented a reasonable range of alternatives which have been analyzed to the maximum extent practicable given available data and knowledge. The Ocean Conservancy's concern about the lack of a preferred alternative in the SDEIS is correct. The Council did have a preferred alternative that was not identified by NMFS in the SDEIS. The Council's preferred alternative did not change based on comments received during the comment period.

Concerns about a new Section 7 consultation will be addressed by NMFS as they review the FEIS and *Sargassum* Plan.

The Ocean Conservancy also questioned the notice and review period. The Council noticed this comment period similar to notices in the past. Given the concern about lack of sufficient time, the Council indicated that the *Sargassum* plan has had extensive public input and comment. The scope of measures was previously noticed, reviewed, and commented upon during the prior comment periods.

The Ocean Conservancy states that it is greatly disappointed to again be reviewing proposed action on Sargassum collection. The Council is equally disappointed but did everything possible to implement a total prohibition (after a phase-out) in the previous version of the *Sargassum* Plan and FEIS.

The Council reviewed the SDEIS comments at the March 6, 2000 Habitat Committee meeting in Savannah, Georgia. A Public Hearing was held during the committee meeting on March 6, 2002. The following individuals testified:

(1) Ken Hinman representing the National Coalition for Marine Conservation (NCMC). "I'm not really going to say anything that I haven't said to this Council on the *Sargassum* FMP a number of times before. I truly hope this will be the last public hearing on the *Sargassum* FMP and that it will be finalized in law very soon. The NCMC did not submit written comments on the draft SEIS, as I understand neither did the hundreds of fishing and conservation organizations and individuals that had previously testified to this council in support of your decision to give full protection to *Sargassum* as essential fish habitat. That's not because we don't care about *Sargassum* anymore. We have viewed the recent deliberations on this particular issue as largely procedural rather than substantive. It's the substance of the fishery management plan that we are most concerned with and we care most about, and that is providing full protection to *Sargassum* as essential fish habitat. We understand that over the last two years deliberations have been based on quirks in the Magnuson-Stevens Act that have required such, in my view, absurdities as

coming up with a maximum sustainable yield for an essential fish habitat and total allowable catches of EFH, and even having to describe and identify the essential fish habitat of essential fish habitat. But, be that as it is, we hope that the National Marine Fisheries Service and South Atlantic Council have been able to resolve these issues to the satisfaction of the law, and that this plan is ready to be approved by this council this week and sent up for final review by the Secretary and implemented very shortly. On the specifics of the plan, I would just reiterate our position that the total allowable catch, the optimum yield for *Sargassum*, should be zero. Barring that, it should be as close to zero as possible. This is essential fish habitat. This is not a fish. We view establishing overfishing definitions and thresholds and MSYs for this as, as I said, absurd and counter to the role of this particular organism in the ecosystem. We also believe that the MSY should be set as close to zero as possible; and barring that, it should be Option 5, 16 metric tons. And, again, I've submitted our comments many times on this issue. Our position is full protection of *Sargassum* as essential fish habitat; if there is any harvest allowed, that it be as small as possible and that it be phased out as soon as possible. Thank you."

(2) Michelle Duval and "I'm presenting these remarks today on behalf of Environmental Defense, our 300,000 members nationwide and our 9,000 members within North Carolina. We have commented extensively on the issue of pelagic *Sargassum* management in the past through both written and oral testimony since the Council first began to consider this issue, and we would like to incorporate by reference all of those previous comments. We do have and remain firm in our position that directed harvest of pelagic *Sargassum* should not be allowed. We would like to commend the Council and staff on their previous efforts to justify the maximum level of protection available to this resource. However, we recognize that the National Marine Fisheries Service has not supported the no-harvest option and acknowledge the reasons for that decision. And in the interest of moving forward with at least a minimum level of protection for pelagic *Sargassum* and the fauna which depend on it, we're supporting the proposed alternatives in this latest version of the fishery management plan of a 5,000 pound wet weight annual harvest limit geographically limited to those areas offshore of North Carolina, further than 100 miles out, during the months of November through June with 100 percent observer coverage. We will, however, continue to support the eventual shutdown and phase out of directed harvest on pelagic *Sargassum* as we feel that the method of harvest does indeed pose a significant threat to a number of juvenile vertebrate and invertebrate species. I'll just leave it at that and say let's move on with this, pass it and move on to something more productive. Thank you."

(3) John Duren. "I live here in Savannah, Georgia. I'm a **recreational fisherman**. I am a **member of the Habitat and Environmental Protection Advisory Panel for the South Atlantic Fisheries Management Council**. I don't have any interest in *Sargassum*. I don't know anybody who does have an interest in it. I did read the draft report back in December, and I submitted comments, as requested, to Mr. Powers and Mr. Gudes. After reading that proposal very carefully and giving careful thought to the whole issue, it seems to me there is only one real concern, and that is that the harvest of any reasonable amounts of *Sargassum* only has an environmental effect to the extent that it endangers young turtles that use it to rest. Sure, it is a place that fish congregate. As a recreational fisherman, I know that very well. I can tell you that I love *Sargassum* when it's glomerated very nicely in a weedline out there in the sea. And I can tell you that I hate it when it's widely disbursed in indiscreet little patches here, there and everywhere, and it doesn't do any good when it's like that. So, anyway, there does seem to be some economic benefit to harvesting certain amounts of this material. I think the proposed

regulations, which would designate time periods and zones and allow harvests are quite reasonable. I recommend that the total allowable catch, if you will, be allowed at something like 50,000 pounds, which should cover any foreseeable economic benefit and should not be any environmental or habitat disruption. Thank you."

(4) Alexander Stone with "Reefkeeper International, for which I am making these comments regarding the proposed *Sargassum* fishery management plan. We think that a maximum sustainable yield of 100,000 metric tons for what is essential fish habitat is outrageous Understand and we will support allowing a catch, a total allowable catch of 5,000 pounds per year currently. But please understand that this document, by designating OY, optimum yield at 5,000 pounds per year, does not preclude or prevent the expansion of the taking of that EFH all the way up to whatever you have designated as maximum sustainable yield, which is 100,000 metric tons. If you approve an MSY of 100,000 metric tons and you don't also establish a total allowable catch, because this does not establish a total allowable catch, then there is nothing to prevent me from getting in a boat and going out there and getting my 5,000 pounds or 10,000 pounds, or whatever it is that I choose to get up to the designated maximum sustainable yield in this document unless you have also established a total allowable catch for *Sargassum*. I read the document and the document doesn't do that. It establishes an optimum yield at 5,000 pounds. Now, remember what the law says, "Optimum yield is a target it is not a limit." So what we're asking you to do is to go back to setting optimum yield. Vote for an optimum yield of zero. That's your target, because, after all, these is essential fish habitat. Not only is it essential fish habitat, it's habitat that's essential to endangered species. Then approve the lowest maximum sustainable yield which this document will allow you to do, which is 16 metric tons. That's Option 5 under MSY. Then do something which this document does not do, which is to establish a total allowable catch. Establish a total allowable catch at your discretion at 5,000 pounds per year or some moderate level above that, but give yourselves now the regulatory precedent of having established a limit on how far this taking of essential fish habitat is going to be allowed to go theoretically. This document, at this point, would allow it to go all the way up to 100,000 metric tons. So, you know, that is our basic problem with this document. I know that if you read the document, there is a whole rationale, calculations and justifications based on the replenishment capability of *Sargassum* and so on. But realize that because of the other provisions that you have in this document prohibiting take anywhere except off North Carolina, prohibiting take closer than 100 miles offshore, prohibiting take several months of the year, you're concentrating the potential take of the habitat within a narrow time window and a limited geographical area. That calls for even an additional precautionary approach to this. Now, why should we give a hoot about something that we are told doubles in biomass every 10 to 20 days? Go back to staying in focus that this is not about the weed. This is about what lives in and on the weed. That's what it's about, and this includes endangered turtle species. It includes, as you know, the larval juveniles of many, many fish, and these all become incidental by kill of the taking of the weed. The four-inch mesh is not going to keep that from happening. And if you don't believe me, just go in the surf, take your hands, scoop up a bunch of this stuff and lift it up and see how much jumps out. Then take that bunch of seaweed to the beach, lay it down and then look through it and see how much stuff is still in there, and you will be amazed. The organisms that live in that habitat will not have an opportunity to escape the habitat when it is being collected. And so this is what I'm asking you to stay focused on, not the weed, not how fast it replenishes itself but the things that live in it. That's what this is about. The maximum sustainable yield could be a time bomb waiting to explode on you if you leave it at 100,000

metric tons. Take it as low as you can within the confines of what this document will allow you. I see no reason why you can't have OY as zero. Your rational for why OY for this essential fish habitat should be zero is sound. And remember, it's a target. And, please, do something that establishes a total allowable catch, which is a ridiculous concept for *Sargassum*, but since you have to do it, establish a total allowable catch so that it doesn't run away from you and then you have to go through a two-year process to amend this plan to take care of that problem. Those are our comments."

In addition to the written comments received during the official SDEIS comment period, the Council received 63 form faxes sent directly to the Council office. The faxes read as follows: "This is to Executive Director Robert Mahood: Please protect essential fish habitat. Dear Executive Director Robert Mahood, I am a citizen of the South Atlantic United States. I am deeply concerned that the South Atlantic Fishery Management Council is again reviewing a proposal to allow collection of *Sargassum* as essential fish habitat. Allowing collection of *Sargassum* can harm post-hatchling sea turtles and more than 100 species of finfish and other ocean wildlife that use the floating algae as habitat. I understand that the National Marine Fisheries Service has rejected the South Atlantic Council's recommendation to phase out over time and ultimately prohibit *Sargassum* collection. I continue to support a phase out and ultimately prohibition on *Sargassum* collection because there are potentially severe impacts on numerous species like threatened and endangered sea turtles. I urge the South Atlantic Council to again recommend to the National Marine Fisheries Service the collection of *Sargassum* ultimately be prohibited in both state and federal waters of the United States." A total of 63 comments were received; 25 were from Georgia; 19 from North Carolina; 9 from South Carolina; 1 from Connecticut; 5 from Florida; 2 from Ohio; 1 from New York; and 1 from California.

The Committee and Council reviewed these comments and the written comments received during the SDEIS comment period. NMFS and NOAA GC did not comment on the SDEIS because they drafted the document. In addition, a public comment period was provided during the Council meeting on March 7, 2002, however, no members of the public testified. The Committee and Council did not change the preferred options, and the Council unanimously approved the *Sargassum* FMP for formal review by the Secretary of Commerce.

FEIS to NMFS on: November 6, 2002 FEIS filed with EPA on: _____
FEIS comment period ends: _____

REGULATORY IMPACT REVIEW

This integrated document contains all elements of the Fishery Management Plan for pelagic *Sargassum* Habitat, Final Environmental Impact Statement (FEIS), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). A table of contents for the RIR is provided separately to aid the reviewer in referencing corresponding sections of the plan.

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INTRODUCTION

The Regulatory Impact Review (RIR) is part of the process of developing and reviewing fishery management plans, amendments, and seasonal adjustments, and is prepared by the Regional Fishery Management Councils with assistance from the National Marine Fisheries Service (NMFS), as necessary. The regulatory impact review provides a comprehensive review of the level and incidence of economic impact associated with the proposed regulatory actions. The purpose of the analysis is to ensure that the regulatory agency or Council systematically considers all available alternatives so that public welfare can be enhanced in the most efficient and cost effective way.

Executive Order 12866 requires that a Regulatory Impact Analysis be prepared for all regulatory actions that are of public interest. To meet this mandate NMFS requires that the Council prepare a Regulatory Impact Review (RIR) for proposed actions. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem, and 3) it ensures the regulatory agency systematically and comprehensively considers all available alternatives so public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed actions are a "significant regulatory action" under certain criteria provided in Executive Order 12866. In addition, information from the RIR is used to assess the impacts of the proposed actions on small entities. Because of the nature of these proposed actions, an initial regulatory flexibility analysis (IRFA) is prepared in Section 4.8 to provide full disclosure of their impacts on small entities.

This RIR analyzes the probable impacts of the proposed Fishery Management Plan (FMP) for pelagic *Sargassum* habitat of the South Atlantic Region.

PROBLEMS AND OBJECTIVES

The general problems and objectives are found in the FMP (Section 1.0). Essentially this FMP proposes to establish a management program for the pelagic *Sargassum* habitat, reduce the impact of fishing on essential fish habitat, and reduce the potential for conflict among various stakeholder groups. Further exposition of these issues are found in discussions under each proposed action.

METHODOLOGY AND FRAMEWORK FOR ANALYSIS

The basic approach adopted in this RIR is an assessment of management measures from the standpoint of determining the resulting changes in costs and benefits to society. The net effects should be stated in terms of producer and consumer surpluses for the harvesting, processing/dealer sectors, and for consumers. Ideally, the expected present values of net yield streams over time associated with the different alternatives should be compared in evaluating the impacts. However, lack of data (particularly on the cost and sale price of producing the final processed *Sargassum* product, the cost of substitute inputs for Aqua-10, and the incremental value of ecosystem services from protection of pelagic *Sargassum*) precludes this type of analysis. The approach taken in analyzing alternative management approaches is to describe and/or quantify the changes in short-term, net benefits. A qualitative discussion of the long-term impacts is also attempted. A detailed analysis of the effect of each proposed management measure is contained in Section 4.2 under the heading economic impacts.

Summary of Expected Changes in Net Benefits (Summary of Regulatory Impact Review)

The Council's preferred options are presented in the following table in bold.

Table 1. Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Proposed Action 1. Establish the Management Unit for pelagic *Sargassum* throughout the South Atlantic EEZ and State waters.	There will be no direct economic impact from this action since it only establishes a management unit.	There will be no direct economic impact from this action since it only establishes a management unit.	There will be no direct economic impact. However, further actions resulting from this measure could have impacts on the one firm harvesting and processing *Sargassum* and increase benefits to other sectors of society from protection of *Sargassum*.
Rejected Options:			
Option 1. No Action.	There will be no direct economic impact from this option.	There will be no direct economic impact from this option. However, it would not allow FMP development and thus limit future actions to protect the *Sargassum* resource.	As a result of not taking timely action to protect *Sargassum*, this option could result in reduced net economic benefits to society if there is excessive harvest of *Sargassum*.
Option 2. Establish the Management Unit for Pelagic *Sargassum* throughout the South Atlantic EEZ.	There will be no direct economic impact from this option since it only establishes a management unit.	There will be no direct economic impact from this option since it only establishes a management unit.	There will be no direct economic impact. However, further actions resulting from this option could have impacts on the one firm harvesting and processing *Sargassum* and increase benefits to other sectors of society from protection of *Sargassum*.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Proposed Action 2. Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* is estimated to be 100,000 metric tons (220,460,000 pounds) wet weight per year.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	Economic effects will stem from the relationship between MSY, OY, and TAC.
Rejected Options:			
Option 1. No Action. Given the limited data, do not specify Maximum Sustainable Yield (MSY) at this time.	There will be no direct economic impact from this option.	There will be no direct economic impact. However, not setting MSY will not allow for development of the FMP.	As a result of not setting MSY and inability to develop this FMP, this option could result in reduced net economic benefits to society if there is excessive harvest of *Sargassum*.
Option 2. MSY is equal to 30%-40% static Spawning Potential Ratio (SPR) (Council to Specify).	There will be no direct economic impact since defining MSY does not alter current use of the resource.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	Economic effects will stem from the relationship between MSY, OY, and TAC.
Option 3. MSY is equal to 50,000 metric tons (110,229,275 pounds) wet weight per year.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	Economic effects will stem from the relationship between MSY, OY, and TAC.
Option 4. MSY is equal to 16 metric tons (35,273 pounds) wet weight per year.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	There will be no direct economic impact since defining MSY does not alter current use of the resource.	Economic effects will stem from the relationship between MSY, OY, and TAC.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Proposed Action 3. Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year.	There will be no direct economic effects. However, there would be increased ecosystem services to species dependent on *Sargassum* if TAC is set at or below this level.	There will be no direct economic effects. However, if TAC is set at or below this level there will be a reduction in net revenue to the one firm harvesting and processing *Sargassum*.	If TAC is set at or below this level it is not possible to determine if gains from this measure would offset the loss of benefits to this firm in the long-term.
Rejected Options:			
Option 1. No Action.	There will be no direct economic effects. However, there would not be a loss of revenue to the firm from setting a restrictive TAC.	There will be no direct economic effects. However, since this option would not allow for management there would not be protection of species dependent on *Sargassum.*	If lack of management leads to excessive harvest of *Sargassum*, there could be reduced net benefits to society from this option.
Option 2. Specify Optimum Yield (OY) for pelagic *Sargassum* as zero harvest.	There will be no direct economic effects. However, if TAC is set at zero, there would be no loss of ecosystem benefits from removal of *Sargassum*.	There will be no direct economic effects. However, if TAC is set at zero there would be a loss of net revenue to the firm that harvests *Sargassum*.	If TAC is set at this level it is not possible to determine if gains from this measure would offset the loss of benefits to this firm in the long-term.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Option 3. Specify Optimum Yield (OY) for pelagic *Sargassum* as MSY.	There will be no direct economic effects. However, if TAC is set at the Council's chosen MSY level, it would allow the *Sargassum* harvesting sector to expand operations.	There will be no direct economic effects. However, if TAC is set at 100,000 mt, there would be loss of ecosystem benefits from removal of *Sargassum*.	If TAC is set at this level it is not possible to determine if expansion of harvest would offset the forgone ecosystem services from removal of *Sargassum*.
Option 4. Specify Optimum Yield (OY) for pelagic *Sargassum* as 20,000 pounds wet weight (average annual harvest over 22 years of the fishery).	There will be no direct economic effects. However, if TAC is set at this level, there would be no loss of revenue to the firm harvesting *Sargassum*.	There will be no direct economic effects. However, if TAC is set at this level there would not be additional protection of species dependent on *Sargassum*.	If TAC is set at this level it is not possible to determine if net benefits would be higher compared to the other options.
Option 5. Specify Optimum Yield (OY) for pelagic *Sargassum* as 11,000 pounds wet weight (average annual harvest for 1995-1999).	There will be no direct economic effects. However, if TAC is set at this level, there would be no loss of revenue to the firm harvesting *Sargassum*.	There will be no direct economic effects. However, if TAC is set at this level there would not be additional protection of species dependent on *Sargassum*.	If TAC is set at this level it is not possible to determine if net benefits would be higher compared to the other options.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Proposed Action 4. Specify Overfishing Level to meet Magnuson-Stevens Act Mandate for pelagic *Sargassum*. Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY.	There would be no direct economic effect from this measure. Economic benefits would stem from management measures implemented to prevent overfishing.	There would be no direct economic effect from this measure. Economic costs would stem from management measures implemented to prevent overfishing.	Measures taken to prevent overfishing would increase long-term benefits.
Rejected Options:			
Option 1. No Action.	There would be no direct economic effect from this option.	This option would not allow for implementation of the FMP.	This option would not allow for management of *Sargassum* and future actions to prevent overfishing, which would decrease long-term benefits.
Option 2. Overfishing occurs when any harvest occurs (any quantity) or when the fishing mortality rate is greater than zero.	This option implies a TAC of zero and would provide the maximum protection of *Sargassum*.	There will be no direct economic effects. However, if TAC is set at zero there would be a loss of net revenue to the firm that harvests *Sargassum*.	If TAC is set at zero it is not possible to determine if gains from this measure would offset the loss of benefits to this firm in the long-term.
Option 3. Overfishing occurs when MFMT>Fmsy.	There would be no direct economic effect from this measure.	There would be no direct economic effect from this measure.	Direct economic effects associated with resource use would only accrue to subsequent management actions in response to an evaluation of the fishery with regards to this benchmark.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Option 4. Overfishing occurs when MFMT>0.5	There would be no direct economic effect from this measure.	There would be no direct economic effect from this measure.	Direct economic effects associated with resource use would only accrue to subsequent management actions in response to an evaluation of the fishery with regards to this benchmark.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Proposed Action 5. Identify Essential Fish Habitat (EFH) for pelagic *Sargassum*.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely optimize benefits in the long-term.
Rejected Options:			
Option 1. Do not identify EFH for pelagic *Sargassum*.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	This option would limit the Council from taking measures to protect EFH, which could reduce net benefits in the long-term.
Option 2. Expand the EFH definition to include *Sargassum* where it occurs in the north Atlantic Gyre in the Sargasso Sea and the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely increase benefits in the long-term.
Option 3. Identify EFH as the average location of the Gulf Stream Front.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely increase benefits in the long-term.
Option 4. Identify EFH as the EEZ, Sargasso Sea, and Gulf Stream outside of the EEZ.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely increase benefits in the long-term.
Option 5. Identify EFH for pelagic *Sargassum* as where it occurs in the water column.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely increase benefits in the long-term.
Option 6. Modifies the preferred option by limiting EFH identification to the upper 10 m of the surface.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely increase benefits in the long-term.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Proposed Action 6. Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH-HAPCs would likely optimize benefits in the long-term.
Rejected Options:			
Option 1. Do not establish EFH-HAPCs for pelagic *Sargassum*.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	This option would limit the Council from taking measures to protect EFH-HAPCs, which could reduce net benefits in the long-term.
Option 2. Expand the EFH-HAPC definition to include *Sargassum* where it occurs in the north Atlantic Gyre in the Sargasso Sea and the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH-HAPCs would likely increase benefits in the long-term.
Option 3. Establish the Charleston Bump and The Point as EFH-HAPCs.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH-HAPCs would likely increase benefits in the long-term.
Option 4. Establish *Sargassum* in the EEZ, Sargasso Sea, and Gulf Stream outside of the EEZ as EFH-HAPCs.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH-HAPCs would likely increase benefits in the long-term.
Option 5. Modifies the preferred option by limiting the EFH-HAPC identification to the upper 10 m of the surface.	There will be no direct economic impact from this measure.	There will be no direct economic impact from this measure.	Measures taken to protect EFH would likely increase benefits in the long-term.

Table 1. (cont.) Summary of Expected Changes in Net Benefits.

Proposed Actions & Alternatives	Positive Impacts	Negative Impacts	Net Impacts
Action 7. A. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude). **B. Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.** **C. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.** **D. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.** **E. Require that an official observer be present on each *Sargassum* harvesting trip.** **F. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.**	This option will increase use benefits and non-use benefits to society from improvement and protection of other species that depend on *Sargassum*.	The one firm harvesting and processing pelagic *Sargassum* would face increased input and operating costs and could be forced out of business.	Due to lack of data it is not possible to determine if incremental benefits from this measure would offset the reduction in revenue to the firm harvesting and processing *Sargassum*.

Table 1. Summary of Expected Changes in Net Benefits (Continued).

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Rejected Options:			
Option 1. No Action.	Would not have an impact on the industry harvesting and processing *Sargasssum*.	Reduce benefits to society from loss of essential fish habitat.	Excessive harvest could result in decreased net benefits to society.
Option 2. Prohibit harvest and/or possession of *Sargassum* in the South Atlantic EEZ.	Could increase use benefits and non-use benefits to society from improvement and protection of other species that depend on *Sargassum*.	The one firm harvesting and processing pelagic *Sargassum* would face increased input and operating costs and could be forced out of business.	Due to lack of data it is not possible to determine if incremental benefits from this option would offset the reduction in revenue to the firm harvesting and processing *Sargassum*.

Table 1. Summary of Expected Changes in Net Benefits (Continued).

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Option 3. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border. Cap harvest at 50,000 pounds wet weight in the area bounded by the latitude lines representing the North Carolina/Virginia border and the North Carolina/South Carolina border and the longitude line representing 100 miles seaward from the North Carolina shoreline until January 1, 2001 when all harvest will end. In addition, harvesters will be required to: (a) acquire a federal permit, (b) allow on board observers if requested, (c) maintain logbooks, (d) call into the NMFS Southeast Regional Law Enforcement Office when leaving and returning to port, and (e) require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger.	Could increase use benefits and non-use benefits to society from improvement and protection of other species that depend on *Sargassum*.	The one firm harvesting and processing pelagic *Sargassum* would face increased input and operating costs and could be forced out of business.	Due to lack of data it is not possible to determine if incremental benefits from this option would offset the reduction in revenue to the firm harvesting and processing *Sargassum*.

Table 1. Summary of Expected Changes in Net Benefits (Continued).

Proposed Actions & Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Option 4. Establish a TAC of 20,000 pounds wet weight per year.	This option would not constrain the harvest of the one firm harvesting *Sargassum*.	This option would not lead to increased use benefits and non-use benefits to society from improvement and protection of other species that depend on *Sargassum* as habitat.	At this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests.
Option 5. Establish a TAC of 100,000 metric tons wet weight per year.	This option would not constrain the harvest of the one firm harvesting *Sargassum*.	This option would lead to reduced use benefits and non-use benefits to society from improvement and protection of other species that depend on *Sargassum* as habitat.	At this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests.
Option 6. Establish a TAC of 200,000 pounds wet weight per year.	This option would not constrain the harvest of the one firm harvesting *Sargassum*.	This option would lead to reduced use benefits and non-use benefits to society from improvement and protection of other species that depend on *Sargassum* as habitat.	At this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests.
Option 7. Modify the Council's preferred option by dropping the gear restrictions, moving harvest 150 miles offshore, and allowing harvest between November to April.	By itself, this option would not have an economic effect on society in the short-term.	If harvesters of the resource were to use gear with smaller mesh there would be some reduction in benefits from ecological services.	If harvesters of the resource were to use gear with smaller mesh there would be some reduction in benefits from ecological services.

Establishing a management unit (Action 1), setting MSY and OY (Actions 2 and 3), specifying an overfished and overfishing level (Action 4), identification of EFH (Action 5), and establishment of EFH-HAPCs (Action 6) while not having an immediate impact will allow the Council to take actions in order to manage the *Sargassum* resource for increased net benefits to society in the long-term.

The harvest restriction (Action 7) will reduce revenue for the firm that harvests pelagic *Sargassum*. There is no information to allow the quantification of the incremental benefits from reduced harvest on *Sargassum*. Thus, at this time it is not possible to determine whether net benefits from this proposed action will increase in the long-term. Refer to Section 4.0 for detailed analysis of these economic effects and impacts on small businesses (IRFA).

SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT

This integrated document contains all elements of the Fishery Management Plan for pelagic *Sargassum* Habitat, Final Environmental Impact Statement (FEIS), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). A table of contents for the SIA/FIS is provided separately to aid reviewers in referencing corresponding sections of the plan.

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INTRODUCTION

Mandates to conduct Social Impact Assessments (SIAs) come from both the National Environmental Policy Act (NEPA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). NEPA requires Federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" [NEPA section 102 (2) (a)]. Under the Council on Environmental Quality's (CEQ, 1986) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, a clarification of the terms "human environment" expanded the interpretation to include the relationship of people with their natural and physical environment (40 CFR 1508.14). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect, or cumulative (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994).

Under the MSFCMA, fishery management plans (FMPs) must "...achieve and maintain, on a continuing basis, the optimum yield from each fishery" [MSFCMA Section 2 (b) (4)]. Recent amendments to the MSFCMA require that FMPs address the impacts of any management measures on the participants in the affected fishery and those participants in other fisheries that may be affected directly or indirectly through the inclusion of a fishery impact statement [MSFCMA Section 303 (a) (9)]. Most recently, with the addition of National Standard 8, FMPs must now consider the impacts upon fishing communities to assure their sustained participation and minimize adverse economic impacts upon those communities [MSFCMA Section 301 (a) (8)]. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. With an increasing need for management action, the consequences of such changes need to be examined in order to mitigate the negative impacts experienced by the populations concerned.

PROBLEMS AND METHODS

Social impacts are generally the consequences to human populations that follow from some type of public or private action. Those consequences may include alterations to "the ways in which people live, work or play, relate to one another, organize to meet their needs and generally cope as members of a society...." (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994:1). In addition, cultural impacts which may involve changes in values and beliefs which affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Therefore, it is extremely important that as much information as possible concerning a fishery and its participants be gathered for an assessment. Although public hearings and scoping meetings do provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

Without access to relevant information for conducting social impact analyses, it is important to identify any foreseeable adverse effects on the human environment. With quantitative data often lacking, qualitative data can be used to provide a rough estimate of some impacts. In addition, when there is a body of empirical findings available from the social science literature, it needs to be summarized and referenced in the analysis.

In attempting to assess the social impacts of the proposed plan, it must be noted that very little data are available for analysis. Social impacts on the harvester, the processing sector, fishing communities, and society as a whole are not fully addressed due to data limitations. The fishery impact statement consists of the description of the commercial fishery and the social impacts under each action item and options. There is presently no information to define or determine impacts upon fishing communities.

The impact of continued or expanded harvest of pelagic *Sargassum* on recreational communities whose success for fishing for dolphin, wahoo, and billfish depend on fishing in association with *Sargassum* patches or "windrows" was noted at public hearings. Continued and expanded harvest could lead to conflict between traditional recreational practices and harvesting of pelagic *Sargassum*.

Social Impact Summary

Table 2. Social impact (SIA/FIS) summary.

ACTION	SOCIAL IMPACTS
ACTION 1. Establish the Management Unit for Pelagic *Sargassum* throughout the South Atlantic EEZ and State waters.	Will allow the Council to implement *Sargassum* management throughout the South Atlantic EEZ.
ACTION 2. Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* is estimated to be 100,000 metric tons (220,460,000 pounds) wet weight per year.	Social impacts for any designation of MSY will stem from how MSY is tied to other management measures like the overfished level or optimum yield.
ACTION 3. Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year.	Social impacts from specifying optimum yield at 5,000 pounds wet weight per year will cause a great singular impact on an individual firm, however, the social impacts of setting OY at 5,000 pounds wet weight per year are determined to be minimal. There is no historical culture of *Sargassum* harvesting, so no other social and cultural impacts are expected for the harvesting sector. There may be harder to quantify benefits for those groups who are concerned with environmental preservation.
ACTION 4. Specify Overfishing Level to meet the Magnuson-Stevens Act Mandate for pelagic *Sargassum*. Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY.	The social impacts from specifying an overfished level come from the management actions implemented to help recover an overfished stock within a specific timeline. The short-term social impacts are usually more negative with a shorter timeframe and stricter measures.

Table 2 (cont.)Social impact (SIA/FIS) summary.

ACTION	SOCIAL IMPACTS
ACTION 5. Identify Essential Fish Habitat (EFH) for pelagic *Sargassum.*	There will be few social impacts from identifying EFH. Impacts may result from future management measures associated with this designation.
ACTION 5. Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*.	There will be few social impacts from establishing EFH-HAPCs. Impacts may result from future management measures associated with this designation.
ACTION 7: **7A.** Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude). **7B.** Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border. **7C.** Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June. **7D.** Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight. **7E.** Require that an official observer be present on each *Sargassum* harvesting trip. **7F.** Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.	The prohibition on harvest off South Carolina, Georgia, and Florida, and severe limitations off North Carolina, will have positive social impacts by preventing conflict between harvesters and recreational/commercial fishermen. This action also addresses the concern expressed by large numbers of individuals (non-use stakeholders) over protecting *Sargassum* habitat. Of all these proposed actions, the one that is most critical to determining negative social impacts is 7D, which establishes a TAC of 5,000 pounds landed wet weight of *Sargassum*. The only harvester of *Sargassum* has made it clear that with a TAC of 5,000 pounds, he cannot expect to remain in business unless he were to substitute products, and substitution is in question. While the singular impact on this individual is great, the social impacts of setting a TAC at 5,000 pounds landed wet weight are not determined to be as substantial. It is understood that Aqua-10 (the company in question) employs three persons on a full-time, year-round basis (the owner, his wife, and one other employee). Other local inhabitants are employed on an irregular, as-needed basis, supposedly for less than a few days at any one time. The disappearance of this employment opportunity will have a minimal social impact and workers can be expected to substitute other local employment opportunities. Furthermore, as far as can be determined, there is no historical or current culture of *Sargassum* harvesting in the region, so no other social and cultural impacts due to a closure of this business should occur.

SOCIAL IMPACT ASSESSMENT DATA NEEDS

To provide better assessments, socio-economic data need to be collected on a continuing basis for both the commercial and recreational sectors, including the for-hire sector, on all fisheries. Collecting social and economic information in logbooks would be one manner of providing this information on a continuing basis for the commercial sector. Social and economic add-ons to the MRFSS data collection system can provide this type of data for recreational fishermen. In addition, information on fishing communities in the South Atlantic is virtually non-existent. Fishing communities need to be identified and their dependence upon fishing and fishery resources needs to be established. The following list of data needs is provided as a guideline:

1. Demographic information may include but is not necessarily limited to: population; age; gender; ethnic/race; education; language; marital status; children (age & gender); residence; household size; household income (fishing/non-fishing); occupational skills; and association with vessels and firms (role and status).
2. Social Structure information may include but is not necessarily limited to: historical participation; description of work patterns; kinship unit, size, and structure; organization and affiliation; patterns of communication and cooperation; competition and conflict; spousal and household processes; and communication and integration.
3. Emic culture information may include but is not necessarily limited to: occupational motivation and satisfaction; attitudes and perceptions concerning management; constituent views of their personal future of fishing; psycho-social well-being; and cultural traditions related to fishing (identity and meaning).
4. Fishing community information may include but is not necessarily limited to: identifying communities; dependence upon fishery resources (this includes recreational use); identifying businesses related to that dependence; and determine the number of employees within these businesses and their status.

This list of data needs is not exhaustive or all inclusive. Upcoming issues within the South Atlantic will undoubtedly focus upon allocation and the need for reliable and valid information concerning the social environment will become even more necessary for managing fisheries. A further recommendation might be for the NMFS to review and implement the "Southeast Social and Cultural Data and Analysis Plan" as this would address many of the current data needs.

There is a need to document what the social impacts may be on other interested parties, in this case those who have an expressed concern with environmental ethics/environmental preservation. This expressed concern crosscuts the traditional sectors usually considered in fishery management plans (recreational, commercial, charter and headboat participants), but also includes those people who never fish for either sustenance or pleasure. This non-use or non-consumptive use group is having a growing influence on crafting fishery management policy and as such should be considered when composing impact statements.

The Atlantic Coastal Cooperative Statistics Program (ACCSP) Program Design contains detailed social and economic data needs and draft survey instruments. Social and economic data collection projects should at least collect the minimum data elements.

1.0 PURPOSE AND NEED

1.1 Issues and Problems

1.1.1 Essential Fish Habitat Mandate

The Magnuson-Stevens Fishery Conservation and Management Act, Public Law 104-208, reflects new Secretary of Commerce and Fishery Management Council authority and responsibilities for the protection of essential fish habitat. Section 305 (b) of the Act directed the Secretary of Commerce (through NMFS) to establish regulatory guidelines that assist the Councils in the description and identification of essential fish habitat (EFH) in fishery management plans (including adverse impacts on such habitat). The guidelines also assist in the consideration of actions to ensure the conservation and enhancement of such habitat.

On December 19, 1997, an interim final rule was published in the Federal Register to implement the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). This rule established guidelines to assist the Regional Fishery Management Councils (Councils) and the Secretary of Commerce (Secretary) in the description and identification of EFH in fishery management plans (FMPs), including identification of adverse impacts from both fishing and non-fishing activities on EFH, and identification of actions required to conserve and enhance EFH. The regulations also detailed procedures the Secretary (acting through NMFS), other Federal agencies, state agencies, and the Councils will use to coordinate, consult, or provide recommendations on Federal and state activities that may adversely affect EFH. The final rule was published on January 17, 2002 [67FR2343]. The intended effect of the rule is to promote the protection, conservation, and enhancement of EFH.

Essential fish habitat is defined in the Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The definition for EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate within each FMP. Section 1.2 of the Habitat Plan (SAFMC, 1998a) contains a detailed discussion of the interim final guidelines. The Council has begun the process of updating the habitat plan which will discuss the final rule in detail. The Council has revised the Final *Sargassum* FMP to ensure it is fully consistent with the final rule.

In assessing the relative value of pelagic *Sargassum* habitat, the Council is taking a risk-averse approach to ensure that adequate areas are protected as essential fish habitat (EFH). The Council used the best scientific information available to describe and identify EFH in the South Atlantic through the Habitat Plan (SAFMC, 1998a) and in the revised fishery management plan for pelagic *Sargassum* Habitat (SAFMC, 2000). The current document (second revision) describes and identifies EFH for pelagic *Sargassum*.

Based on the ecological relationships of species and relationships between species and their habitat, the Council is taking an ecosystem approach in determining EFH of managed species and species assemblages. This approach is consistent with NMFS guidelines and the final EFH rule. Through the existing habitat policy, the Council directs the protection of essential fish habitat types and the enhancement and restoration of their quality and quantity.

1.1.2 Problems Addressed by the Plan

1. No management structure exists to protect pelagic *Sargassum* habitat.
2. Harvest represents removal of essential fish habitat for other federally managed species including threatened and endangered sea turtles.
3. Potential conflicts could arise if harvest occurs where recreational fishing is occurring.
4. Limited information on distribution, production, and ecology of pelagic *Sargassum* habitat.

1.2 Objectives of the Plan

1. Establish a management structure to regulate pelagic *Sargassum* habitat.
2. Reduce the impact of the pelagic *Sargassum* fishery on essential fish habitat.
3 Reduce the potential for conflict.
4. As a federally managed species/habitat, direct needed research to better determine distribution, production, and ecology of pelagic *Sargassum* habitat.

1.3 History of Management

The Council first discussed options to manage pelagic *Sargassum* in 1991. The Council considered preparing a Fishery Management Plan for pelagic *Sargassum*; amending an existing fishery management plan (e.g., Snapper/Grouper or Mackerel); and protecting this important offshore, pelagic fisheries habitat through designation as "critical" to threatened or endangered sea turtles by the NMFS Office of Protected Resources who could promulgate regulations under the Endangered Species Act to regulate harvest. The Council decided to prepare a fishery management plan after determining harvest to be a violation of the Council's Habitat Policy which results in a net loss of offshore fisheries habitat. Potential alternatives included the following: no action; establishing an allowable harvest; and prohibiting harvest.

The Council, viewing pelagic *Sargassum* as an important pelagic habitat in the South Atlantic Region, requested NMFS Southeast Fisheries Science Center in Beaufort, North Carolina to compile available information on pelagic *Sargassum*. In addition, a survey of larval and juvenile fishes associated with pelagic *Sargassum* habitat in the South Atlantic Bight and adjacent western Atlantic Ocean was conducted between August 1991 and March 1993.

The Council voted to prepare a fishery management plan for pelagic *Sargassum* and deferred action pending resolution of what habitat mandates would be included in reauthorization of the Magnuson Act. Reathorization of the Act in 1996 directed the Council to identify, describe, and protect essential fish habitat for all species or species complexes managed by the Council.

On October 7-8, 1997 a Working Sub-Group met to review pelagic *Sargassum* habitat and water column information in state, federal, and regional systems, and to discuss fishing and non-fishing threats to these habitats. The Sub-Group also discussed policy recommendations and research and monitoring needs for these habitats.

Subsequently a writing team was established and provided the pelagic habitat section of the Habitat Plan (SAFMC, 1998a). The sections on pelagic *Sargassum* habitat and the offshore water column have been incorporated into the Fishery Management Plan for Pelagic *Sargassum* Habitat.

The Council considered information on pelagic *Sargassum* habitat included in the Habitat Plan and recommendations on essential fish habitat definitions provided by the Habitat and Environmental Protection Advisory Panel to manage pelagic *Sargassum* habitat thereby addressing the essential fish habitat mandates in the Magnuson-Stevens Act. The Council voted

at their March 2-6, 1998 meeting in Jekyll Island, Georgia to take to public hearing the draft fishery management plan for pelagic *Sargassum* habitat which prohibited the harvest and/or possession of pelagic *Sargassum* from the South Atlantic EEZ.

The Council reviewed public hearing and informal agency review comments at the August 1998 and December 1998 Council meetings. Additional public comment was taken during the December 3, 1998 Council meeting in Kill Devil Hills, North Carolina. During the December 3, 1998 meeting, the Council approved the *Sargassum* Plan (including the Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis, Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement) for formal Secretarial review. The document and proposed rule were submitted on December 14, 1998.

On September 22, 1999 NMFS advised the Council of their decision on the proposed rule (Source: Letter from William T. Hogarth to Peter Moffitt dated September 22, 1999): "Pursuant to Section 304(b)(1) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), and based on the rationale below, NMFS has determined not to publish the proposed rule. While NMFS agrees with the Council's designation of pelagic *Sargassum* as essential fish habitat (EFH) and as habitat of particular concern for snapper-grouper and coastal migratory pelagic fishes, we find no justification in the Council's selection of an optimum yield (OY) at zero harvest. As you are aware, Section 303(a)(7) of the Magnuson-Stevens Act requires that the Councils minimize to the extent practicable adverse effects on EFH caused by fishing, but clearly this does not, in every instance, preclude some loss or damage to EFH from fishing impacts. Given the suggested standing crop of 9 to 24 billion pounds, and a documented harvest of 448,000 pounds over the last 23 years, NMFS determined that sufficient evidence has not been provided to determine that there has been an adverse impact on *Sargassum* EFH, or that OY should be zero harvest."

On September 23, 1999, the Council received public comment during the open comment period on the notice of availability for the *Sargassum* FMP. These comments and a letter from the Council's Habitat and Environmental Protection Advisory Panel were included with the Council's October 21, 1999 letter commenting on the notice of availability.

On November 24, 1999 NMFS advised the Council of their decision on the *Sargassum* Fishery Management Plan (Source: Letter from William T. Hogarth to Pete Moffitt dated November 24, 1999): "Based on the rationale below, NMFS has determined that the FMP is inconsistent with the Magnuson-Stevens Fishery Conservation and Management Act, and is disapproving the FMP. Alternative management options are enclosed for your consideration. NMFS finds insufficient justification in the Council's selection of an optimum yield (OY) at zero harvest in the subject FMP. NMFS disagrees with the Council's position that any removal of pelagic *Sargassum* represents a net loss of EFH and thus is contradictory to the goals and objectives of the Council's Comprehensive Habitat Plan for the South Atlantic Region or to the Magnuson-Stevens Act. NMFS believes that the designation of a particular habitat as EFH does not preclude continued use of that habitat, nor would this position be consistent with other designations of EFH and EFH-HAPC in the Council's Habitat Plan. The Council allows the harvest of octocorals, which are part of the overall coral complex designated as EFH. Oyster reefs and shell hash areas are designated as EFH and as HAPC for penaeid shrimp, red drum, snapper-grouper, and coastal migratory pelagic fish management units, and these reefs are extensively harvested. Section 303 (a)(7) of the Magnuson-Stevens Act requires that the Councils minimize to the extent practicable adverse effects on EFH caused by fishing, but clearly this does not, in every instance, preclude recoverable impacts to EFH due to fishing efforts. The Council chose not to specify an MSY value for Sargassum in the FMP. MSY is a

necessary and fundamental component of an FMP, on which other FMP measures, including OY, would depend. Section 303 (a)(3) of the Magnuson-Stevens Act requires, in addition to other requirements, that any FMP 'assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification.' "

The Council's Habitat and Environmental Committee reviewed the management alternatives suggested by NMFS and developed modifications for consideration by the Council. The Council received public input on March 9, 2000 in Tybee Island, Georgia and approved a revised *Sargassum* Fishery Management Plan for formal review and implementation by the Secretary of Commerce. The Revised Final FMP and regulations were submitted for formal Secretarial review in early September 2000. The NMFS rejected the Council's plan and advised the Council to consider alternatives to a total prohibition and resubmit a modified FMP.

On advice from the National Marine Fisheries Service (NMFS), the Council prepared a DEIS (SAFMC, 2001) which was then modified by NMFS into a SDEIS in order to give the public an additional opportunity to comment on the proposed actions. For this reason, no preferred alternative was chosen for any of the actions in the SDEIS. Preferred alternatives were identified in the DEIS prepared by the Council and are identified in the Final Environmental Impact Statement.

The Council reviewed the SDEIS comments at the March 6, 2002 Habitat Committee meeting in Savannah, Georgia. A Public Hearing was held during the committee meeting on March 6, 2002. In addition, a public comment period was provided during the Council meeting on March 7, 2002, however, no members of the public testified.

1.4 Proposed Measures

The Council is establishing a fishery management plan for pelagic *Sargassum* habitat and is proposing the following actions to meet the habitat-related requirements of the Magnuson-Stevens Act: Specify the management unit for pelagic *Sargassum* as throughout the South Atlantic EEZ and State waters; Specify Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* as 100,000 metric tons (220,460,000 pounds) wet weight per year; Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year; Specify an overfishing level to meet Magnuson-Stevens Act Mandate for pelagic *Sargassum.* Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY; Identify Essential Fish Habitat for pelagic *Sargassum*; Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*; and Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude). Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight. Require that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest Sargassum be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

National Environmental Policy Act (NEPA) regulations indicate that Section 2.0 should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public. The Council's documents must also conform to Magnuson-Stevens Act and "Other Applicable Law" requirements. National Environmental Policy Act regulations are one of the "other applicable laws" referenced. The Council decided to blend Magnuson-Stevens Act and "other applicable law" (including NEPA) requirements in one consolidated, non-duplicative, and non-repetitive document. The bulk of the evaluation of alternatives and discussion about the effects on the environment is in Section 4.0 Environmental Consequences. Section 2.0 Alternatives presents a summary of Section 4.0. The Council concluded this meets NEPA regulatory requirements.

Management measures (proposed actions) address the management objectives and issues discussed in Section 1. Each management measure has a number of alternatives that have been considered by the Council.

The following problems pertaining to *Sargassum* habitat have been identified. The summary title is used in the impact table (Table 3) to identify which problems are addressed by which proposed management measure.

Biological

· Mandate to identify and describe EFH.	Habitat Identification
· Mandate to identify EFH-Habitat Areas of Particular Concern.	Habitat Identification
· Habitat degradation/loss of Essential Fish Habitat.	Habitat Protection
· Mandate to reduce impact of fishing in the EEZ on EFH.	Habitat Protection
· Recommend measures to reduce the impact from non-fishing activities.	Habitat Protection
· Limited information on production, distribution, and ecology of EFH and species or species complex use of EFH.	Data

Socio-Economic

· Potential conflict between *Sargassum* harvest and fishing for other managed species.	Conflicts
· Limited statistical, social, and economic information.	Data

The following table (Table 3) summarizes how the alternatives address the problems and issues identified by the Council. Management alternatives are in the rows, and issues and problems are in the columns. The Council's preferred options are shown in **bold**.

Table 3. Summary of Environmental Consequences.

Alternatives	Issues/Problems	
	Biological: Habitat Identification, Habitat Protection, and Data	**Social and Economic: Conflicts and Data**
Proposed Action 1: Establish the Management Unit for pelagic *Sargassum* throughout the South Atlantic EEZ and state waters.	Establishing a management unit for pelagic *Sargassum* will provide the basis for conservation and management of essential fish habitat. Research on pelagic *Sargassum* production, distribution, and ecology will be encouraged as a federally managed species/habitat.	Social and economic impacts will stem from other management measures.
No Action.	Would not provide the basis for management and protection of essential fish habitat.	Would not allow for management and could result in reduced net social and economic benefits.
Establish the Management Unit for pelagic *Sargassum* throughout the South Atlantic EEZ.	Would not provide the basis for management and protection of essential fish habitat and essential fish habitat-habitat areas of particular concern in state waters.	Social and economic impacts will stem from other management measures.

Alternatives	Issues/Problems	
	Biological: Habitat Identification, Habitat Protection, and Data	**Social and Economic: Data**
Proposed Action 2: Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* is estimated to be 100,000 metric tons (220,460,000 pounds) wet weight per year.	Will allow approval of FMP which will protect *Sargassum* habitat through other measures.	Social and economic impacts from this designation of MSY will stem from how MSY is tied to other management measures such as OY, TAC, and allowable harvest.
No Action. Given the limited data, do not specify Maximum Sustainable Yield (MSY) at this time.	Lack of adequate information to specify MSY would encourage research to quantify distribution and production.	None. However, could result in non-optimal benefits to society if there is excessive harvest of *Sargassum*.
MSY = 30%-40% static Spawning Potential Ratio (SPR).	Not an appropriate definition of MSY and would likely result in disapproval of FMP.	None. However, further actions resulting from this option could have impacts on the one firm harvesting and processing *Sargassum*.
MSY = 50,000 metric tons (110,229,275 pounds) wet weight per year.	Would allow approval of FMP which will protect *Sargassum* habitat through other measures.	Social and economic impacts from this designation of MSY will stem from how MSY is tied to other management measures such as OY, TAC, and allowable harvest.
MSY = 16 metric tons (35,273 pounds) per year.	Would allow approval of FMP which will protect *Sargassum* habitat through other measures.	Social and economic impacts from this designation of MSY will stem from how MSY is tied to other management measures such as OY, TAC, and allowable harvest.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Identification, Habitat Protection, and Data	**Social and Economic: Conflicts and Data**
Proposed Action 3: Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year.	Will have positive biological impacts by setting optimum yield at a low level thereby protecting essential fish habitat.	Social and economic impacts from specifying optimum yield are determined from the management actions that stem from the Council's management timeline for reaching optimum yield. The designation of an optimum yield set at 5,000 pounds would impact the one firm currently in the fishery.
No Action.	Likely damage to essential fish habitat.	Would not result in further actions to prevent overfishing, which would decrease long-term benefits.
Specify Optimum Yield (OY) for pelagic *Sargassum* as zero harvest.	Would have greater positive biological impacts if optimum yield was set at 0 by better protecting essential fish habitat.	Social and economic impacts from specifying optimum yield are determined from the management actions that stem from the Council's management timeline for reaching optimum yield. The designation of an optimum yield set at zero harvest would impact the one firm currently in the fishery.
Specify Optimum Yield (OY) for pelagic *Sargassum* as MSY.	As the proposed MSY is estimated to be 100,000 metric tons, this alternative would specify the greatest OY for pelagic *Sargassum* in relation to all the alternatives. As OY is a target reference point, it has no direct effect on the resource. However, this alternative sacrifices the indirect positive biological impacts established by setting optimum yield at a low level to protect essential fish habitat.	Social and economic impacts from specifying optimum yield are determined from the management actions that stem from the Council's management timeline for reaching optimum yield.
Specify Optimum Yield (OY) for pelagic *Sargassum* as 20,000 pounds wet weight (average annual harvest over 22 years of the fishery).	This alternative would establish an OY greater than the preferred option. As OY is a target reference point, it has no direct effect on the resource. However, this alternative sacrifices, though to a lesser degree in comparison to rejected option 3, the indirect positive biological impacts established by setting optimum yield at a low level to protect essential fish habitat.	Social and economic impacts from specifying optimum yield are determined from the management actions that stem from the Council's management timeline for reaching optimum yield.
Specify Optimum Yield (OY) for pelagic *Sargassum* as 11,000 pounds wet weight (average annual landings for 1995-1999).	This alternative would establish an OY greater than the preferred option. As OY is a target reference point, it has no direct effect on the resource. However, this alternative sacrifices, though to a lesser degree in comparison to the other rejected alternatives, the indirect positive biological impacts established by setting optimum yield at a low level to protect essential fish habitat.	Social and economic impacts from specifying optimum yield are determined from the management actions that stem from the Council's management timeline for reaching optimum yield.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Protection and Data	**Social and Economic: Conflicts and Data**
Proposed Action 4: Specify Overfishing Level to meet Magnuson-Stevens Act Mandate for Pelagic *Sargassum*. Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY. **The Maximum Fishing Mortality Threshold (MFMT) is 9.0 to 18.0 units per year.** **The Minimum Stock Size Threshold (MSST) is 25,000 metric tons (55,115,000 pounds).**	Specifying overfishing as the rate of harvest which compromises the stock's ability to produce MSY would protect pelagic *Sargassum* which supports a diverse assemblage of marine organisms including fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, over 100 species of fishes, four endangered or threatened species of sea turtles, and numerous marine birds. This action would also preserve the contribution to total primary production within oligotrophic (low nutrient) waters. In addition, recent research indicates *Sargassum* also provides significant nutrients to benthic communities in areas like "The Point" off North Carolina.	The social and economic impacts from specifying an overfished level come from the management actions implemented to help recover an overfished stock within a specific timeline.
No Action.	Likely damage to essential fish habitat.	The impacts of no action could result in non-optimal benefits.
Overfishing occurs when any harvest occurs (any quantity) or when the fishing mortality rate is greater than zero.	Specifying overfishing to occur when any harvest occurs (any quantity) would protect pelagic *Sargassum* which supports a diverse assemblage of marine organisms including fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, over 100 species of fishes, four endangered or threatened species of sea turtles, and numerous marine birds. This action would have also preserved the contribution to total primary production within oligotrophic (low nutrient) waters. Prohibiting harvest would have been consistent with the Council's designation of pelagic *Sargassum* as essential fish habitat and an essential fish habitat - habitat area of particular concern for both snapper grouper and coastal migratory pelagics species. This action would have prohibited existing harvest and prevented expansion of harvest of this important pelagic habitat which serves as essential fish habitat and essential fish habitat - habitat areas of particular concern for federally managed species.	The social and economic impacts from specifying an overfished level come from the management actions implemented to help recover an overfished stock within a specific timeline.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Protection and Data	**Social and Economic: Conflicts and Data**
Overfishing occurs when MFMT > Fmsy.	Overfished and overfishing definitions have an indirect effect on the resource by ensuring that sustainable quantities of *Sargassum* habitat are maintained. However, no direct biological impacts are anticipated from the establishment of an OY.	The social and economic impacts from specifying an overfished level come from the management actions implemented to help recover an overfished stock within a specific timeline.
Overfishing occurs when MFMT > 0.5.	Overfished and overfishing definitions have an indirect effect on the resource by ensuring that sustainable quantities of *Sargassum* habitat are maintained. However, no direct biological impacts are anticipated from the establishment of an OY.	The social and economic impacts from specifying an overfished level come from the management actions implemented to help recover an overfished stock within a specific timeline.

Alternatives	Issues/Problems	
	Biological: Habitat Identification, Habitat Protection, and Data	**Social and Economic: Conflicts and Data**
Proposed Action 5: Identify Essential Fish Habitat (EFH) for pelagic *Sargassum* as where it occurs in the South Atlantic Council's EEZ and in the state waters off of North Carolina, South Carolina, Georgia, and the east coast of Florida. Essential fish habitat (EFH) for pelagic *Sargassum* includes the Gulf Stream because it provides a mechanism to disperse *Sargassum*.	Identifying EFH for pelagic *Sargassum* will provide the basis for management and protection of essential fish habitat. Research on pelagic *Sargassum* production, distribution, and ecology will be encouraged as a federally managed species/habitat.	There will be no economic or social impacts from identifying essential fish habitat itself. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Do not identify EFH for pelagic *Sargassum*.	Likely loss of essential fish habitat.	Would prevent the Council from protecting EFH, which could reduce net benefits in the long-term.
Expand the EFH definition to include Sargassum where it occurs in the north Atlantic Gyre in the Sargasso Sea and the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream.	Identifying EFH for pelagic *Sargassum* will provide the basis for management and protection of essential fish habitat. Research on pelagic *Sargassum* production, distribution, and ecology will be encouraged as a federally managed species/habitat.	There would be no economic or social impacts from identifying essential fish habitat itself. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Identification, Habitat Protection, and Data	**Social and Economic: Conflicts and Data**
Identify EFH as the average location of the Gulf Stream Front. The mean location of the Gulf Stream is shown in Figure 3b.	Compared to the preferred option, this alternative limits the geographic designation of *Sargassum* as EFH. Direct impacts to the biological resources are not anticipated through the designation of EFH. However, indirect positive biological impacts, such as future opportunities for the council to establish regulations to protect EFH from fishing activities, would be sacrificed through limiting the geographic designation of *Sargassum* EFH.	There would be no economic or social impacts from identifying essential fish habitat itself. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Identify EFH as the EEZ, Sargasso Sea, and Gulf Stream outside of the EEZ.	Compared to the preferred option, this alternative includes *Sargassum* that is beyond the outer limit of the EEZ. Direct impacts to the biological resources are not anticipated through the designation of EFH.	There would be no economic or social impacts from identifying essential fish habitat itself. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Identify EFH for pelagic *Sargassum* as where it occurs in the water column.	Compared to the preferred option, this alternative includes *Sargassum* that is within State waters, the EEZ, and beyond the outer limit of the EEZ. Direct impacts to the biological resources are not anticipated through the designation of EFH.	There would be no economic or social impacts from identifying essential fish habitat itself. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Modifies the preferred option by limiting the EFH identification to the upper 10 m of the surface.	Compared to the preferred option, this alternative would only include *Sargassum* that is within the upper 10 meters and would not include other concentrations of *Sargassum*. Direct impacts to the biological resources are not anticipated through the designation of EFH. However, indirect positive biological impacts, such as future opportunities for the council to establish regulations to protect EFH from fishing activities, would be sacrificed through limiting the geographic designation of *Sargassum* EFH.	There would be no economic or social impacts from identifying essential fish habitat itself. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Identification, Habitat Protection, and Data	**Social and Economic: Conflicts and Data**
Proposed Action 6: Establish the distribution of pelagic *Sargassum* within the South Atlantic Council's EEZ and within the state waters off of North Carolina, South Carolina, Georgia, and the east coast of Florida as an EFH-HAPC.	Establishing EFH-HAPCs for pelagic *Sargassum* will provide the basis for management and protection of essential fish habitat. Research on pelagic *Sargassum* production, distribution, and ecology will be encouraged as a federally managed species/habitat.	There will be no economic or social impacts from identifying EFH-HAPCs. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Do not establish EFH-HAPCs for pelagic *Sargassum*.	Likely loss of essential fish habitat and essential fish habitat - habitat area of particular concern.	Would prevent the Council from protecting EFH-HAPCs, which could reduce net benefits in the long-term.
Expand the EFH-HAPC definition to include *Sargassum* where it occurs in the north Atlantic Gyre in the Sargasso Sea and the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream.	Establishing EFH-HAPCs for pelagic *Sargassum* would provide the basis for management and protection of essential fish habitat. Research on pelagic *Sargassum* production, distribution, and ecology would be encouraged as a federally managed species/habitat.	There would be no economic or social impacts from identifying EFH-HAPCs. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Establish the Charleston Bump and the Point as EFH-HAPCs.	Compared to the preferred option, this alternative limits the geographic designation of EFH-HAPCs. Direct impacts to the biological resources are not anticipated through the designation of EFH-HAPCs. However, indirect positive biological impacts, such as future opportunities for the council to establish regulations to protect EFH-HAPCs from fishing activities, would be sacrificed through limiting the geographic designation of *Sargassum* EFH-HAPCs.	There would be no economic or social impacts from identifying EFH-HAPCs. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Establish *Sargassum* in the EEZ, Sargasso Sea, and Gulf Stream outside of the EEZ as EFH-HAPCs.	Compared to the preferred option, this alternative includes *Sargassum* that is beyond the outer limit of the EEZ. Direct impacts to the biological resources are not anticipated through the designation of EFH-HAPCs.	There would be no economic or social impacts from identifying EFH-HAPCs. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.
Modifies the preferred option by limiting the EFH-HAPC identification to the upper 10 m of the surface.	Compared to the preferred option, this alternative limits the geographic designation of EFH-HAPCs. Direct impacts to the biological resources are not anticipated through the designation of EFH-HAPCs. However, indirect positive biological impacts, such as future opportunities for the council to establish regulations to protect EFH from fishing activities, would be sacrificed through limiting the geographic designation of *Sargassum* EFH-HAPCs.	There would be no economic or social impacts from identifying EFH-HAPCs. Impacts would arise from management actions taken to protect essential fish habitat for *Sargassum*.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Protection and Data	**Social and Economic: Conflicts and Data**
Proposed Action 7: **A. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).** **B. Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.** **C. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.** **D. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.** **E. Require that an official observer be present on each *Sargassum* harvesting trip.** **F. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.**	The prohibitions and limited harvest would protect pelagic *Sargassum* which supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four endangered or threatened species of sea turtles, and numerous marine birds. This action would also preserve the contribution to total primary production within oligotrophic (low nutrient) waters.	This action would increase harvesting cost and cost to the processing facility that manufactures products from the harvested *Sargassum.* It is unclear whether the net benefits from increased ecosystem services would outweigh the economic costs of this measure. There may be minimal short-term social impacts if the harvester and processor operations are stopped. There are no expected long-term impacts. There may be long-term social benefits to non-use stakeholders.
No Action.	This would result in continued loss of pelagic *Sargassum* habitat as well as essential fish habitat and essential fish habitat - habitat areas of particular concern for snapper grouper and coastal migratory pelagic species. Uncontrolled harvest and loss of egg, juvenile, larval, and adult fish habitat could reach levels which limit the production of federally managed species dependent on this essential fish habitat.	Excessive harvest of *Sargassum*, could result in reduction in long-term net benefits to society.
Prohibit harvest and/or possession of pelagic *Sargassum* in the South Atlantic EEZ.	Prohibiting harvest would have been most consistent with the Council's designation of pelagic *Sargassum* as essential fish habitat and essential fish habitat - habitat area of particular concern for both snapper grouper and coastal migratory pelagic species. This action would have prohibited existing harvest and prevented expansion of harvest of this important pelagic habitat.	This action would have reduced benefits to the vessel harvesting *Sargassum* and increased cost to the processing facility that manufactures products from the harvested *Sargassum.* It is unclear whether the net benefits from increased ecosystem services would have outweighed the economic costs of this measure. There may be minimal short-term social impacts if the harvester and processor operations are stopped. There are no expected long-term impacts. There may be long-term social benefits to non-use stakeholders.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Protection and Data	**Social and Economic: Conflicts and Data**
Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border. Cap harvest at 50,000 pounds wet weight (determined dockside after being off-loaded) in the area bounded by the latitude lines representing the North Carolina/Virginia border and the North Carolina/South Carolina border and the longitude line representing 100 miles seaward from the North Carolina shoreline until January 1, 2001 when all harvest will end. In addition, harvesters will be required to: (a) acquire a federal permit, (b) allow on board observers if requested, (c) maintain logbooks, (d) call into NMFS Southeast Regional Law Enforcement Office when leaving and returning to port, and (e) require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger.	Since the *Sargassum* Plan did not go into effect January 2001, the impact of this option would be the same as Rejected Option 2. Prohibiting harvest would have been most consistent with the Council's designation of pelagic *Sargassum* as essential fish habitat and essential fish habitat - habitat area of particular concern for both snapper grouper and coastal migratory pelagic species. This action would have prohibited existing harvest and prevented expansion of harvest of this important pelagic habitat.	Since the *Sargassum* Plan did not go into effect January 2001, the impact of this option would be the same as Rejected Option 2. This action would have reduced benefits to the vessel harvesting *Sargassum* and increased cost to the processing facility that manufactures products from the harvested *Sargassum.* It is unclear whether the net benefits from increased ecosystem services would have outweighed the economic costs of this measure. There may be minimal short-term social impacts if the harvester and processor operations are stopped. There are no expected long-term impacts. There may be long-term social benefits to non-use stakeholders.
Establish a TAC of 20,000 pounds wet weight per year.	The elimination of the prohibitions and limited harvest contained in the preferred alternative and rejected alternative 7 sacrifices preservation to protected species and *Sargassum* as EFH as compared to the other alternatives.	Would allow harvest at the maximum level reported over the three most recent harvest years. However, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvest.
Establish a TAC of 100,000 metric tons wet weight per year.	The elimination of the prohibitions and limited harvest contained in the preferred alternative and rejected alternative 7, in addition to this alternative's increase in TAC, sacrifices preservation to protected species and *Sargassum* as EFH as compared to the other alternatives.	Would allow essentially unencumbered harvest. However, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvest.

Table 3. Summary of Environmental Consequences Continued.

Alternatives	Issues/Problems	
	Biological: Habitat Protection and Data	**Social and Economic: Conflicts and Data**
Establish a TAC of 200,000 pounds wet weight per year.	The elimination of the prohibitions and limited harvest contained in the preferred alternative and rejected alternative 7, in addition to this alternative's increase in TAC, sacrifices preservation to protected species and *Sargassum* as EFH as compared to the other alternatives.	Would allow harvest at the maximum level previously demonstrated by the fishery. However, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvest.
Modifies the Council's preferred option by dropping the gear restriction, moving harvest 150 miles offshore, and allowing harvest between November to April.	The prohibitions and limited harvest would protect pelagic *Sargassum* which supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four endangered or threatened species of sea turtles, and numerous marine birds. This action would also preserve the contribution to total primary production within oligotrophic (low nutrient) waters. Compared to the preferred option, greater conservation would be achieved through eliminating harvest during the month of May and through restricting harvest beyond 150 miles offshore, while conservation would be sacrificed with the elimination of the gear restriction.	The majority of the impacts of this alternative parallel the preferred option's impacts. There may be minimal short-term social impacts if the harvester and processor operations are stopped. There are no expected long-term impacts. There may be long-term social benefits to non-use stakeholders. Additional impacts would include a reduction in benefits from ecological services if the harvesters of the resource were to use gear with smaller mesh.

3.0 AFFECTED ENVIRONMENT

3.1 *Sargassum* Habitat

3.1.1 Description of *Sargassum* Habitat

Within warm waters of the western North Atlantic, pelagic brown algae *Sargassum natans* and *S. fluitans* (Phaeophyta: Phaeophyceae: Fucales: Sargassaceae) form a dynamic structural habitat. These holopelagic species are believed to have evolved from benthic ancestors at least 40 million years ago. Evidence supporting this contention include: 1) lack of sexual reproduction characteristic of benthic species, 2) absence of a basal holdfast, 3) endemic faunal elements (10 invertebrates and 2 vertebrates), 4) greater buoyancy than benthic forms, and 5) late Eocene to early Miocene fossil remains from the Carpathian basin of the Tethys Sea (Winge, 1923; Parr, 1939; Friedrich, 1969; Butler et al., 1983; Stoner and Greening, 1984, Luning, 1990). *Sargassum natans* is much more abundant than *S. fluitans*, comprising up to 90% of the total drift macroalgae in the Sargasso Sea. Limited quantities of several benthic species, including *S. filipendula, S. hystrix, S. polycertium, S. platycarpum,* and *S. pteropleuron,* detached from coastal areas during storms, are also frequently encountered adrift. However, the drifting fragments of these benthic species soon perish (Hoyt, 1918; Winge, 1923; Parr, 1939; Butler et al., 1983).

Figure 1. Pelagic *Sargassum* ssp. community (*Sargassum* fish, *Sargassum* nudibranch, *Sargassum* shrimp, *Sargassum* crab and filefish) (Source: Teal and Teal, 1975).

The pelagic species are golden to brownish in color and typically 20 to 80 cm in diameter. Both species are sterile and propagation is by vegetative fragmentation. The plants exhibit complex branching of the thallus, a lush foliage of lancolate to linear serrate phylloids, and numerous berry-like pneumatocysts. Perhaps the most conspicuous features are the pneumatocysts (Figure 1). These small vesicles function as floats and keep the plants positively buoyant. Gas within these bladders is predominately oxygen with limited amounts of nitrogen and carbon dioxide. The volume of oxygen within the pneumatocysts fluctuates diurnally in response, not to diurnal cycles of photosynthesis, but to changes in the partial pressure of

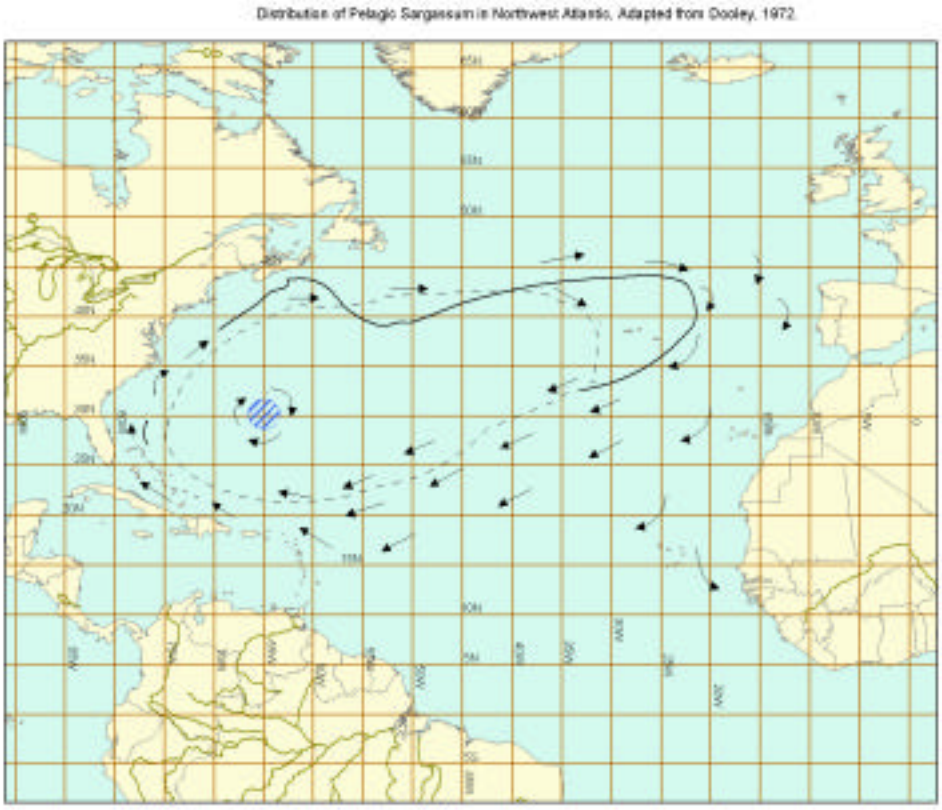
oxygen in the surrounding medium (Woodcock, 1950; Hurka, 1971). There are generally a large number of pneumatocysts on a healthy plant; up to 80% of the bladders can be removed and the plants will remain positively buoyant (Zaitsev, 1971). Under calm sea states the algae are at the surface with less than 0.3% of their total mass exposed above the air - water interface. Experiments indicate that an exposure to dry air of 7-10 minutes will kill phylloids, whereas, pneumatocysts and thallomes can tolerate exposures of 20-30 minutes and 40 minutes, respectively. Wetting of exposed parts with seawater at 1 minute intervals, however, is enough to prevent tissue damage (Zaitsev, 1971). In nature, such stress is likely encountered only during the calmest seas or when the algae is cast ashore. Illustrations and descriptions of *S. natans* and *S. fluitans* are given in Hoyt (1918), Winge (1923), Parr (1939), Taylor (1960), Prescott (1968), Humm (1979), Littler et al. (1989) and Schneider and Searles (1991).

Most pelagic *Sargassum* circulates between 20°N and 40°N latitudes and 30°W longitude and the western edge of the Florida Current/Gulf Stream (Figure 2). The greatest concentrations are found within the North Atlantic Central Gyre in the Sargasso Sea (Winge, 1923; Parr, 1939; Ryther, 1956; Dooley, 1972; Butler et al., 1983; Butler and Stoner, 1984; Nierman et al., 1986). Total biomass is unknown, but, estimates obtained from net tows range from 800 – 2,000 kg wet weight km^{-2}; within the Sargasso Sea, this translates into a standing crop of 4 to 11 million metric tons (Parr, 1939; Zaitzev, 1971; Peres, 1982; Butler et al., 1983; Butler and Stoner, 1984; Nierman et al., 1986; Luning, 1990). Stoner (1983) suggested that there had been a significant decline in biomass this century, but later recanted (Butler and Stoner, 1984). Nierman et al. (1986) also calculated that no apparent decline had occurred.

Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column (Howard and Menzies, 1969; Carpenter and Cox, 1974; Hanson, 1977; Peres, 1982). Estimates of production are typically around 1 mgC m^{-2} d^{-1} with slightly higher values reported from more nutrient rich shelf waters. Production has been shown to double under conditions of nitrogen and phosphorus enrichment (LaPointe, 1986 and 1995). Hanisak and Samuel (1987) found *Sargassum* to have low nitrogen and phosphorus requirements, and optimal growth at water temperatures of 24 - 30° C and salinity of 36 ppt. Nitrogen fixation by epiphytic cyanobacteria of the genera *Dichothrix, Trichodesmium,* and *Synechococcus* may enhance production (Carpenter 1972; Carpenter and Cox, 1974; Phlips and Zeman, 1990; Spiller and Shanmugam, 1987). Photosynthesis in both *Sargassum* and the blue-green epiphytes is not inhibited at high light intensities (Hanisak and Samuel, 1984; Phlips et al., 1986) which is not surprising in view of the neustonic niche they occupy.

Large quantities of *Sargassum* frequently occur on the continental shelf off the southeastern United States. Depending on prevailing surface currents, this material may remain on the shelf for extended periods, be entrained into the Gulf Stream, or be cast ashore (Hoyt, 1918; Humm, 1951; Howard and Menzies, 1969; Carr and Meylen, 1980; Winston, 1982; Haney, 1986; Baugh, 1991). During calm conditions *Sargassum* may form large irregular mats or simply be scattered in small clumps. Langmuir circulations, internal waves, and convergence zones along fronts aggregate the algae along with other flotsam into long linear or meandering rows collectively termed “windrows” (Winge, 1923; Langmuir, 1938; Ewing, 1950, Faller and Woodcock, 1964; Stommel, 1965; Barstow, 1983; Shanks, 1988; Kingsford, 1990). The algae sinks in these convergence zones when downwelling velocities exceed 4.5 cm sec^{-1}. Buoyancy is not lost unless the algae sink below about 100 m or are held under at lesser depths for extended periods (Woodcock, 1950). A time-at-depth relationship exists which affects the critical depth at

which bladder failure ensues (Johnson and Richardson, 1977). If buoyancy is lost, plants slowly sink to the sea floor. Schoener and Rowe (1970) indicate that sinking algae can reach 5000 m in about 2 days. Such sinking events contribute to the flux of carbon and other nutrients from the surface to the benthos (Schoener and Rowe, 1970; Pestana, 1985; Fabry and Deuser, 1991). However, the flux of *Sargassum* to the sea floor has not been quantified and there is no information on the fate of this surface export.



Solid line refers to the outer boundary of regular occurrence; dashed line refers to the area in which there is a > 5% probability of encounter within 1° square; and hatched circle represents possible center of distribution

Figure 2. Distribution of pelagic *Sargassum* in the Northwest Atlantic (Source: Adapted From Dooley, 1972).

3.1.2 Utilization of *Sargassum* Habitat

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including fungi (Winge, 1923; Kohlmeyer, 1971), micro-and macro-epiphytes (Carpenter, 1970; Carpenter and Cox, 1974; Mogelberg et al., 1983), at least 145 species of invertebrates (Winge, 1923; Parr, 1939; Adams, 1960; Yeatman, 1962; Weis, 1968; Friedrich, 1969; Fine, 1970; Dooley, 1972; Morris and Mogelberg, 1973; Ryland, 1974; Teal and Teal, 1975; Peres, 1982; Butler et al., 1983; Deason, 1983; Andres and John, 1984; Stoner and Greening, 1984; Morgan et al., 1985; Nierman, 1986; see Table 1 in Coston-Clements et al., 1991), over 100 species of fishes (see Table 4), five species of sea turtles (Smith, 1968; Fletemeyer, 1978; Carr and Meylan, 1980; Redfoot et al., 1985; Ross, 1989; Carr, 1986, 1987a, 1987b; Schwartz, 1988, 1989; Witham, 1988; Manzella and Williams, 1991; Richardson and McGillivary, 1991), and numerous marine birds (Haney, 1987). Many of the organisms most closely associated with *Sargassum* (Figure 1)

have evolved adaptive coloration or mimic the algae in appearance (Crawford and Powers, 1953; Adams, 1960; Teal and Teal, 1975; Gorelova and Fedoryako, 1986; Hacker and Madin, 1991).

Fishes

The fishes associated with pelagic *Sargassum* in the western North Atlantic have been studied by a number of investigators (Adams, 1960; Parin, 1970; Zaitzev, 1971; Dooley, 1972; Bortone et al., 1977; Fedoryako, 1980, 1989; Gorelova and Fedoryako, 1986; Settle, 1993; Moser et al., in press). Similar research has also addressed the ichthyofauna of drift algae in the Pacific (Uchida and Shojima, 1958; Besednov, 1960; Hirosaki, 1960b; Shojima and Ueki, 1964; Anraku and Azeta, 1965; Kingsford and Choat, 1985; Kingsford and Milicich, 1987; Nakata et al., 1988). In all cases, juvenile fishes were numerically dominant. Sampling designs and gear avoidance have no doubt contributed to the poorly described adult fish fauna. However, studies by Gibbs and Collette (1959), Beardsley (1967), Parin (1970), Manooch and Hogarth (1983), Manooch and Mason (1983), Manooch et al. (1984, 1985), and Fedoryako (1989) clearly indicate that large, pelagic, adult fishes utilize *Sargassum* resources. This becomes even more evident when one observes the efforts of fishermen targeting "weedlines".

Many of the fishes found in association with *Sargassum* are not restricted to that habitat and are known to frequent various types of drift material and fish aggregating devices (Besednov, 1960; Mansueti, 1963; Hunter and Mitchell, 1967; Kojima, 1966; Kulczycki et al., 1981; Lenanton et al., 1982; Robertson, 1982; Nakata et al., 1988; Fedoryako, 1989; Rountree, 1989, 1990). Protection, feeding opportunity, cleaning, shade, structural affinity, visual reference, tactile stimulation, historical accident, passive drift, and use as a spawning substrate have all been postulated as reasons for such associations (Hirosaki, 1960a; Hunter and Mitchell, 1968; Senta, 1966a, 1966b, 1966c; Dooley, 1972; Helfman, 1981).

Species composition and abundance of fishes associated with *Sargassum* are affected by surface residence time, season, and geographic location. Most of the young fishes that associate with the algae are surface forms (Fahay, 1975; Powles and Stender, 1976) and it is not known if they remain near the *Sargassum* when it is submerged. Recruitment of fishes to drift algae and flotsam is initially rapid and continues to increase over time (Senta, 1966a; Hunter and Mitchell; 1968; Kingsford and Choat, 1985; Kingsford, 1992). The abundance of larval and juvenile fishes varies seasonally and regionally, both in terms of numbers of fish and fish biomass (Dooley, 1972; Settle, 1993). The invertebrate fauna is similarly variable (Weis, 1968; Fine, 1970; Stoner and Greening, 1984). Regional trends in the mean abundance and biomass of young fish show a decrease in abundance across the continental shelf and into the Gulf Stream and Sargasso Sea, and a decrease from spring through winter (Settle, 1993). Species richness is generally highest on the outer shelf during spring and summer and further offshore during the fall and winter (Settle, 1993). Overall, diversity is greatest in offshore waters (Bortone et al., 1977; Fedoryako, 1980, 1989; Settle, 1993).

The types of *Sargassum* habitats (e.g., individual clumps, small patches, large rafts, and weedlines) and the "age" (i.e., growth stage and degree of epibiont colonization) also affect the distribution and abundance of associated fishes. Ida et al. (1967a,b), Fedoryako (1980), Gorelova and Fedoryako (1986) and Moser et al. (in press) described the spatial distribution of fishes in and around clumps and rafts of *Sargassum*. Juvenile *Diodon, Coryphaena, Lobotes*, and the exocoetids occupy the outer periphery, whereas *Canthidermis, Balistes, Kyphosus, Abudefduf, Caranx*, and *Seriola* are distributed below the algae. Other species such as *Histrio* and *Syngnathus* are typically hidden within the foliage. Larger juveniles and adults occupy nearby waters out to several tens of meters from the patches. With regard to algal age, Conover

and Sieburth (1964) and Sieburth and Conover (1965) suggest that the community could be significantly controlled by the effects of exogenous metabolites on algal epibionts. These substances, which are released during periods of new algal growth, inhibit epibiotic colonization, and could alter the trophic resources available to associated macrofauna, including fish (Gorelova and Fedoryako, 1986). Stoner and Greening (1984) concluded that algal age did affect the macrofaunal composition, but the abundance of carnivores remained stable. However, since their study dealt primarily with the invertebrate fauna, the effects of these substances on other trophic links remains unknown, although similar compounds are known to deter some herbivores (Paul, 1987; Hay and Fenical, 1988; Hay et al., 1988; Steinberg, 1988).

Fish abundance has been found to be positively correlated with *Sargassum* biomass. Correlations were significant over the middle shelf throughout the year. Fish biomass was also positively correlated over the outer shelf during the fall (Settle, 1993). No correlation was observed in the Gulf Stream or Sargasso Sea (Dooley, 1972; Fedoryako, 1980; Settle, 1993). The abundance of motile macrofauna (mostly invertebrates) has also been shown to be related to *Sargassum* biomass (Stoner and Greening, 1984).

There have been well over 100 species of fishes collected or observed associated with the *Sargassum* habitat (Table 4). The carangids and balistids are the most conspicuous, being represented by 21 and 15 species respectively. The planehead filefish, *Monacanthus hispidus*, is clearly the most abundant species in shelf waters off the southeastern U.S. and in the Gulf of Mexico (Dooley, 1972; Bortone et al., 1977; Settle, 1993; Moser et al., in press).

A number of species have direct fisheries value although not all of them are common. However, the seasonal abundances of *Caranx* spp., *Elagatis bipinnulata*, *Seriola* spp., *Coryphaena hippurus*, *Pagrus pagrus*, *Mugil* spp., *Peprilus triacanthus*, and *Balistes capriscus* illustrates the importance of the habitat to the early life stages of these species.

The relationships between a number of fishes and *Sargassum* habitat remains problematic. The Muraenids, Gonostomatids, Myctophids, Apogonids, Serranids, Gerreids, Scarids, Lutjanids, Chaetodontids, Acanthurids, Istiophorids, Scorpaenids, Bothids, and several other taxa have been collected in limited numbers. It is likely that many of these fishes are found in convergence zones even in the absence of *Sargassum.*

Turtles

There are five species of sea turtles that associate with *Sargassum* and all are highly migratory. The offshore waters of the Western Atlantic may be used by these species as post-hatchling developmental habitat, foraging habitat, or migratory pathways. No individual members of any of the species are likely to be year-round residents of *Sargassum*. Individual animals will make migrations into nearshore waters as well as other areas of the North Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico.

Table 4. List of fishes collected or observed in association with pelagic *Sargassum* in the North Atlantic Ocean including the Gulf of Mexico and Caribbean Sea. Life-stages are E=egg, L=larva, J=juvenile, and A=adult. Nomenclature follows Robins et al. (1991) (Source: Larry Settle NMFS SEFSC pers. comm. 1997).

Family Genus and species	Common name	Life-stage(s)
Carcharhinidae	requiem sharks	
Carcharhinus falciformis	silky shark	A
C. limbatus	blacktip shark	A
C. longimanus	oceanic whitetip shark	A
Muraenidae	morays	
Unidentified	moray	L
Clupeidae	herrings	
Sardinella aurita	Spanish sardine	J
Gonostomatidae	lightfishes	
Unidentified	lightfish	L
Myctophidae	lanternfishes	
Unidentified	lanternfish	L
Gadidae	cods	
Urophycis chuss	red hake	L, J
U. earlli	Carolina hake	L, J
U. floridana	southern hake	L, J
U. regia	spotted hake	L, J
Antennariidae	frogfishes	
Histrio histrio	*Sargassum*fish	L, J, A
Exocoetidae	flyingfishes	
Cypselurus furcatus	spotfin flyingfish	E, L, J, A
C. melanurus	Atlantic flyingfish	E, L, J, A
Exocoetus obtusirostris	oceanic two-wing flyingfish	J
Hemirhamphus balao	balao	J
H. brasiliensis	ballyhoo	J
Hirundichthys affinis	fourwing flyingfish	E, L, J, A
Hyporhamphus unifasciatus	silverstripe halfbeak	L, J
Paraexocoetus brachypterus	sailfin flyingfish	E, L, J, A
Prognichthys gibbifrons	bluntnose flyingfish	E, L, J, A
Belonidae	needlefishes	
Tylosurus acus	agujon	L, J
Fistulariidae	cornetfishes	
Fistularia tabacaria	bluespotted cornetfish	J
Centriscidae	snipefishes	
Macroramphosus scolopax	longspine snipefish	J
Syngnathidae	pipefishes	
Hippocampus erectus	lined seahorse	J
H. reidi	longsnout seahorse	J
Microphis brachurus	opossum pipefish	J
Syngnathus caribbaeus	Caribbean pipefish	J
S. floridae	dusky pipefish	J
S. fuscus	northern pipefish	J
S. louisianae	chain pipefish	J
S. pelagicus	*Sargassum* pipefish	E, L, J, A
S. scovelli	gulf pipefish	J
S. springeri	bull pipefish	J

Table 4.(cont.) List of fishes collected or observed in association with pelagic *Sargassum* in the North Atlantic Ocean including the Gulf of Mexico and Caribbean Sea.

Family Genus and species	Common name	Life-stage(s)
Dactylopteridae	flying gurnards	
Dactylopterus volitans	flying gurnard	L, J
Scorpaenidae	scorpionfishes	
Unidentified	scorpionfish	L
Serranidae	sea basses	
Epinephelus inermis	marbled grouper	J
Priacanthidae	bigeyes	
Priacanthus arenatus	bigeye	J
Pristigenys alta	short bigeye	L, J
Apogonidae	cardinalfishes	
Apogon maculatus	flamefish	L
Pomatomidae	bluefish	
Pomatomus saltatrix	bluefish	L
Rachycentridae	cobias	
Rachycentron canadum	cobia	E, L, J, A
Echeneidae	remoras	
Phtheirichthys lineatus	slender suckerfish	J
Carangidae	jacks	
Caranx bartholomaei	yellow jack	L, J
C. crysos	blue runner	L, J
C. dentex	white trevally	J
C. hippos	crevalle jack	J
C. latus	horse-eye jack	J
C. ruber	bar jack	L, J
Chloroscombrus chrysurus	Atlantic bumper	L, J
Decapterus macerellus	mackerel scad	J
D. punctatus	round scad	J
D. tabl	redtail scad	J
Elagatis bipinnulata	rainbow runner	L, J, A
Naucrates ductor	pilotfish	J
Selar crumenophthalmus	bigeye scad	L, J
Selene vomer	lookdown	J
Seriola dumerili	greater amberjack	L, J
S. fasciata	lesser amberjack	J
S. rivoliana	almaco jack	L, J, A
S. zonata	banded rudderfish	J
Trachinotus falcatus	permit	L, J
T. goodei	palometa	J
Trachurus lathami	rough scad	L, J
Coryphaenidae	dolphins	
Coryphaena equisetis	pompano dolphin	L, J, A
C. hippurus	dolphin	L, J, A
Lutjanidae	snappers	
Lutjanus sp.	snapper	L
Rhomboplites aurorubens	vermillion snapper	L, J
Lobotidae	tripletails	
Lobotes surinamensis	tripletail	L, J, A
Gerreidae	mojarras	
Eucinostomus sp.	mojarra	L

Table 4.(cont.) List of fishes collected or observed in association with pelagic *Sargassum* in the North Atlantic Ocean including the Gulf of Mexico and Caribbean Sea.

Family Genus and species	Common name	Life-stage(s)
Sparidae	porgies	
Pagrus pagrus	red porgy	L, J
Mullidae	goatfishes	
Mullus auratus	red goatfish	L, J
Unidentified	goatfish	L
Kyphosidae	sea chubs	
Kyphosus incisor	yellow chub	L, J
K. sectatrix	Bermuda chub	L, J
Chaetodontidae	butterflyfishes	
Chaetodon ocellatus	spotfin butterflyfish	J
C. striatus	banded butterflyfish	J
Pomacentridae	damselfishes	
Abudefduf saxatilis	sergeant major	L, J
Mugilidae	mullets	
Mugil cephalus	striped mullet	L
M. curema	white mullet	L
Sphyraenidae	barracudas	
Sphyraena barracuda	great barracuda	A
S. borealis	northern sennet	L, J
Polynemidae	threadfins	
Polydactylus virginicus	barbu	J
Labridae	wrasses	
Bodianus pulchellus	spotfin hogfish	J
Thalassoma bifasciatum	bluehead	J
Scaridae	parrotfishes	
Unidentified	parrotfish	L
Uranoscopidae	stargazers	
Unidentified	stargazer	L
Blenniidae	combtooth blennies	
Hypsoblennius hentzi	feather blenny	L
Parablennius marmoreus	seaweed blenny	L
Gobiidae	gobies	
Microgobius sp.	goby	L
Acanthuridae	surgeonfishes	
Acanthurus randalli	gulf surgeonfish	J
Acanthurus sp.	surgeonfish	L
Trichiuridae	snake mackerels	
Unidentified	snake mackerel	L
Scombridae	mackerels	
Acanthocybium solandri	wahoo	J, A
Auxis thazard	frigate mackerel	J, A
Euthynnus alletteratus	little tunny	A
Katsuwonus pelamis	skipjack tuna	A
Scomber japonicus	chub mackerel	J
Scomberomorus cavalla	king mackerel	A
Thunnus albacares	yellowfin tuna	J, A
T. atlanticus	blackfin tuna	A
Xiphiidae	swordfishes	
Xiphius gladius	swordfish	L, J

Table 4.(cont.) List of fishes collected or observed in association with pelagic *Sargassum* in the North Atlantic Ocean including the Gulf of Mexico and Caribbean Sea.

Family Genus and species	Common name	Life-stage(s)
Istiophoidae	billfishes	
Istiophorus platypterus	sailfish	L, J
Makaira nigricans	blue marlin	L, J, A
Tetrapturus albidus	white marlin	L, J, A
Stromateidae	butterfishes	
Ariomma sp.	driftfish	L
Centrolophus sp.	ruff	J
Cubiceps pauciradiatus	bigeye cigarfish	J
Hyperoglyphe bythites	black driftfish	J
H. perciformis	barrelfish	J
Peprilus triacanthus	butterfish	L, J
Psenes cyanophrys	freckled driftfish	J
Bothidae	lefteye flounders	
Bothus sp.	flounder	L
Cyclopsetta fimbriata	spotfin flounder	L
Balistidae	leatherjackets	
Aluterus heudeloti	dotterel filefish	L, J
A. monoceros	unicorn filefish	L, J
A. schoepfi	orange filefish	L, J
A. scriptus	scrawled filefish	L, J
Balistes capriscus	gray triggerfish	J, A
B. vetula	queen triggerfish	J
Cantherhines macrocerus	whitespotted filefish	J
C. pullus	orangespotted filefish	J, A
Canthidermis maculata	rough triggerfish	J
C. sufflamen	ocean triggerfish	J
Monacanthus ciliatus	fringed filefish	J
M. hispidus	planehead filefish	J
M. setifer	pygmy filefish	J
M. tuckeri	slender filefish	J
Xanthichthys ringens	*Sargassum* triggerfish	J
Ostraciidae	boxfishes	
Lactophrys sp.	cowfish	L
Tetraodontidae	puffers	
Chilomycterus antennatus	bridled burrfish	J
C. schoepfi	striped burrfish	J
Diodon holocanthus	ballonfish	J
D. hystrix	porcupinefish	J
Sphoeroides maculatus	northern puffer	L
S. spengleri	bandtail puffer	L
Unidentified	puffer	L
Molidae	molas	
Mola sp.	mola	J

Loggerhead turtle (*Caretta caretta*) — threatened

The loggerhead is the most abundant species of sea turtle in U.S. waters, commonly occurring throughout the inner Continental Shelf from Florida through Cape Cod, Massachusetts. The loggerhead's winter and early spring range is south of 37°00' N in estuarine rivers, coastal bays, and shelf waters of the southeastern United States. Loggerheads move northward and enter northeast coastal embayments as water temperatures approach 20°C (Burke et al., 1989; Musick et al., 1984) to feed on benthic invertebrates, leaving the northern embayments in the fall when water temperatures drop.

Like the Kemp's ridley sea turtle, the activity of the loggerhead is limited by temperature. Keinath et al. (1987) observed sea turtle emigration from the Chesapeake Bay when water temperatures cooled to below 18°C, generally in November. Work in North Carolina showed a significant movement of sea turtles into more northern waters at 11°C (Chester et al., 1994) and Morreale has seen sea turtles persist in New York waters for extended periods at temperatures as low as 8°C (NMFS, 1995b). Surveys conducted offshore and sea turtle strandings during November and December off North Carolina suggest that sea turtles emigrating from northern waters in fall and winter months may concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters (Epperly et al., 1995).

Aerial surveys of loggerhead turtles at sea north of Cape Hatteras indicate that they are most common in waters from 22 to 49 m deep, although they range from the beach to waters beyond the Continental Shelf (Shoop and Kenney, 1992). Morreale and Standora (1998) monitored the gathering of migrating loggerheads during the winter in Onlsow Bay, approximately 100 km offshore from Wilmington, North Carolina, between Cape Lookout Shoals and Frying Pan Shoals.

Pursuant to a November 1994 Biological Opinion on the continued operation of the shrimp fishery in the southeastern United States, NMFS selected a Turtle Expert Working Group (TEWG) consisting of population biologists, sea turtle biologists, and State and Federal managers to consider the best available information to formulate population estimates for sea turtles affected by human activities in the NMFS Southeast Region. The TEWG focused on determining population estimates for Kemp's ridley and loggerhead sea turtles. The TEWG developed the NMFS Technical Memorandum (NMFS-SEFSC, 1998) entitled "An assessment of the Kemp's ridley (*Lepidochelys kempii*) and Loggerhead (*Caretta caretta*) Sea Turtle populations in the Western North Atlantic. New information or conclusions provided within these reports are summarized very briefly below, and the reports are incorporated by reference.

The TEWG identified four nesting subpopulations of loggerheads in the western North Atlantic (two that occupy waters and beaches found within the consultation area): (1) the Northern Subpopulation producing approximately 6,200 nests/year from North Carolina to Northeast Florida; (2) the South Florida Subpopulation occurring from just north of Cape Canaveral on the east coast of Florida and extending up to Naples on the west coast; (3) the Florida Panhandle Subpopulation, and (4) the Yucatan Subpopulation. Since then, a fifth, small subpopulation - the Dry Tortugas Subpopulation - has been identified (NMFS-SEFSC, 2001).

Overall, numbers of nesting females in Georgia and the Carolinas appear to be stable at best if not declining while numbers for south Florida are thought to be increasing though the most recent evidence indicates that their rate of increase may be slowing (NMFS, SEFSC 2001). These trends are of adult nesting females and may not reflect growth rates for the overall population. Increases of adult loggerheads in Florida waters have occurred without a concomitant increase in benthic immature loggerheads. These data may forecast limited recruitment to South Florida nesting beaches in the future. Since loggerheads take

approximately 20-30 years to mature, the effects of decline in immature loggerheads might not be apparent on nesting beaches for decades; therefore, the TEWG cautions against considering trends in nesting too optimistically.

Green Turtle (*Chelonia mydas*) — threatened/endangered

Green turtles are distributed circumglobally, mainly in waters between the northern and southern 20°C isotherms (Hirth, 1971). In the western Atlantic, several major nesting assemblages have been identified and studied. Most green turtle nesting in the continental United States occurs on the Atlantic Coast of Florida (Ehrhart, 1979). Green turtle nesting numbers show biennial peaks in abundance, with a generally positive trend and significant increase during the ten years of regular monitoring since establishment of the index beaches in 1989 (Florida Marine Research Institute, Index Nesting Beach Survey Database, 1990-1995). Hatchlings inhabit the pelagic environment where they are believed to associate with communities of *Sargassum*. After several years, the turtles head to coastal habitats where they forage on sea grasses and macroalgae in shallow bays, lagoons, and reefs (Rebel, 1974).

Important feeding grounds have been identified off both the southwest and southeast coastlines of Florida as well as the Florida Keys. Other principal feeding pastures in the western Atlantic Ocean include the northwestern coast of the Yucatan Peninsula, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth, 1971). Evidence provided by Mendonca and Ehrhart (1982) indicates that immature green turtles may utilize estuarine systems during periods of their lives. These authors identified a population of young green turtles (carapace length 29.5 to 75.4 cm) believed to be resident in Mosquito Lagoon, Florida. The Indian River system, of which Mosquito Lagoon is a part, supported a green turtle fishery during the late 1800s (Ehrhart, 1983), and these turtles may be remnants of this historical colony. Additional juvenile green turtles occur north to Long Island Sound, presumably foraging in coastal embayments. In North Carolina, green turtles occur in estuarine and oceanic waters (Epperly et al., 1995), but nesting is minimal with generally less than five nests reported each year.

Leatherback turtle (*Dermochelys coriacea)* — endangered

The Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) contains a description of the natural history and taxonomy of this species (USFWS and NMFS, 1992). Leatherbacks are widely distributed throughout the oceans of the world and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour, 1972). Leatherbacks are predominantly distributed pelagically, feeding primarily on jellyfish such as *Stomolophus*, *Chryaora*, and *Aurelia* (Rebel, 1974). They may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas, associated with a dense aggregation of *Stomolophus*.

The status of the leatherback population is the most difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. The primary leatherback nesting beaches occur in French Guiana and Suriname in the western Atlantic and in Mexico in the eastern Pacific. Although increased observer effort on some nesting beaches has resulted in increased reports of leatherback nesting, declines in nest abundance have been reported from the beaches of greatest nesting densities. At Mexiquillo, Michoacan, Mexico, Sarti et al. (1996) reported an average annual decline in leatherback nesting of about 23% between 1984 and 1996. The total number of females nesting on the Pacific coast of Mexico

during the 1995-1996 season was estimated at fewer than 1,000. The major western Atlantic nesting area for leatherbacks is located in the Suriname-French Guiana trans-boundary region. Chevalier and Girondot (1998) report that combined nesting in the two countries has been declining since 1992. Some nesting occurs on Florida's east coast, although nests are likely under-reported because surveys are not conducted during the entire period that leatherbacks may nest. In the eastern Caribbean, nesting occurs primarily in the Dominican Republic, the Virgin Islands, and on islands near Puerto Rico. Sandy Point, on the western edge of St. Croix, Virgin Islands, has been designated by the U.S. Fish and Wildlife Service (USFWS) as critical habitat for nesting leatherback turtles. Anecdotal information suggests nesting has declined at Caribbean beaches over the last several decades (NMFS and USFWS, 1995).

Leatherbacks are the largest of sea turtles and are able to maintain body temperatures several degrees above ambient temperatures, likely by virtue of their size, insulating subdermal fat, and an arrangement of blood vessels in the skin and flippers that enables retention of heat generated during swimming (Paladino et al., 1990). Although their tolerance of low temperatures is greater than for other sea turtles, leatherbacks are generally absent from temperate Atlantic waters in winter and spring. Stranding patterns suggest that leatherbacks move north along the coast with increasing water temperatures.

Periodically, large numbers of leatherback strandings occur from northern Florida in January and February, through North Carolina in May. Aerial surveys conducted during stranding events confirmed the abundance of leatherback turtles. Two separate studies, one involving aerial surveys for right whales off Georgia and northern Florida (Kraus and Knowlton, pers. comm.) and the other involving public reporting of leatherback sightings off North Carolina (Braun and Epperly, unpublished), illustrate peaks of leatherback abundance in nearshore waters in late winter, early spring months.

Hawksbill turtle (*Eretmochelys imbricata*) — endangered

The hawksbill turtle is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. Known important foraging habitats in U.S. waters are confined to the Caribbean. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands.

In the Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database, 1990). Many of these strandings were observed after hurricanes or offshore storms. Although there have been no reports of hawksbills in the Chesapeake Bay, one has been observed taken incidentally in a fishery just south of the Bay (Anon., 1992).

Researchers believe that hawksbills occurring in U.S. waters are from populations that are depleted but are no longer declining (NMFS and USFWS, 1995). Habitat loss, fisheries, and continued exploitation are all identified as factors preventing recovery.

Kemp's ridley sea turtle (*Lepidochelys kempii*) — endangered

The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) (USFWS and NMFS, 1992) contains a complete description of the natural history, taxonomy, and distribution of the Kemp's or Atlantic ridley turtle. Of the seven species of sea turtles of the world, the Kemp's ridley is in the greatest danger of extinction. Following is a brief summary of the information on the distribution and trends in abundance of this species.

Adult Kemp's ridleys are found primarily in the Gulf of Mexico. Adult females nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, Mexico. Most of the population of adult females nest in this single locality (Pritchard, 1969). Ridley hatchlings leave the nesting beach and are not seen again until they reach over 20 cm, when they are found in the northern Gulf of Mexico and the embayments along the eastern Atlantic seaboard as far north as Cape Cod Bay. Nothing is known about the specific movements of hatchling Kemp's ridley turtles, although it is believed that they may be controlled by current patterns: either the loop current for northward transport or an eddy for southward transport with occasional transportation through the Florida Straits via the Gulf Stream system (Hildebrand, 1982). Pritchard and Marquez (1973) suggest that passive transportation via the Gulf Stream up the eastern coast of the United States may be the usual dispersal pattern of young Kemp's ridley turtles. It is widely believed that hatchlings inhabit and forage in *Sargassum* rafts that occur at fronts and eddies (Carr, 1987b). However, some authors have observed that *Sargassum* may be used for resting only, since ample food is available throughout the water column, where the likelihood of aggregated predators may be lower (Collard, 1990). Laboratory studies have shown that post-hatchlings are attracted to floating "pseudo" seaweed (Mellgren et al., 1994, Mellgren and Mann, 1996) and tend to hide and remain motionless for long periods indicating that weed lines such as *Sargassum* may also provide shelter and a platform for resting.

Pritchard and Marquez (1973) speculated that ridleys feed and grow rapidly during passive transport, and by the time they reach offshore waters of New England are large enough for active swimming. However, Morreale et al. (1992) hypothesize that passive drifting would result in only sporadic occurrence of ridleys in the northeast United States and that the observed annual occurrence suggests some alternative mechanism. Regardless of the mechanism, small juvenile ridleys enter Atlantic coastal embayments in the summer, when water temperatures approach 20^{o}C (Burke et al., 1989; Musick et al., 1984) and become benthic feeders. Ridleys leave the northern embayments in the fall, when water temperatures cool (Burke et al., 1991). Morreale et al. (1992) give evidence for directed movements of Kemp's ridleys south, out of northeastern coastal waters, as temperatures drop below 14^{o}C, generally in late October (Morreale, pers. comm.). Keinath et al. (1987) observed sea turtle emigration from the Chesapeake Bay when waters dropped below 18^{o}C in November. High Kemp's ridley mortality during November and December in some years associated with the summer flounder fishery off North Carolina suggest that sea turtles emigrating from northern waters in fall and winter months may concentrate in nearshore and southerly areas influenced by warmer Gulf stream waters (Epperly et al., 1995).

Kemp's ridley population estimates are imprecise due to the inaccessibility of these predominantly pelagic animals. When nesting aggregations at Rancho Nuevo were discovered in 1947, greater than 40,000 adult females were estimated to have nested in one day (Hildebrand, 1963). Ridley nest numbers continued to decline until 1987, when less than 750 nests were counted. The subsequent increase in documented nest numbers was not dramatic until 1994, when over 1,500 nests were documented in Mexico. During 1995, over 1,900 nests were observed, and greater than 3,700 nests were observed during the summer of 1998. These nest counts far surpass the numbers of nests observed in any year since monitoring was initiated in 1978. However, these data need to be interpreted cautiously due to expanded monitoring since 1989. Expanded beach survey areas were established in 1989, when much of Rancho Nuevo was destroyed by Hurricane Gilbert. Approximately 25 percent of the ridley nests observed each year since 1990 have occurred on the expanded survey beaches adjacent to Rancho Nuevo despite the fact that Rancho Nuevo's beaches have returned to their original conformation

(Marquez, pers. comm., 1995). Ridley nests have always been observed on the beaches north of Rancho Nuevo during the opportunistic aerial surveys frequently conducted during the decade prior to expansion of the survey area. However, significant nesting was not noted. The large number of nests now collected from those beaches may be the result of a northern expansion of the ridley population's nesting beach, or may reflect a previously undocumented group of nests. After 1994, the positive nesting trend is apparent even exclusive of the nests along the expanded survey area. Assuming 2.5 nests per female and a population growth rate of 9.6 - 13% per year, the population will reach the target of 10,000 females around 2014-2025 (TEWG, 2000).

Recent estimates by the sea turtle Expert Working Group suggest that there now may be 1,500 adult females (NMFS-SEFSC, 1998). Based on 2000 data, estimates of adult females are 2,332.

Marine Mammals

Six species of listed whales (humpback, right, sperm, blue, fin, and sei) are known to occur in the action area. Reported interactions of these species with fisheries in the deeper waters of the Atlantic Ocean are rare. Detailed information on the biology and distribution of these whales documented in the ESA Section 7 Biological Opinion is incorporated by reference and summarized here. Blue and sei whales sightings are uncommon in the southern U.S. EEZ. Humpback, sperm, and fin whales migrate seasonally through the action area, moving north in the summer to feeding grounds and south in the winter to mating and calving grounds. Most appear to only transit the action area, however a significant number of humpbacks, are observed in mid- and high-latitude regions in the winter (Swingle et al., 1993). Based on sighting and stranding information, it appears that young humpbacks in particular have increased in occurrence along the coasts of Virginia and North Carolina during the winter (Wiley et al., 1995). Right whales also use mid-Atlantic waters as a migratory pathway between their summer feeding grounds and winter calving grounds. During the winter, a segment of the population, consisting mainly of pregnant females, migrates southward to calving grounds off the coastal waters of the southeastern United States. Located off the coasts of southern Georgia and northern Florida, a right whale critical habitat was designated by NMFS on June 3, 1994 (59 FR 28793). It is considered highly unlikely that interactions will occur between these whales and the pelagic *Sargassum* fishery in the defined action area. Therefore, NMFS has determined that these listed whale species are not likely to be adversely affected by the action and will not be discussed further.

3.1.3 Measuring *Sargassum* Distribution and Abundance

Information on and understanding of the seasonal distribution and areal abundance (i.e., biomass per unit area) of pelagic *Sargassum* within the Exclusive Economic Zone (EEZ) is limited. Gross estimates of the standing stock for the North Atlantic obtained from towed net samples are highly variable and range between 4 and 11 million metric tons. There is a clear need to improve our understanding of the distribution and abundance of this important habitat. Remote technology could aid to that end. Satellite-based Synthetic Aperture Radar (SAR) offers potential for assessing the distribution of large aggregations over broad swaths of the ocean surface. Coincident ship-based ground-truthing would permit an evaluation of the applicability of routine remote measurements of *Sargassum* distribution and abundance.

3.2 Water Column

3.2.1 Description of Water Column Used by *Sargassum*

Specific habitats in the water column can best be defined in terms of gradients and discontinuities in temperature, salinity, density, nutrients, light, etc. These "structural" components of the water column environment (Peters and Cross, 1992) are not static, but change both in time and space. Therefore, there are numerous potentially distinct water column habitats for a broad array of species and life-stages within species.

The continental shelf off the southeastern U.S., extending from the Dry Tortugas to Cape Hatteras, encompasses an area in excess of 100,000 km^2 (Menzel, 1993). Based on physical oceanography and geomorphology, this environment can divided into two regions: Dry Tortugas to Cape Canaveral and Cape Canaveral to Cape Hatteras. The break between these two regions is not precise and ranges from West Palm Beach to the Florida-Georgia border depending on the specific data considered. The shelf from the Dry Tortugas to Miami is approximately 25 km wide and narrows to approximately 5 km off Palm Beach. The shelf then broadens to approximately 120 km off of Georgia and South Carolina before narrowing to 30 km off Cape Hatteras. The Florida Current/Gulf Stream flows along the shelf edge throughout the region. In the southern region, this boundary current dominates the physics of the entire shelf (Lee et al., 1992, 1994). In the northern region, additional physical processes are important and the shelf environment can be subdivided into three oceanographic zones (Atkinson et al., 1985; Menzel, 1993). The outer shelf (40-75 m) is influenced primarily by the Gulf Stream and secondarily by winds and tides. On the mid-shelf (20-40 m), the water column is almost equally affected by the Gulf Stream, winds, and tides. Inner shelf waters (0-20 m) are influenced by freshwater runoff, winds, tides, and bottom friction.

Several water masses are present in the region. From the Dry Tortugas to Cape Canaveral, the three water types are: Florida Current Water (FCW), waters originating in Florida Bay, and shelf water. Shelf waters off the Florida Keys is a mixture of FCW and waters from Florida Bay. From Cape Canaveral to Cape Hatteras, four water masses are found: Gulf Stream Water (GSW), Carolina Capes Water (CCW), Georgia Water (GW), and Virginia Coastal Water (VCW). Virginia Coastal Water enters the region from north of Cape Hatteras. Carolina Capes Water and GW are mixtures of freshwater runoff and GSW (Pietrafesa et al., 1985 and 1994).

Spatial and temporal variation in the position of the western boundary current has dramatic affects on water column habitats. Variation in the path of the Florida Current near the Dry Tortugas induces formation of the Tortugas Gyre (Lee et al., 1992 and 1994). This cyclonic eddy has horizontal dimensions on the order of 100 km and may persist in the vicinity of the Florida Keys for several months. The Pourtales Gyre, which has been found to the east, is formed when the Tortugas Gyres moves eastward along the shelf. Upwelling occurs in the center of these gyres, thereby adding nutrients to the near surface (<100 m) water column. Wind and input of Florida Bay water also influence the water column structure on the shelf off the Florida Keys (Smith, 1994; Wang et al., 1994). Similarly, further downstream, the Gulf Stream encounters the "Charleston Bump", a topographic rise on the upper Blake Ridge. Here the current is often deflected offshore, again resulting in the formation of a cold, quasi-permanent cyclonic gyre and associated upwelling (Brooks and Bane, 1978). Along the entire length of the Florida Current and Gulf Stream, cold cyclonic eddies are imbedded in meanders along the western front. Three areas of eddy amplification are known: Downstream of Dry Tortugas, downstream of Jupiter Inlet (27°N to 30°N latitude), and downstream of the "Charleston Bump" (32°N to 34°N latitude). Meanders propagate northward (i.e., downstream) as waves. The crests and troughs represent the onshore and offshore positions of the Gulf Stream front. Cross-shelf

amplitudes of these waves are on the order 10 to 100 km. Upwelling within meander troughs is the dominant source of "new" nutrients to the southeastern U.S. shelf and supports primary, secondary, and ultimately fisheries production (Yoder, 1985; Menzel 1993). Off Cape Hatteras, the Gulf Stream turns offshore to the northeast. Here, the confluence of the Gulf Stream, the Western Boundary Under Current (WBUC), Mid-Atlantic Shelf Water (MASW), Slope Sea Water (SSW) , CCW, and VCW create a dynamic and highly productive environment known as the "Hatteras Corner" or "The Point" (Figure 3a).

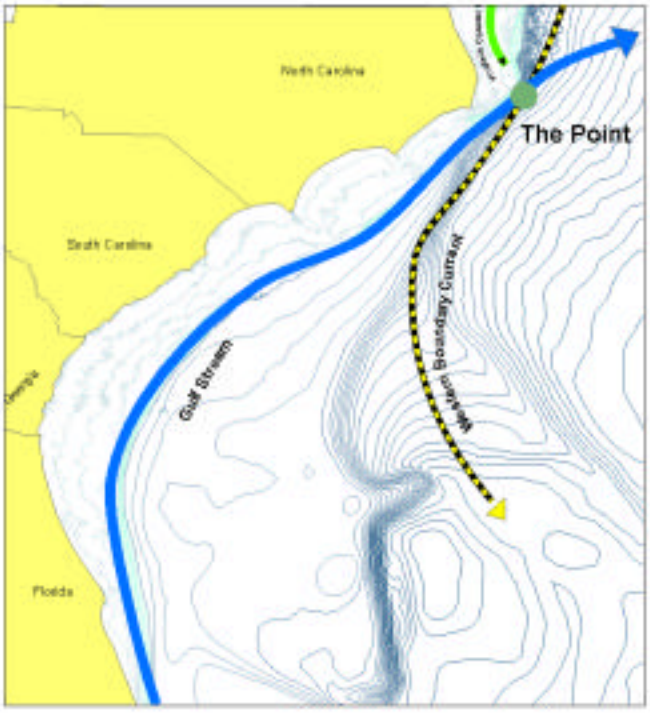


Figure 3a. Water masses off Cape Hatteras, North Carolina. (Source: Roger Pugliese, SAFMC; Adapted from Shepard and Hulbert, 1994).

On the continental shelf, offshore projecting shoals at Cape Fear, Cape Lookout, and Cape Hatteras affect longshore coastal currents and interact with Gulf Stream intrusions to produce local upwelling (Blanton et al., 1981; Janowitz and Pietrafesa, 1982). Shoreward of the Gulf Stream, seasonal horizontal temperature and salinity gradients define the mid-shelf and inner-shelf fronts. In coastal waters, river discharge and estuarine tidal plumes contribute to the water column structure.

3.2.2 Use of Water Column Habitats

Coastal waters off the southeastern U.S. are split into two zoogeographic provinces based on shore fishes and continental shelf invertebrate species. The Caribbean Province includes the Florida Keys and extends northward to approximately the Florida-Georgia border, but its northern boundary is not sharp. The Carolinian Province extends from this border, northwards to Cape Hatteras (Briggs, 1974). A similar faunal break is evident in mesopelagic fish fauna. The boundary between the North Sargasso Sea Province and the South Sargasso Sea Province occurs approximately parallel with Jupiter Inlet, Florida (Backus et al., 1977).

The water column from Dry Tortugas to Cape Hatteras serves as habitat for many marine fish and shellfish. Most marine fish and shellfish release pelagic eggs when spawning and thus, most species utilize the water column during some portion of their early life history (e.g., egg, larvae, and juvenile stages). Larvae of shrimp, lobsters, and crabs, and larvae of reef, demersal, and pelagic fishes are found in the water column (e.g., Fahay, 1975; Powels and Stender, 1976; Leis, 1991; Yeung and McGowan, 1991; Criales and McGowan, 1994). Problems with species-level identification prohibits an exact accounting of the number of fishes whose larvae inhabit the water column, but the number of families represented in ichthyoplankton collections ranges from 40 to 91 depending on location, season, and sampling method (Table 5).

Table 5. Summary of the number of larval fish families identified from studies conducted off the southeastern coast of the United States.

Location	**Season**	**Number Families**	**Study**
Florida Keys	Sp	91	Limouzy-Paris et al. (1994)
Cape Canaveral to Cape Lookout	W	48/60*	Powles and Stender (1976)
Cape Canaveral to Cape Lookout	Sp	49/56*	Powles and Stender (1976)
Cape Canaveral to Cape Lookout	F	40/55*	Powles and Stender (1976)
Cape Fear to Cape Lookout	W	74	Govoni and Spach (submitted)
Cape Fear to Cape Lookout	W	66	Powell and Robbins (1994)
Palm Beach to Cape Lookout	Sp-W	51	Fahay (1975)

* - bongo / neuston data

There are a large number of fishes that inhabit the water column as adults. Pelagic fishes include numerous Clupeoids, Exocoetids, Carangids, *Rachycentron*, *Pomatomus*, Coryphaenids, Sphyraenids, and the Scombroids (Schwartz, 1989). Some pelagic species are associated with particular benthic habitats (e.g., *Seriola* and *Sphyraena*), while other species are truly pelagic (e.g., *Thunnus* and *Makaira*). Adult meso- and bathypelagic species inhabit the water column in the Gulf Stream (Figure 3b) and adjacent Sargasso Sea (Backus et al., 1977).

Species- and life-stage-specific patterns of water column habitat utilization are not well known for most fishes. Some utilize near-shore fronts as feeding or nursery habitats (e.g., *Anchoa* and *Scomberomorus*); others utilize offshore fronts (e.g., *Coryphaena* and *Xiphius*). Important spawning locations include estuarine fronts (e.g., *Cynoscion* and *Sciaenops*), the mid-shelf front (*Micropogonias*, *Leiostomus*, and *Paralichthys*), and the Gulf Stream front (Figure 3b) (*Coryphaena* and *Xiphius*). Recent work has shown an accumulation of fish larvae in these shelf fronts (Govoni, 1993). Movement of the Gulf Stream front also affects the distribution of adult fishes (Magnuson et al., 1981) and hook-and-line fisherman and longliners target much of their effort for pelagic species in these frontal zones.

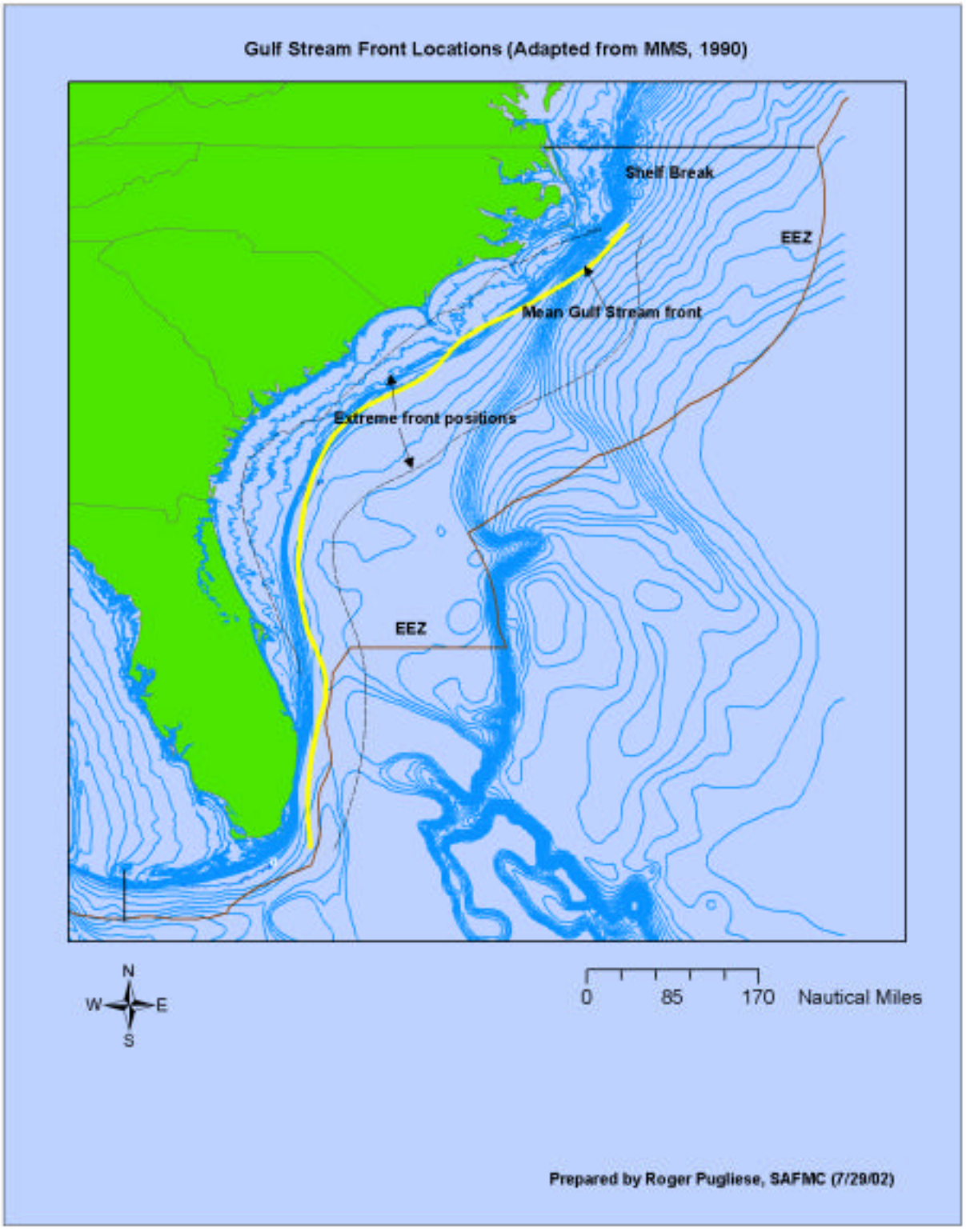


Figure 3b. Gulf Stream front location (Source: Minerals Management Service, 1990).

In addition, the quasi-permanent gyres which impinge upon the shelf near the Florida Keys and downstream from the "Charleston Bump" probably serve as important spawning/larval retention habitat for a variety of fishes (Collins and Stender, 1987; Lee et al., 1994). The region known as "The Point" off Cape Hatteras supports an unusually high biomass of upper trophic level predators, including many important pelagic fishes. It has been suggested that the area is the most productive sport fishery on the east coast (Ross, 1989).

Due to their important ecological function, at least two offshore pelagic environments, the "Charleston Bump" and "The Point", discussed above were designated essential fish habitat-habitat areas of particular concern (EFH-HAPCs) for coastal migratory pelagics, snapper grouper species, and coral and live/hard bottom habitat (SAFMC, 1998a,b). Both regions are productive and highly dynamic oceanic areas where pelagic *Sargassum* is concentrated. This was noted in the SAFMC essential fish habitat workshop on pelagic habitat. A quasi-permanent, cyclonic eddy with attendant upwelling of nutrient-rich deep water sets-up in the wake of the Charleston Bump. Upwelling results in persistent primary and secondary production that may well result in an important, if not essential feeding environment for the larvae of fishes that congregate to spawn there. The hydrodynamics of the eddy may well serve in the retention of fish propagules that are lost from local populations elsewhere through entrainment into the Gulf Stream. "The Point" off Cape Hatteras is also highly productive due to the confluence of as many as four water masses. Adults of highly migratory species congregate in this area, while the diversity of larval fishes found there is high (Appendix A).

3.3 Factors Affecting *Sargassum* and *Sargassum* Habitat

3.3.1 Assessment of Adverse Effects of Fishing on EFH

Section 303(a)(7) of the Magnuson-Stevens Act requires that FMPs minimize to the extent practicable the adverse effects of fishing on EFH. The EFH regulations at 50 CFR 600.815(a)(2)(i) state that each FMP "must contain an evaluation of the potential adverse effects of fishing on EFH." The regulations also state that "Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there is evidence that a fishing activity adversely effects EFH" based on the assessment of potential fishing impacts and/or a cumulative impacts analysis (50 CFR 600.815(a)(2)(ii)). For *Sargassum*, these requirements encompass fishing activities that may adversely affect EFH for *Sargassum*, as well as fishing activities that may adversely affect *Sargassum* itself, since *Sargassum* is designated as EFH for coastal migratory pelagic species and snapper/grouper.

3.3.1.1 Description of Fishing Activities

The following is a list of gear currently in use (or regulated) in fisheries managed under the South Atlantic Council fishery management plans. These gears all have the potential to interact with *Sargassum*. In general if gear is not listed it is prohibited or not commonly used in the fishery:

<u>Snapper Grouper Fishery Management Plan</u>

1. Vertical hook-and-line gear, including hand-held rod and manual or electric reel or "bandit gear" with manual, electric or hydraulic reel (recreational and commercial).
2. Spear fishing gear including powerheads (recreational and commercial).

3. Bottom longlines (commercial).
   - Prohibited south of a line running east of St. Lucie Inlet, Florida and in depths less than 50 fathoms north of that line.
   -May not be used to fish for wreckfish.
4. Sea bass pots (commercial).
   -May not be used or possessed in multiple configurations.
   -Pot size, wire mesh size and construction restrictions.
   -May not be used in the EEZ south of a line running due east of the NASA Vehicle Assembly Building, Cape Canaveral, Florida.
5. Special Management Zones (created under the Snapper Grouper FMP).
   -Sea bass pots are prohibited in all Special Management Zones.
   -Fishing may only be conducted with hand-held hook-and-line gear (including manual, electric, or hydraulic rod and reel) and spearfishing gear in specified Special Management Zones, however, in other specified Special Management Zones a hydraulic or electric real that is permanently affixed to a vessel ("bandit gear") and/or spear fishing gear (or only powerheads) are prohibited.

Shrimp Fishery Management Plan

1. Shrimp trawls -- wide-ranging types including otter trawls, mongoose trawls, rock shrimp trawls, etc. (commercial). Specified areas are closed to trawling for rock shrimp.

Red Drum Fishery Management Plan

1. No harvest or possession is allowed in or from the EEZ (no gear specified).

Golden Crab Fishery Management Plan

1. Crab traps (commercial).
   -May not be fished in water depths less than 900 feet in the northern zone and 700 feet in the middle and southern zones.
   -Trap size, wire mesh size, and construction restrictions.

Coral, Coral Reefs, and Live/Hard Bottom Habitat Fishery Management Plan

1. Hand harvest only for allowable species (recreational and commercial).
2. Oculina Bank Habitat Area of Particular Concern
   -Fishing with bottom longlines, bottom trawls, dredges, pots or traps is prohibited.
   -Fishing vessels may not anchor, use an anchor and chain, or use a grapple and chain.

Coastal Migratory Pelagic Resource Fishery Management Plan

1. Hook and line gear, usually rod and reel or bandit gear, hand lines, flat lines etc. (recreational and commercial).
2. Run-around gillnets or sink nets (commercial).
   -A gillnet must have a float line less than 1,000 yards in length to fish for coastal migratory pelagic species.
   -Gillnets must be at least 4-3/4 inch stretch mesh.
3. Spearfishing gear including powerheads (cobia bag limit).
4. Purse seines for other coastal migratory species (commercial) with an incidental catch allowance for Spanish mackerel (10%) and king mackerel (1%).
5. Surface longlines primarily for dolphin.

Spiny Lobster Fishery Management Plan

1. Traps, hand harvest, dip nets and bully nets (recreational and commercial). There are trap size and construction restrictions.

Fishing gears used in state waters include hook-and-line (e.g., trolling, long-line, trot line), nets (e.g., cast, fyke, trammel, channel, ocean drift, ocean sink gill), seines (e.g., long haul, hand, beach, purse), pots (e.g., fish, eel, crab, shrimp), dredges (e.g., crab, oyster, sea scallop, hydraulic clam), trawls (e.g., otter, crab, skimmer, butterfly, fish trawls/flynets), bull rake, gig spear, oyster tongs, and clam tongs (see the Habitat Plan Appendix H; SAFMC, 1998a).

Only one company, Aqua-10 Laboratories, has harvested pelagic *Sargassum* offshore of North Carolina from 1976 to 1997; no harvest has occurred since 1997. A total of approximately 448,000 pounds wet weight of pelagic *Sargassum* has been harvested to date (Table 6). Pelagic *Sargassum* was originally collected with unweighted shrimp trawls or 3' x 4' and 4' x 8' beam trawls constructed of iron pipe with 1.5 inch and 2 inch mesh bags that were 6'- 8' deep. The average capacity of the beam trawl is 200 pounds of *Sargassum*. Initially, harvest was conducted during the months of June and September by Aqua-10 contracting with a shrimp, snapper grouper, or longline vessel to harvest pelagic *Sargassum* in conjunction with their regular fishing trip. No harvest occurred from 1991 through 1994. The company reinitiated harvest activities in 1995 and has now purchased a former snapper grouper vessel to conduct directed trips harvesting pelagic *Sargassum* in the South Atlantic EEZ off North Carolina. The company anticipates a growth in demand and projects an increase from an average annual harvest of 1,723 pounds dry weight or 17,230 pounds wet weight, to 50,000 dry weight or 500,000 pounds wet weight annually between 1999 and 2005 to meet demand. However, no harvest has occurred since 1997.

Pelagic *Sargassum* is sundried, powdered, fermented, and extracted to provide a processed liquid used by Aqua-10 in plant and yield stimulants (soil and foliar), fertilizer concentrate (soil and foliar), poultry feed supplement, and livestock feed supplement.

For a summary of previous harvest activities see, "Commercial harvest of pelagic *Sargassum*: A summary of landings since June 1995 (Settle, 1997)" and a NMFS SEFSC *Sargassum* harvest report - June 13 1996. In addition, reference the thesis prepared by Lawrence Settle (Settle, 1993) titled "Spatial and Temporal Variability in the Distribution and Abundance of Larval and Juvenile Fishes Associated with Pelagic *Sargassum*".

William E. Campbell, owner of Aqua-10 Laboratories, provided information on the harvest and processing of pelagic *Sargassum* during the informal review and public hearing process which is contained in the Administrative record. Additional comments were provided during the September 1998 Council meeting in Charleston, S.C. and are included in a supplemental comment package compiled for the December 1998 Council meeting. Mr. Campbell gave written permission for his confidential landings data to be used. In his comments to the Council on December 3, 1998, Mr. Campbell indicated he used 4-inch stretched mesh to harvest *Sargassum*.

Table 6. Pelagic *Sargassum* Harvested from the South Atlantic region off North Carolina 1976 through 1999. (Source: William E. Campbell, Aqua-10 Laboratories, Beaufort, North Carolina. July 29, 1998 and updated by NMFS through March 2002.)

Year	Number of Trips	Harvest region	Landings (wet weight in lb.) (approximately = 10x dry weight)
1976	4	WCS-MCS-GS	30,000
1977	-		
1978	-		
1979	1	ECS-GS	22,000
1980	-		
1981	3	ECS-GS	20,000
1982	2	GS	11,000
1983	1	ECS	1,000
1984	3	GS	30,000
1985	1	ECS	10,000
1986	1	GS	9,000
1987	7	SS	50,000
1988	3	SS	22,000
1989	-		
1990	14	SS	200,000
1991	-		
1992	-		
1993	-		
1994	-		
1995	4	ECS-GS-SS	11,000
1996	6	SS	20,000
1997	2	SS	12,000
1998	-		
1999	-		
2000	-		
2001	-		
Total as of June 2002	**52**		**448,000**

Notes: WCS - West of Continental Shelf
MCS - Mid Continental Shelf
ECS - East of Continental Shelf
GS - Gulf Stream
SS - Sargasso Sea

3.3.1.2 Effects of all fishing activities on EFH

While many of the fishing gears listed above are designed to target benthic habitats, most have some interaction with the water column (*Sargassum* EFH) during deployment and retrieval. When drawn through the water column, fishing gears could have effects on the water column environment, including creation of turbulence, alteration of water chemistry, or scattering or removal of pelagic organisms. These effects are temporary and isolated in nature; because of the fluid nature of the pelagic environment, recovery time is rapid. Furthermore, while these effects result in modifications, there is no evidence that the modifications are adverse. **Thus, based on available information, fishing activities are not expected to adversely affect the quality or quantity of suitable habitat for pelagic *Sargassum*.**

While fishing activities are not expected to adversely affect EFH for *Sargassum*, they do affect *Sargassum* itself as EFH for other species. The direct harvest of *Sargassum* removes EFH for coastal migratory pelagic species and snapper/grouper. This adverse effect is expected to be localized and of short duration given the rapid recovery time and the limits on *Sargassum* harvest under this FMP.

The *Sargassum* FMP proposes the following management measures that limit the amount and location of *Sargassum* harvest:

a) specifying OY as 5,000 pounds of *Sargassum* wet weight per year;
b) establishing a TAC of 5,000 pounds of *Sargassum* landed wet weight;
c) prohibiting all harvest and possession of *Sargassum* from certain geographic areas; and
d) including harvest restrictions (i.e., mesh size and seasonal restrictions).

In addition to direct harvest, the deployment of fishing gears through *Sargassum* habitat could result in some incidental loss of *Sargassum*. For most gears, fishermen avoid *Sargassum* in order to prevent fouling of gear and nets. Hook-and-line fishermen, however, often target the perimeters of *Sargassum* windrows in an attempt to harvest associated fish species. During retrieval, *Sargassum* could become entangled on the fishing lines and be brought on board the fishing vessel; however, the *Sargassum* is generally thrown back overboard and the amount affected in this manner is minimal and replenishable.

The EFH regulations state that "in determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider whether, and to what extent, the fishing activity is adversely affecting EFH, including the fishery; the nature and extent of the adverse effect on EFH; and whether the management measures are practicable, taking into consideration the long and short-term costs as well as benefits to the fishery and its EFH, along with other appropriate factors, consistent with national standard 7." (50 CFR 600.815(a)(2)(iii)).

Based on the above analysis regarding adverse effects to *Sargassum*, the harvest and incidental loss of *Sargassum* would not measurably impact EFH for *Sargassum* or the standing crop of *Sargassum* for those managed fish species that rely on *Sargassum* for habitat. **Therefore, the *Sargassum* FMP meets the Magnuson-Stevens Act requirement to minimize to the extent practicable the adverse effects of fishing on EFH, and no further action is warranted at this time.**

3.3.2 Assessment of Adverse Effects of Non-fishing Activities on *Sargassum* Habitat

The following discussion identifies non-fishing activities, including navigation, ocean dumping, and oil and gas exploration, that could result in threats to offshore, pelagic environments. While little information is available on the specific effects of the activities on *Sargassum* or *Sargassum* habitat, impacts related to these activities, such as increased turbidity or contamination, could affect the ability of the water column to support *Sargassum* growth and reproduction.

3.3.2.1 Navigation

Offshore navigation activities that potentially impact EFH include channel dredging and routine vessel operations. Channel dredging and spoil disposal can create localized areas of elevated turbidity and, potentially, a resuspension of toxic and harmful components. Impacts from vessel operations are mainly linked to routine disposal of trash and wastes and the accidental release or spillage of cargo or discharge or spillage of fuel, oil, grease, paints, solvents, and trash. Vessel related disposal is likely to occur more often in the open ocean, rather than in estuarine and nearshore waters where such activities may be more strictly controlled and are likely to be observed. Vessel operations can also result in the transfer and introduction of exotic and harmful organisms through ballast water discharge.

3.3.2.2 Ocean Dumping

Potential threats from offshore dumping include: introduction of contaminants and toxic substances into waters and substrates, and increased turbidity levels. Threats to water column EFH from dredging are most significant in terms of turbidity from dumped materials, although contamination of the water column is also possible if the dredged material is contaminated.

Dredged material disposal in ocean waters generally involves disposal of sediments dredged from shallower inshore areas such as port facilities and navigation channels. Most of the sediments taken from inshore areas are fine grained, contain some degree of contamination, and produce at least short-term impacts such as turbidity plumes when removed and deposited in offshore disposal areas. The overall effects of dumping on water column EFH are not well studied, but are expected to be temporary.

Under provisions of the Marine Protection Research and Sanctuaries Act (MPRSA), ocean disposal of hazardous and toxic materials, other than dredged materials, is prohibited by U.S. flag vessels and by all vessels operating in the U.S. territorial sea and contiguous zone. The U.S. Environmental Protection Agency may issue emergency permits for industrial waste dumping into ocean waters if unacceptable human health risk do not exist and no other alternative is feasible.

To date, offshore ocean dumping sites have been approved for ports at Wilmington, North Carolina; Brunswick, Georgia; Charleston, South Carolina; and Miami, Fort Pierce, Jacksonville, and Fernandina Beach, Florida (C. McArthur, Jacksonville Corps of Engineers; personal communication). The Army Corps of Engineers (COE) has identified Port Everglades and Palm Beach, Florida; Port Royal, South Carolina; and Wilmington, North Carolina as locations in need of new or additional designated ocean dumping sites.

Because of MPRSA and the Marine Plastic Pollution Research and Control Act (MPPRCA), major dumping threats to EFH within Federal waters should be limited mostly to illegal dumping and accidental disposal of material in unapproved locations. However, many agencies lack sufficient staff and funds to carry out mandated responsibilities and the opportunity for illegal and accidental dumping may be substantial. The effect of insufficient monitoring and enforcement is evident by the tons of debris that are washed up on the nation's beaches every year.

3.3.2.3 Oil and Gas Exploration, Development, and Transportation

Extensive areas of the west central Atlantic have been designated for oil and gas exploration and development. This activity, however, has been relatively dormant, unlike the activities that proliferate in the Gulf of Mexico. Initial exploration in the vicinity of Cape Hatteras several years ago did not advance due to environmental and other concerns including consistency issues associated with North Carolina's Coastal Zone Management Program. As oil and gas reserves in the U.S. decline, petroleum exploration could resume and, if economically viable reserves are located, this activity could expand and water column EFH within the EEZ of the west central Atlantic could be at risk.

Potential threats to water column EFH include: release of harmful and toxic substances from extracted well cuttings and muds; oil and gas from materials used in oil and gas exploration and recovery; and damage to organisms and habitats due to accidental spills. Oil and gas related activities are inherently intrusive and pose a considerable level of threat to marine and estuarine ecosystems, including EFH. The toxic nature of hydrocarbon products and certain drilling materials (e.g., drilling muds), spill clean up chemicals, and the large volume of unrefined and refined products that must be moved within the coastal zone places large areas and resource bases as risk.

Blowouts occur when improperly balanced well pressures result in sudden, uncontrolled releases of petroleum hydrocarbons. Blowouts can occur during any phase of development: exploratory drilling, development drilling, production, or workover operations. Historically, about 23% of all blowouts will have associated oil spills, of which 8% will result in oil spills greater than 50 barrels, and 4% will result in spills greater than 1000 barrels. In subsurface blowouts, sediment will be resuspended and bottom disturbance will generally occur within a 300 meter radius. Whereas larger grain sediment will settle first, fined grained material may remain in suspension for periods of up to thirty days or longer. Fine grained material may be redistributed over a significantly large area depending on the volume of sediment disturbed, bottom morphology, and currents (MMS, 1996).

The major operational wastes associated with offshore oil and gas exploration and development include drilling fluids and cuttings and produced waters. Other important wastes include: from drilling--waste chemicals, fracturing and acidifying fluids, and well completion and workover fluids; from production--produced sand, deck drainage, and miscellaneous well fluids; and from other sources--sanitary and domestic wastes, gas and oil processing wastes, ballast water, storage displacement water, and miscellaneous minor discharges (MMS, 1996). Major contaminants or chemical properties of materials used in oil and gas operations may include those that are highly saline; have a low pH; contain suspended solids, heavy metals, crude oil compounds, organic acids, priority pollutants, and radionuclides; and those which generate high biological and chemical oxygen demands.

Accidental discharge of oil can occur during almost any stage of exploration, development, or production on the Outer Continental Shelf (OCS) or in near shore base areas. Oil spills may result from many possible causes including equipment malfunction, ship collisions, pipeline breaks, human error, or severe storms. Oil spills may also be attributed to support activities associated with product recovery and transportation. In addition to crude oil spills, chemical, diesel, and other oil-product spills can occur with OCS activities. Of the various potential OCS-related spill sources, the great majority are associated with product transportation activities (MMS, 1996).

As of this writing, only test wells have been drilled in the South Atlantic Bight area and these have been confined to nearshore areas. All of these wells were capped immediately after drilling. No production or transportation facilities such as offshore terminals and pipelines have been built, nor are any such facilities currently planned in South Atlantic Bight waters. Despite this, millions of barrels of crude oil and refined product transit South Atlantic Bight waters by tank vessel every year and the potential exists for the discharge of thousands of barrels of oil due to vessel collision or sinking. Discharge of untreated ballast water from transiting vessels is also a chronic low level source of petroleum-based pollution.

3.4 Effect of *Sargassum* Harvest on Listed Turtles

The harvest of *Sargassum* is expected to adversely affect sea turtles, particularly loggerhead hatchlings, primarily through the take of individuals and the temporary loss of sea turtle habitat. Pelagic sea turtle hatchlings occupy the *Sargassum* weed lines of the South Atlantic area and research suggests that post-hatchlings are present in close proximity and timing to potential pelagic *Sargassum* harvesting operations. Witherington (1998a) observed an average of 12 hatchlings for each one-half hour spent harvesting, or a minimum of five (5) sea turtles per nautical mile, in a region of the Atlantic Ocean off the southeast U.S., and observed a maximum density of 30 post-hatchlings in a $50m^2$ *Sargassum* mat. According to Witherington (1998a), "the habitat targeted for *Sargassum* harvesting off North Carolina is similar enough to the 'upstream' habitat off Florida to warrant similar predictions of neonate loggerhead densities...harvesting of *Sargassum* in this region of the ocean will result in take of sea turtles." No historical data on take exists for this fishery. No sea turtle post-hatchlings have been reported dockside (Settle, 1997). Mr. Campbell of Aqua-10 Laboratories (Beaufort, NC) informed NMFS that on one occasion a vessel collected sea turtle post-hatchlings during *Sargassum* harvesting. According to Mr. Campbell's report, about 20 post-hatchlings were "caught" and released alive in 1990 (Campbell, pers. comm., 1999).

The presence of post-hatchling sea turtles in *Sargassum* has been documented frequently (Witherington, 1998b, 1994; Richardson and McGillivary, 1991; Carr and Meylan, 1980). Based on estimates of pelagic post-hatchling densities, take is expected to occur during harvesting operations. Calculation of the expected amount of incidental take is difficult. The distribution of pelagic post-hatchlings is highly variable and, therefore, the take rate/tow is also expected to vary greatly, with many of the tows expected to have zero take based on observed trips. The majority of take will be loggerhead sea turtles as this is the primary nesting species along the East Coast of the United States. Leatherback, green, hawksbill, and Kemp's ridley sea turtles may also occur in this area.

The harvesting of pelagic *Sargassum* through the summer and fall months coincides with the majority of seasonal hatchling emergence along the southeast coast, when the greatest density of post-hatchlings is expected to occur in weed lines of pelagic *Sargassum*. The overlap of harvesting activities with the seasonal occurrence of post-hatchlings is expected to increase the

risk of take. Numerous trawls/trip along the same weed line or concentrated effort, as well as the length of time the trawl is in the water, will also increase the risk of take of post-hatchlings.

The trawling process, including the processing and handling of the *Sargassum* from the trawl once aboard, will result in mortality of some of those sea turtle post-hatchlings incidentally taken. Some sea turtle post-hatchlings associated with the *Sargassum* may drown during tows. Using a 4" inch mesh size may initially reduce the incidental take of post-hatchling sea turtles. However, *Sargassum* is a characteristically sturdy and leafy algae. Any weed line, in bulk, will quickly clog the mesh openings and likely prevent the escape of bycatch, including sea turtle post-hatchlings. In addition, post-hatchlings, juvenile fish, invertebrates, and other organisms associated with *Sargassum*, are generally found intermixed with the algae. It is unlikely that most of these organisms could separate from the large mats of *Sargassum* and escape through the mesh.

Even with their contrasting coloration, sea turtle post-hatchlings collected by the trawl will be difficult to detect due to the animal's small body size and the large amount of *Sargassum* (average 200-300 pounds wet weight) collected in each tow. Post-hatchling sea turtles not observed in the weed line, and collected with the *Sargassum*, are likely to continue to go undetected in this quantity of algae. Therefore, unless there is a careful search of the *Sargassum*, take of sea turtles can occur and go unnoticed. However, a careful search of the algae would ensure that most individuals will be observed.

Due to the size of the vessel used for harvesting (63 feet), varying sea and atmospheric conditions, glare, observer distance from the water, and the small size and cryptic nature of post-hatchlings, an onboard observer will likely be unable to spot post-hatchlings in the water or in a *Sargassum* weed line about to be trawled. Take could not, therefore, be prevented by the presence of an onboard observer. Immature pelagic sea turtles, slightly larger than post-hatchlings, may also occur in the action area. If encountered, this size turtle, like the post-hatchling, will be unable to avoid capture by the *Sargassum* trawl. Larger juvenile, sub-adult, and adult sea turtles may also be unable to avoid capture, particularly if they are resting when engulfed and taken by the trawl.

Once *Sargassum* weed lines have been harvested, this habitat previously used for foraging, sheltering, and resting is now unavailable. Pelagic hatchlings once associated with the *Sargassum*, if found alive after harvesting, will be at a high risk of predation when returned to waters that are now without surrounding *Sargassum* cover and their survival is questionable. In addition to capture of sea turtle post-hatchlings, significant foraging, sheltering, and resting habitat for sea turtles may be temporarily lost as a result of the harvest of *Sargassum* in the action area.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This section presents management measures and alternatives considered by the Council and the environmental consequences of management. The Final Environmental Impact Statement (FEIS), regulatory impact review (RIR), and social impact assessment (SIA)/fishery impact statement (FIS) are incorporated into the discussion under each of the proposed action items.

Each action is followed by four sub-headings: Biological Impacts, Economic Impacts, Social Impacts, and Conclusions. These are self explanatory presenting the impacts of each measure considered and the Council's rationale for the action. The Council's preferred action is listed below the Action number and options considered by the Council are indicated under the heading "Rejected Options".

4.2. Management Options

4.2.1 ACTION 1. Establish the Management Unit for pelagic *Sargassum* throughout the South Atlantic EEZ and State waters.

The management unit is the population of pelagic *Sargassum* occurring within the South Atlantic Council's area of jurisdiction along the U.S. Atlantic coast from the east coast of Florida, including the Atlantic side of the Florida Keys, to the North Carolina/Virginia Border and within state waters of North Carolina, South Carolina, Georgia, and the Florida East Coast.

Biological Impacts

The proposed action would provide for the conservation and management of pelagic *Sargassum* occurring within the South Atlantic Council's area of authority and within state waters of the south Atlantic region. This will provide the Council with authority to manage pelagic *Sargassum* habitat effectively and to take timely actions when necessary. This could lead to possible increases in biological production and would result in the protection of essential fish habitat.

Establishing a management unit for pelagic *Sargassum* habitat will allow the Council to more effectively meet the Magnuson-Stevens Act mandate to identify and describe essential fish habitat (EFH) and essential fish habitat-habitat areas of particular concern (EFH-HAPCs). In addition, taking this action will ensure the Council continues a risk-averse, ecosystem approach to addressing the degradation or loss of essential fish habitat for other species which depend on this habitat and are managed by the Council including species in the snapper grouper, coastal migratory pelagics, and dolphin and wahoo management units. Also this action will protect habitat essential to other federally managed species including billfish, tunas, sharks, threatened/endangered sea turtles, and sea birds. The Council will also be able to meet the mandate to reduce the impact of fishing in the EEZ on essential fish habitat including addressing potential conflicts between *Sargassum* harvest and fishing for other managed species.

In addition, the Council will be able to work more closely with State and Federal permitting agencies towards a common goal of reducing the impact of non-fishing activities on pelagic *Sargassum* habitat. Establishing a management unit and managing this habitat will encourage State, Federal, and academic research efforts to better determine the production, distribution, and ecology of pelagic *Sargassum* habitat, as well as the importance of this habitat to recreational and commercial fishermen.

Economic Impacts

There will be no direct economic impact from establishing a management unit for pelagic *Sargassum* throughout the South Atlantic EEZ and state waters since this action does not directly affect current use of the resource by individuals or communities. Designation of the management unit is required by statute for FMP implementation and establishes a platform for future action and defines the bounds over which such action can apply. This action would meet the technical requirements of defining the management unit and support implementation of a FMP for the resource. Future actions resulting from establishing a management unit could have short-term and long-term economic impacts on individuals harvesting pelagic *Sargassum* and on other societal groups.

This measure allows the Council to manage the fishery effectively and to take timely actions when necessary. Implementation of subsequent management measures could result in increased net economic benefits to society.

Social Impacts

There would be few social impacts from establishing the management unit throughout the South Atlantic EEZ and state waters. The benefits from this action would include the ability to provide uniform management throughout the range. Bringing pelagic *Sargassum* habitat under management and establishing a management unit will also provide the necessary means to address concerns that have developed or may develop regarding pelagic *Sargassum* and habitat. Most stakeholders will benefit through the Council's ability to address problems within the fishery that have a direct or indirect effect upon other fisheries or other physical and social environments.

Conclusion

The Council concluded the proposed management unit is appropriate for pelagic *Sargassum* given that *Sargassum* occurs in State waters and the EEZ. Regulations specified will protect pelagic *Sargassum* within the South Atlantic Council's EEZ and within south Atlantic state waters. The Council is recommending the States enact similar measures in order to achieve the plan's objectives (Section 1.2). The Council recognizes *Sargassum* occurs seaward of the EEZ and recommends international protection as specified in Section 4.2.5. The Council concluded this management unit is supported by the best available information and allows the Council to achieve the stated objectives. Also, defining the management unit is a required part of a fishery management plan.

Rejected Options for Action 1:

Rejected Option 1. No Action.

Biological Impacts

The Council would not be able to address management needs in the *Sargassum* fishery. This could lead to decreased biological productivity over the long-term.

Economic Impacts

This option would not allow FMP approval and, thus, may limit the capacity and pace of future action, if needed. Presently, there are no regulations for management of pelagic *Sargassum*. There is only one known firm that has harvested pelagic *Sargassum*. It is likely that

if the market for this product expands, other participants would enter the fishery. Thus, if the Council does not take action to manage harvest, net economic benefits to society could decrease in the long-term.

Social Impacts

There would be social impacts if the Council did not address the *Sargassum* issue of which Action 1 is a part.

Conclusion

The Council concluded not establishing a management unit would not provide protection for pelagic *Sargassum* habitat, would not achieve the stated objectives, and would not meet Magnuson-Stevens Act requirements concerning habitat and contents of fishery management plans. Therefore, the Council rejected this option.

Rejected Option 2. Establish the Management Unit for pelagic *Sargassum* throughout the South Atlantic EEZ.

The management unit would be the population of pelagic *Sargassum* occurring within the South Atlantic Council's area of jurisdiction along the U.S. Atlantic coast from the east coast of Florida, including the Atlantic side of the Florida Keys, to the North Carolina/Virginia Border.

Biological Impacts

The proposed action would provide for management of pelagic *Sargassum* occurring within the South Atlantic Council's area of authority but would not include state waters. This would provide the Council with authority to manage pelagic *Sargassum* habitat in the EEZ but would not include State waters which could lead to long-term negative impacts.

Economic Impacts

There would be no direct economic impact from establishing a management unit for pelagic *Sargassum* throughout the South Atlantic EEZ since this action does not directly affect current use of the resource by individuals or communities. Designation of the management unit is required by statute for FMP implementation and establishes a platform for future action and defines the bounds over which such action can apply. This action would meet the technical requirements of defining the management unit and support implementation of an FMP for the resource, thereby providing the platform for subsequent action. Future actions resulting from establishing a management unit could have short-term and long-term economic impacts on individuals harvesting pelagic *Sargassum* and on other societal groups.

This measure would allow the Council to manage the fishery in the EEZ and to take timely actions when necessary. Implementation of management measures could result in increased net economic benefits to society. Compared to the Council's proposed action, this measure would result in less effective management of the resource due to the exclusion of state waters.

Social Impacts

There would be few social impacts from establishing the management unit throughout the South Atlantic EEZ. The benefits from this action would be the ability to provide uniform

management throughout the EEZ. Bringing pelagic *Sargassum* habitat in the EEZ under management and establishing a management unit would provide the necessary means to address concerns that have developed or may develop regarding pelagic *Sargassum* and habitat. Most stakeholders would benefit through the Council's ability to address problems within the fishery that have a direct or indirect effect upon other fisheries or other physical and social environments.

Because this option would not include state waters, there is the possibility of decreased ability to enforce future management actions; it would create confusion about regulations regarding *Sargassum*.

Conclusion

The Council rejected establishing the management unit for pelagic *Sargassum* habitat solely in the EEZ in favor of including state waters because the preferred option provides more protection. Also, this option would not achieve the plan's objectives.

4.2.2 ACTION 2. Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* is estimated to be 100,000 metric tons (220,460,000 pounds) wet weight per year.

[Source: NMFS SEFSC (letter from William T. Hogarth, Regional Administrator to Pete Moffitt, SAFMC Chair dated February 24, 2000 and memo from Lawrence Settle, NMFS Beaufort Lab to William Hogarth dated November 29, 1999).]

Assumptions

1. The standing stock of *Sargassum* in the North Atlantic is nearly constant (ref. Butler and Stoner, 1984).
2. No harvest is allowed from July 1 through October 31 (based on recommendation contained in the Biological Opinion of NMFS, S.E. Region Office of Protected Resources). [Note: Action 7C. is consistent with this assumption.]
3. Harvest is restricted to an area off North Carolina between the Virginia and South Carolina lines and starting 100 miles offshore extending to the EEZ (i.e., current harvest area as recommended by SAFMC). [Note: Actions 7A. and 7B. are consistent with this assumption.]

Estimate of MSY

Biomass (B_{NA}) of *Sargassum* in the North Atlantic is on the order of 4 to 11 million metric tons wet weight (ref. Parr, 1939; Zaitzev, 1971; Peres, 1982; Butler et al., 1983; Butler and Stoner, 1984; Nierman et al., 1986; Luning, 1990).

Biomass (B_{NC}) within the proposed harvest area is on the order of 100,000 metric tons wet weight (ref. Howard and Menzies, 1969).

Growth rate (G) is on the order of $0.1Bd^{-1}$ (i.e., 1 doubling every 10-20 days)(ref. Carpenter and Cox, 1974; Howard and Menzies, 1969; LaPointe, 1995).

Fishing mortality (F) is on the order of 7 metric tons wet weight $year^{-1}$ (i.e., average annual landings in North Carolina by Aqua-10 over 15 years).

Natural mortality (M_S) due to beach stranding is on the order of 1 metric ton (km of coastline) $^{-1}$ $year^{-1}$ (ref. Bulter et al., 1983).

Natural mortality due to all other causes is $(M_O)=B-(F+M_S)$. So for the proposed allowable harvest area off North Carolina: M_O = 100,000-(7+500) = 99,493 metric tons wet weight $year^{-1}$.

If we let total natural mortality (M_O+M_S) vary from 99% to 99.99% of B_{NC}, we have surplus production in the proposed harvest area ranging from: 1,000 metric tons wet weight at M=99% to 10 metric tons wet weight at M=99.99%.

Therefore, MSY could be set at 100,000 metric tons wet weight year^{-1} corresponding to B_{NC}.

Biological Impacts

Establishment of an MSY value would have no direct biological effect on the resource. Defining MSY merely establishes a benchmark for fishery and resource evaluation from which to base management decisions.

Economic Impacts

Defining the MSY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing the OY and TAC. OY and TAC should be less than or equal to MSY. Since defining the MSY has no direct effect on resource harvest/use, there would be no direct economic impacts from this measure. Direct economic effects only accrue to the additional actions that directly alter use of the resource.

The economic effects of setting MSY at this level will stem from how MSY is tied to other management measures such as OY and allowable harvest. As a benchmark, this option will accommodate harvests far in excess of historical harvests of pelagic *Sargassum*. The net economic effects of these higher potential harvests cannot be determined due to a lack of information on directed resource demand (the demand to harvest pelagic *Sargassum*) and the value to other species (such as the value of pelagic *Sargassum* as a habitat to dolphin-fish) or processes (such as the value of pelagic *Sargassum* as a fish location tool by anglers targeting dolphin-fish).

Social Impacts

It is difficult to determine the social impacts when there is limited data to determine MSY, for the impacts come from the status of a fishery in relation to MSY and how the Council must tailor its management with regard to MSY.

Accurately defining MSY for the resource would, however, affect constituent perception of rational and responsible management action. Definition of an MSY is a mandated requirement of an FMP and failure to define MSY would both prevent full implementation of the pelagic *Sargassum* FMP and diminish the capacity of management to respond to future needs in a timely fashion. The Council's preferred action will meet the statutory requirements and help establish the platform on which future action can be taken. Public perception triggers indirect behaviors, as discussed above with respect to defining the management unit, and the indirect effects accruing to public satisfaction with the management action would again be relevant. Since this action would support full implementation of the FMP, this may result in more positive public behavior by those favoring resource management. However, this may be offset by dissatisfaction associated with the magnitude of harvests that these levels of MSY would appear to accommodate.

Conclusion

This action will meet the technical requirements for implementation of an FMP, and will provide a biological basis from which to derive further management actions to protect and

conserve *Sargassum* as EFH and EFH-HAPC for selected finfish stocks, as well as promoting adequate habitat for protected resources that utilize this resource.

Indirectly, establishment of MSY sets a limit reference point (ceiling threshold) for other management criteria such as OY. Given that the resource is not overfished and overfishing is not occurring, from a biological standpoint, OY could be any value equal to or less than MSY. Once OY is established, it plays a direct role in the specification of TAC, which does have a direct effect on the biological health of the resource, and to the associated fish community.

The Council concluded that there is limited information available to determine MSY at this time. However, MSY is a required provision of a fishery management plan and the above estimate was provided by NMFS. Therefore, the Council is establishing 100,000 metric tons wet weight as a preliminary MSY based on the best available information as provided by the NMFS Southeast Fisheries Science Center (SEFSC).

Rejected Options for Action 2:

Rejected Option 1. No Action. Given the limited data, do not specify Maximum Sustainable Yield (MSY) at this time.

Biological Impacts

Information to determine MSY is very limited at this time. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal, gear, and area limitations.

Economic Impacts

This option would not meet the statutory requirements and would necessitate resource protection through the FMP for another fishery (and incrementally for each fishery where relevant) or necessitate definition of the MSY at a future date, thus potentially slowing the pace at which future action could occur, leading to the costs associated with regulatory delay. Not specifying MSY could have impacts since other management measures such as total allowable harvest depend on setting an MSY. This situation could result in a non-optimal level of benefits if there is excessive harvest of *Sargassum*.

Social Impacts

It is difficult to determine the social impacts when there is insufficient data to determine MSY, for the impacts come from the status of a fishery in relation to MSY and how the Council must tailor its management with regard to MSY. With insufficient information concerning MSY for pelagic *Sargassum*, the social impacts are unknown. Even not specifying MSY would have, at this time, indeterminate impacts.

Conclusion

The Council rejected this option in favor of the proposed action because MSY is a required provision of a FMP and the Council's original *Sargassum* FMP was rejected in part because no MSY was specified.

Rejected Option 2. MSY is equal to 30%-40% static Spawning Potential Ratio (SPR) (Council to specify).

Biological Impacts

Information to determine MSY is very limited at this time. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal, gear, and area limitations. Pelagic *Sargassum* propagates by fragmentation and the use of Spawning Potential Ratio (SPR) would probably be inappropriate.

Establishment of an MSY value would have no direct biological effect on the resource. Defining MSY merely establishes a benchmark for fishery and resource evaluation from which to base management decisions.

Economic Impacts

Defining MSY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing OY and TAC. OY and TAC should be less than or equal to MSY. Since defining the MSY has no direct effect on resource harvest/use, there would be no direct economic effects associated with this option. Direct effects would only accrue to the additional actions that directly alter the use of the resource. The Council would not have to lower the TAC if the fishery is currently operating at or above 30%-40% static Spawning Potential Ratio (SPR). However, if it is operating below 30%-40% static SPR, there would be some impact depending on what measures are implemented to get to the specified MSY level.

Social Impacts

It is difficult to determine the social impacts when there is insufficient data to determine MSY, for the impacts come from the status of a fishery in relation to MSY and how the Council must tailor its management with regard to MSY. With insufficient information concerning MSY for pelagic *Sargassum*, the social impacts are unknown.

Conclusion

The Council rejected this option in favor of the proposed action based on recommendations from the NMFS Southeast Fisheries Science Center. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal, gear, and area limitations.

Rejected Option 3. MSY is equal to 50,000 metric tons (110,229,275 pounds) wet weight per year.

Biological Impacts

Information to determine MSY is very limited at this time. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal, gear, and area limitations.

Establishment of an MSY value would have no direct biological effect on the resource. Defining MSY merely establishes a benchmark for fishery and resource evaluation from which to base management decisions.

Economic Impacts

Defining MSY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing OY and TAC. OY and TAC should be less than or equal to MSY. Since defining the MSY has no direct effect on resource harvest/use, there would be no direct economic effects associated with this option. Direct effects only accrue to the additional actions that directly alter the use of the resource. However, MSY is used as a benchmark for establishing OY and TAC, and, thus, is sequentially responsible for effects that accrue to these measures.

Social Impacts

It is difficult to determine the social impacts when there is limited data to determine MSY, for the impacts come from the status of a fishery in relation to MSY and how the Council must tailor its management with regard to MSY.

Accurately defining MSY for the resource would, however, affect constituent perception of rational and responsible management action as the definition of an MSY is a mandated requirement of an FMP and failure to define MSY would both prevent full implementation of the pelagic *Sargassum* FMP and diminish the capacity of management to respond to future needs in a timely fashion. Rejected Option 3 would meet the statutory requirements and help establish the platform on which future action could be taken. Public perception triggers indirect behaviors, as discussed above with respect to defining the management unit, and the indirect effects accruing to public satisfaction with the management action would again be relevant. Since this option would support full implementation of the FMP, this may result in more positive public behavior by those favoring resource management. However, this may be offset by dissatisfaction associated with the magnitude of harvests that these levels of MSY would appear to accommodate.

Conclusion

This option would meet all the technical requirements for implementation of an FMP, and would have a biological basis from which to derive further management actions to protect and conserve *Sargassum* as EFH and EFH-HAPC for selected finfish stocks, as well as promoting adequate habitat for protected resources that utilize this resource.

The Council rejected this option in favor of the proposed action based on recommendations from the NMFS Southeast Fisheries Science Center that the proposed action is based on the best available data. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal and area limitations.

Rejected Option 4. MSY is equal to 16 metric tons (35,273 pounds) per year.

Biological Impacts

Information to determine MSY is very limited at this time. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal and area limitations.

Establishment of an MSY value would have no direct biological effect on the resource. Defining MSY merely establishes a benchmark for fishery and resource evaluation from which to base management decisions.

Economic Impacts

Defining MSY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing OY and TAC. OY and TAC should be less than or equal to MSY. Since defining the MSY has no direct effect on resource harvest/use, there would be no direct economic effects associated with this option. Direct effects only accrue to the additional actions that directly alter the use of the resource. However, MSY is used as a benchmark for establishing OY and TAC, and, thus, is sequentially responsible for effects that accrue to these measures.

Social Impacts

It is difficult to determine the social impacts when there is limited data to determine MSY, for the impacts come from the status of a fishery in relation to MSY and how the Council must tailor its management with regard to MSY.

Accurately defining MSY for the resource would, however, affect constituent perception of rational and responsible management action as the definition of an MSY is a mandated requirement of an FMP and failure to define MSY would both prevent full implementation of the pelagic *Sargassum* FMP and diminish the capacity of management to respond to future needs in a timely fashion. Rejected Option 4 would meet the statutory requirements and help establish the platform on which future action could be taken. Public perception triggers indirect behaviors, as discussed above with respect to defining the management unit, and the indirect effects accruing to public satisfaction with the management action would again be relevant. Since this option would support full implementation of the FMP, this may result in more positive public behavior by those favoring resource management. However, this may be offset by dissatisfaction associated with the magnitude of harvests that these levels of MSY would appear to accommodate.

Conclusion

This option would all meet the technical requirements supporting implementation of an FMP, and both have a biological basis from which to derive further management actions to protect and conserve *Sargassum* as EFH and EFH-HAPC for selected finfish stocks, as well as promoting adequate habitat for protected resources that utilize this resource.

Additional options eliminated from detailed discussion included establishment of an MSY as a biomass per square meter, or as the estimated North Atlantic standing stock of 4-11 million metric tons. The former is a measure of density, not of biomass, therefore it would not be an appropriate estimator for MSY. The standing stock represents an estimate of the biomass of all existing *Sargassum*; one cannot harvest the entire stock on a sustainable basis.

The Council rejected these options in favor of the proposed action based on recommendations from the NMFS Southeast Fisheries Science Center that the proposed action is based on the best available data. In addition, specifying MSY is less important given *Sargassum* is being managed as a habitat with an immediate prohibition on harvest south of the North Carolina/South Carolina border and a 5,000 pound annual TAC harvest allowed off North Carolina with seasonal and area limitations.

4.2.3 ACTION 3. Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year.

Biological Impacts

OY is a target reference point that fishery management objectives are intended to achieve. As such, establishment of OY has no direct effect on the resource; it provides a target from which to base other regulatory management measures. Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column. In addition, preliminary analysis of research conducted at "The Point" off North Carolina indicates Sargassum may be providing significant amounts of nutrients to benthic communities (Steve Ross, NC National Estuarine Research Reserve; personal communication). Allowing the harvest of 5,000 pounds of pelagic *Sargassum* will result in the take of species including endangered/threatened sea turtles.

Economic Impacts

Defining the OY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing the TAC. Since defining the OY has no direct effect on resource harvest or use, there would be no direct economic effects associated with this measure. Direct effects only accrue to the additional management actions that directly alter the use of the resource.

An indirect effect of the specification of the OY is its effect on the specification of the TAC. If the TAC were set equal to OY, this proposed action implies that there will be very limited harvest of pelagic *Sargassum* from the South Atlantic Council's area of jurisdiction. Since total allowable harvest is based on the OY chosen, this measure could lead to a reduction in net revenue to the firm that currently harvests pelagic *Sargassum* from the South Atlantic Council's area of jurisdiction. A more detailed discussion of the impacts from *Sargassum* harvest restrictions is contained in Section 4.2.8 (Action 7).

Social Impact

Selecting optimum yield is less rigid than selecting an overfished level and economic and social factors are to be incorporated into the selection. This makes selecting optimum yield slightly more uncertain because economic and social information about fisheries is often lacking. There is also no time frame requirement for reaching optimum yield, although the Council is supposed to continuously make progress toward that goal. The impacts from selecting optimum yield will most likely depend upon the time frame chosen to reach optimum yield and the associated benefits that are desired from the fishery.

However, the owner of the one firm involved in the harvesting and processing of *Sargassum* has informed the Council that setting OY at this level will force him out of business, unless he can find a suitable substitute for *Sargassum*. Even if a substitute is found, the cost of replacement may also pose a threat to the continuance of his business.

However, while the singular impacts on this individual are great, the social impacts of setting OY at 5,000 pounds wet weight per year are not determined to be as substantial. It is understood that Aqua-10 (the company in question) employs three persons on a fulltime, year-round basis (the owner, his wife, and one other employee). Other local inhabitants are employed on an irregular, as-needed basis, supposedly for less than a few days at one time. Thus the social impacts of not having such an employment opportunity exist would be very minimal, and workers can reasonably be expected to be able to substitute other employment opportunities that exist in the immediate area. Furthermore, as far as can be determined, there is no historical culture of *Sargassum* harvesting, so no other social and cultural impacts, due to the one firm going out of business, should occur.

There may be positive social impacts for groups of persons who consider themselves to be defined in some manner by their interest in environmental ethics. This benefit is less tangible and so, harder to measure than, for example, an increase in wages. However, the preservation of *Sargassum* is seen by this group as a good for society as a whole. There is a need for further research into the above-mentioned issues.

Conclusion

The Council is specifying OY as 5,000 pounds wet weight per year because this harvest level will, to the least extent practicable, impact the integrity of the *Sargassum* community as habitat. The Council's preference would be to set OY as zero (Rejected Option 2) but this was rejected by the NMFS. Therefore, to implement protection for *Sargassum*, the Council had to specify some level of allowable harvest. NMFS suggested, and the Council discussed, an OY of 10,000 to 20,000 pounds but the Council wanted to be risk adverse and set the OY at 5,000 pounds. The average landings from 1990 through 1999, after dropping the highest and lowest years, was 5,300 pounds; average landings from 1991 through 1999 was 4,800 pounds. The OY of 5,000 pounds is based on the mid-range from these two scenarios.

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. This action is consistent, to the maximum extent practicable, with the Council's designations of *Sargassum* as essential fish habitat (EFH) and essential fish habitat-habitat area of particular concern (EFH-HAPCs) for species in the snapper grouper complex and coastal migratory pelagics. These designations are specified in the South Atlantic Council Habitat Plan (SAFMC, 1998a) and the Comprehensive Amendment addressing Essential Fish Habitat in the South Atlantic region (SAFMC, 1998b).

Because pelagic *Sargassum* has been identified as essential fish habitat, allowing higher harvest levels of pelagic *Sargassum* would be contradictory to the goals of the Habitat Plan and Comprehensive Amendment addressing Essential Fish Habitat. While the present level of pelagic *Sargassum* harvest is limited, its loss represents a direct loss of essential fish habitat and essential fish habitat-habitat areas of particular concern. Research on pelagic *Sargassum* habitat confirms that it is important to Council and other federally managed species (e.g., billfish, swordfish, tunas, and sharks), and if that harvest were to expand the impacts may not only further reduce the availability of this habitat but also may reduce recreational and commercial fishing opportunities.

The Council remains concerned about the role of *Sargassum* as habitat versus allowing some low level of yield. Were the Council to allow higher levels of optimum yield, then the risk

to allowing entire rafts of habitat (*Sargassum*) to be removed could result in the loss of larval and juvenile fishes and turtles.

The Council concluded specifying optimum yield at such a low level is consistent with the proposed significant limitation on harvest and possession of *Sargassum* habitat. The Council weighed biological, social, and economic considerations and determined the optimum value of the resource is as habitat while allowing some limited level of harvest to get the fishery management plan in place. This option best achieves the stated objectives of the fishery management plan and mandates of the Magnuson-Stevens Act.

The Council also determined there is no foreign *fishing* for Sargassum and no Indian treaty fishing rights for *Sargassum* in the EEZ. U.S. fishing vessels and processors have sufficient harvesting and processing capacity, on an annual basis, to harvest and process 100% of the 5,000 pound OY. Therefore no portion of the OY will be available for foreign harvesting or processing.

Rejected Options for Action 3:

Rejected Option 1. No Action.

Biological Impacts

To manage pelagic *Sargassum* habitat, the Council must set an Optimum Yield for the fishery. Given the complex interrelationship of a wide variety of marine species using pelagic *Sargassum* habitat, not setting optimum yield for a managed species that is considered essential fish habitat would be inconsistent with the Council's approach used for other species managed as habitat (e.g., coral, coral reefs, and live/hard bottom habitat).

Economic Impacts

Specification of the OY is a mandated requirement of an FMP and this option would not allow the *Sargassum* FMP to be implemented. In addition, the Council would not be able to set the total allowable harvest of the resource. This option could indirectly result in a decline of pelagic *Sargassum* habitat if there is unrestricted harvest. This situation would adversely affect other fish species that depend on *Sargassum* habitat, and thus reduce net economic benefits in the long-term.

Social Impacts

Not specifying a level for Optimum Yield would allow for unregulated harvest of *Sargassum*. The social results of such an action are predicted to be primarily a promulgation of conflict between different interest groups, and possibly leading to legal actions against NMFS and the Council. Selecting optimum yield is less rigid than selecting an overfished level and economic and social factors are to be incorporated into the selection. This makes selecting optimum yield slightly more uncertain because economic and social information about fisheries is often lacking. There is also no time frame requirement for reaching optimum yield, although the Council is supposed to continuously make progress toward that goal. The impacts from selecting optimum yield will most likely depend upon the time frame chosen to reach optimum yield and the associated benefits that are desired from the fishery.

Conclusion

The Council concluded the establishment of a fishery management plan for pelagic *Sargassum* habitat and the specification of an Optimum Yield for *Sargassum* habitat were necessary to manage pelagic *Sargassum* in the South Atlantic region and reduce loss of habitat

essential to managed species. Taking no action would compromise the goals of the Habitat plan (SAFMC, 1998a) and Comprehensive Amendment addressing Essential Fish Habitat (SAFMC, 1998b). Therefore, this option was rejected. Also, taking no action would not meet the plan's objectives.

Rejected Option 2. Specify Optimum Yield (OY) for pelagic *Sargassum* as zero harvest.

Biological Impacts

OY is a target reference point that fishery management objectives are intended to achieve. As such, establishment of OY has no direct effect on the resource; it provides a target from which to base other regulatory management measures. However, this option implies no harvest which would provide the maximum protection for *Sargassum* habitat. Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column.

Economic Impacts

This option implies no harvest of pelagic *Sargassum* from the South Atlantic Council's area of jurisdiction and would result in reduced revenue to the firm that harvests pelagic *Sargassum*. At this time, due to lack of appropriate data, it is not possible to calculate the incremental benefits that would accrue to society from the reduction in harvest of pelagic *Sargassum*. A detailed discussion of the impacts from prohibiting the harvest of *Sargassum* is contained in Section 4.2.8 (Action 7).

Social Impact

Selecting optimum yield is less rigid than selecting an overfished level and economic and social factors are to be incorporated into the selection. This makes selecting optimum yield slightly more uncertain because economic and social information about fisheries is often lacking. There is also no time frame requirement for reaching optimum yield, although the Council is supposed to continuously make progress toward that goal. The impacts from selecting optimum yield will most likely depend upon the time frame chosen to reach optimum yield and the associated benefits that are desired from the fishery. However, the owner of the one firm involved in the harvesting and processing of *Sargassum* has informed the Council that setting OY at this level will force him out of business, unless he can find a suitable substitute for *Sargassum*. Even if a substitute is found, the cost of replacement may also pose a threat to the continuance of his business. However, while the singular impacts on this individual would have been great, the social impacts of setting OY at zero harvest would not have been determined to be as substantial. It is understood that Aqua-10 (the company in question) employs three persons on a fulltime, year-round basis (the owner, his wife, and one other employee). Other local inhabitants are employed on an irregular, as-needed basis, supposedly for less than a few days at one time. Thus the social impacts of not having such an employment opportunity exist would have been very minimal, and workers could reasonably be expected to have been able to

substitute other employment opportunities that exist in the immediate area. Furthermore, as far as can be determined, there is no historical or current culture of *Sargassum* harvesting in the region, so no other social and cultural impacts from this firm going out of business would have occurred.

There may be positive social impacts for groups of persons who consider themselves to be defined in some manner by their interest in environmental ethics. This benefit is less tangible and so, harder to measure than, for example, an increase in wages. However, the preservation of *Sargassum* is seen by this group as a good for society as a whole. There is a need for further research into the above-mentioned issues.

Conclusion

The Council initially specified OY as zero because pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. This action would have been consistent with the Council's designations of *Sargassum* as essential fish habitat and essential fish habitat-habitat area of particular concern for species in the snapper grouper complex and coastal migratory pelagics. These designations are specified in the South Atlantic Council Habitat Plan (SAFMC, 1998a) and the Comprehensive Amendment addressing Essential Fish Habitat in the South Atlantic region (SAFMC, 1998b).

Because pelagic *Sargassum* has been identified as essential fish habitat, allowing harvest of pelagic *Sargassum* is contradictory to the goals of the Habitat Plan and Comprehensive Amendment addressing Essential Fish Habitat. While the present level of pelagic *Sargassum* harvest is limited, its loss represents a direct loss of essential fish habitat and essential fish habitat-habitat areas of particular concern. Research on pelagic *Sargassum* habitat confirms that it is important to Council and other federally managed species (e.g., billfish, swordfish, tunas, and sharks), and if that harvest were to expand the impacts may not only further reduce the availability of this habitat but also may reduce recreational and commercial fishing opportunities.

Given the complex interrelationship of a wide variety of marine species using *Sargassum* habitat, setting optimum yield at zero for a managed species that is considered essential fish habitat would have been consistent with the Council's approach used for other species managed as habitat (e.g., coral, coral reefs, and live/hard bottom habitat).

The Council rejected this option only because the NMFS disapproved setting the optimum yield at zero in their letter rejecting the original FMP: "NMFS finds insufficient justification in the Council's selection of an optimum yield (OY) at zero harvest in the subject FMP. NMFS disagrees with the Council's position that any removal of pelagic Sargassum represents a net loss of EFH and thus is contradictory to the goals and objectives of the Council's Comprehensive Habitat Plan for the South Atlantic Region or to the Magnuson-Stevens Act. NMFS believes that the designation of a particular habitat as EFH does not preclude continued use of that habitat, nor would this position be consistent with other designations of EFH and EFH-HAPC in the Council's Habitat Plan."

Rejected Option 3. Specify Optimum Yield (OY) for pelagic *Sargassum* as MSY.

Biological Impacts

OY is a target reference point that fishery management objectives are intended to achieve. As such, establishment of OY has no direct effect on the resource; it provides a target from which to base other regulatory management measures. Pelagic *Sargassum* supports a diverse

assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column. In addition, preliminary analysis of research conducted at "The Point" off North Carolina indicates Sargassum may be providing significant amounts of nutrients to benthic communities (Steve Ross, pers. comm.). Allowing the harvest of 100,000 metric tons of pelagic *Sargassum* would have resulted in a large take of species including endangered/threatened sea turtles.

Economic Impacts

Defining the OY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing the TAC. Since defining the OY has no direct effect on resource harvest or use, there would be no direct economic effects associated with this option. Direct effects only accrue to the additional management actions that directly alter the use of the resource. An indirect effect of the specification of the OY is its effect on the specification of the TAC. If the TAC were set equal to OY, this proposed action implies that there could be a very high level of harvest allowed (assuming the MSY level was set at the Council's preferred option of 100,000 metric tons). Harvest at this level would adversely impact populations that depend on *Sargassum* habitat and reduce economic benefits.

Social Impacts

Since the definition of OY for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. Specification of OY is a mandated requirement of an FMP. With respect to indirect behavioral affects that accrue to public satisfaction with the management process, since public input has strongly indicated a preference to have pelagic *Sargassum* managed, those alternatives that limit harvest may generate the greatest public acceptance and associated positive public behavior.

Conclusion

This option may not be a practical limit on harvest since it sets OY equal to MSY, which may be set equal to the entire biomass of the resource, and therefore would not be acceptable to the public as a benchmark for allowable harvest. The predominant public opinion expressed to the Council has been in favor of zero harvest. This option would maximize negative impacts to EFH and EFH-HAPCs and maximize the bycatch of finfish and other marine species including threatened and endangered turtles. In addition, this option would lead to conflict between the *Sargassum* fishery and recreational and commercial fishermen. Therefore, the Council rejected this option.

Rejected Option 4. Specify Optimum Yield (OY) for pelagic *Sargassum* as 20,000 pounds wet weight (average annual harvest over 22 years of the fishery)

Biological Impacts

OY is a target reference point that fishery management objectives are intended to achieve. As such, establishment of OY has no direct effect on the resource; it provides a target from

which to base other regulatory management measures. Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column. In addition, preliminary analysis of research conducted at "The Point" off North Carolina indicates Sargassum may be providing significant amounts of nutrients to benthic communities (Steve Ross, pers. comm.). Allowing the harvest of 20,000 pounds of pelagic *Sargassum* would have resulted in the take of species including endangered/threatened sea turtles.

Economic Impacts

Defining the OY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing the TAC. Since defining the OY has no direct effect on resource harvest or use, there would be no direct economic effects associated with this option. Direct economic effects only accrue to the additional management actions that directly alter the use of the resource.

An indirect effect of the specification of the OY is its effect on the specification of the TAC. If the TAC were set equal to OY, this rejected option would allow status quo operation by the single company participating in the fishery since the resultant TAC would be greater than or equal to recent harvests.

Social Impacts

Since the definition of OY for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. Specification of OY is a mandated requirement of an FMP. With respect to indirect behavioral affects that accrue to public satisfaction with the management process, since public input has strongly indicated a preference to have pelagic *Sargassum* managed, those alternatives that limit harvest may generate the greatest public acceptance and associated positive public behavior.

Conclusion

This option would have allowed a larger harvest than the Council concluded was necessary given the potential interactions with protected resources and the fact that *Sargassum* is EFH for a number of important recreational and commercial species. This option would not be acceptable to the public as a benchmark for allowable harvest since the predominant public opinion expressed to the Council has been in favor of zero harvest. This option would increase negative impacts to EFH and EFH-HAPCs four-fold over the Council's preferred action and increase the bycatch of finfish and other marine species including threatened and endangered turtles by a similar amount. In addition, this option would lead to conflict between the *Sargassum* fishery and recreational and commercial fishermen. Therefore, the Council rejected this option.

Rejected Option 5. Specify Optimum Yield (OY) for pelagic *Sargassum* as 11,000 pounds wet weight (average annual landings for 1995-1999).

Biological Impacts

OY is a target reference point that fishery management objectives are intended to achieve. As such, establishment of OY has no direct effect on the resource; it provides a target from which to base other regulatory management measures.

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of threatened or endangered sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column. In addition, preliminary analysis of research conducted at "The Point" off North Carolina indicates Sargassum may be providing significant amounts of nutrients to benthic communities (Steve Ross, pers. comm.). Allowing the harvest of 11,000 pounds of pelagic *Sargassum* would have resulted in the take of species including endangered/threatened sea turtles.

Economic Impacts

Defining the OY does not alter current use of the resource; it merely establishes a benchmark for fishery and resource evaluation from which to base additional management actions, specifically establishing the TAC. Since defining the OY has no direct effect on resource harvest or use, there would be no direct effects associated with its specification. Direct effects only accrue to the additional management actions that directly alter the use of the resource.

An indirect effect of the specification of the OY is its effect on the specification of the TAC. If the TAC were set equal to OY, this rejected option would allow status quo operation by the single company participating in the fishery since the resultant TAC would be greater than or equal to the average annual landings in recent years (1995-1997).

Social Impacts

Since the definition of OY for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. Specification of OY is a mandated requirement of an FMP. With respect to indirect behavioral affects that accrue to public satisfaction with the management process, since public input has strongly indicated a preference to have pelagic *Sargassum* managed, those alternatives that limit harvest may generate the greatest public acceptance and associated positive public behavior.

Conclusion

This option would have allowed a larger harvest than the Council concluded was necessary given the potential interactions with protected resources and the fact that *Sargassum* is EFH for a number of important recreational and commercial species. This option would not be acceptable to the public as a benchmark for allowable harvest since the predominant public opinion expressed to the Council has been in favor of zero harvest. This option would double the negative impacts to EFH and EFH-HAPCs and double the bycatch of finfish and other marine species including threatened and endangered turtles as compared to the Council's preferred action. In addition, this option would lead to conflict between the *Sargassum* fishery and recreational and commercial fishermen. Therefore, the Council rejected this option.

4.2.4 ACTION 4. Specify Overfishing Level to meet Magnuson-Stevens Act Mandate for Pelagic *Sargassum*. Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY.

The Maximum Fishing Mortality Threshold (MFMT) is 9.0 to 18.0 units per year.

The Minimum Stock Size Threshold (MSST) is 25,000 metric tons (55,115,000 pounds).

Source: NMFS SEFSC (memo dated April 5, 2000 from John Merriner, Michael Prager, Lawrence Settle and Douglas Vaughan to Nancy Thompson). The assumptions and estimates discussed in estimating MSY (Action 2) are adopted in the following method to estimate MFMT and MSST:

1. The standing stock of *Sargassum* in the North Atlantic is approximately constant.
2. The harvest area is off North Carolina, as described further in the referenced memos.
3. The standing stock in the harvest area is approximately 100,000 mt.
4. The estimated doubling time of *Sargassum* is 10 to 20 days.
5. The proportion of each species harvested is equal to its proportion in the stock.

The estimated doubling time is equivalent to a range in the intrinsic rate of increase r = 18.25/yr to r = 36.5/yr. Assuming that the standing stock is presently at the carrying capacity K, and further assuming a simple Schaefer-form production function, MSY is estimated as rK/4. Thus, the range of estimates of maximum sustainable yield becomes MSY = 456,250 mt/yr to 912,500 mt/yr. Under these same assumptions, we estimate B_{MSY} = K/2 = 50,000 mt in the harvest area (i.e., the standing stock would be reduced to half its present size). Corresponding estimates of F_{MSY} are 9/yr to 18/yr. These would be limit reference points (LRPs), and overfishing and overfished status would be defined accordingly. (Using the guidelines in the NOAA Tech Memo of July 17, 1999, the MSST would be at most $B_{MSY}/2$).

The pelagic *Sargassum* habitat are not overfished nor is overfishing occurring.

Biological Impacts

Specifying overfishing as the rate of harvest which compromises the stock's ability to produce MSY and setting a low OY, is consistent to the maximum extent practicable with the Council's approach used for other species managed as habitat (e.g., coral, coral reefs, and live/hard bottom habitat). This action will ensure very limited net loss of essential fish habitat and protect essential fish habitat-habitat areas of particular concern for species in the snapper grouper and coastal migratory pelagics management units.

Pelagic *Sargassum* is a complex habitat type with resident, endemic, and transient species using *Sargassum* during various stages of their life history. Therefore, pelagic *Sargassum* is clearly an essential fish habitat as defined by the Magnuson-Stevens Act. Fish abundance has been found to be positively correlated with pelagic *Sargassum* biomass over the middle shelf throughout the year (Settle, 1993). Fish biomass was also positively correlated over the outer shelf during the fall (Settle, 1993). The abundance of motile macrofauna (mostly invertebrates) has also been shown to be related to pelagic *Sargassum* biomass. Over 100 species of fishes have been collected or observed associated with pelagic *Sargassum* habitat with 21 species of Carangids (jacks) and 15 species of Balistids (triggerfishes) being the most conspicuous. Seasonal abundance of *Caranx* spp., *Elagatis bipinnulata*, Amberjack, Almaco Jack, Banded Rudderfish (*Seriola* spp.), Dolphin (*Coryphaena hippurus)*, Red Porgy *(Pagrus pagrus)*, Mullet *(Mugil* spp.), *Peprilus triacanthus*, and *Balistes capriscus* in pelagic *Sargassum* habitat illustrates the importance of this habitat to early-life-stages of these species. A number of other fishes including the Muraenids, Gonostomatids, Myctophids, Apogonids, Serranids, Gerreids, Scarids,

Lutjanids, Chaetodontids, Acanthurids, Istiophorids, Scorpaenids, and Bothids use pelagic *Sargassum* habitat.

Economic Impacts

Specifying the overfished and overfishing definitions does not directly affect resource use and, therefore would not have any direct economic effects on existing fisheries and communities. Direct economic effects associated with resource use would only accrue to subsequent management actions in response to an evaluation of the fishery with regards to these benchmarks. In addition, measures taken to prevent overfishing of pelagic *Sargassum* would optimize long-term net benefits to society.

Social Impacts

Since defining the overfished and overfishing conditions for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. These definitions are statutory requirements of an FMP and the Council's preferred action would allow full implementation of the FMP, thereby providing future opportunity to manage the resource. Since public opinion has strongly favored management of the resource, failure to achieve full implementation of the FMP would likely precipitate the most negative public behavior.

Conclusion

Designation of MFMT and MSST thresholds are an integral part of establishing stock status criteria in any FMP, and thus the actions that identify these thresholds would be consistent with the requirements of the Magnuson-Stevens Act. Specifying overfishing as the rate of harvest which compromises the stock's ability to produce MSY and setting a low OY, will allow the Council to more effectively meet the mandate to identify and describe essential fish habitat and essential fish habitat-habitat areas of particular concern. In addition, this will ensure the Council addresses the degradation or loss of essential fish habitat for other species managed by the Council including species in the snapper grouper, coastal migratory pelagics, and dolphin and wahoo management units. Also this action will protect habitat essential to other federally managed species including billfish, tunas, sharks, threatened and endangered sea turtles, and sea birds. The Council will be able to meet the mandate to reduce the impact of fishing in the EEZ on essential fish habitat including eliminating potential conflicts between *Sargassum* harvest and fishing for other managed species. In addition, the Council will be able to work more closely with permitting agencies to reduce the impact of non-fishing activities on pelagic *Sargassum* habitat.

The Council concluded specifying overfishing as the rate of harvest which compromises the stock's ability to produce MSY is consistent with the proposed very limited harvest of pelagic *Sargassum*. The Council weighed biological, social, and economic considerations and determined the optimum value of the resource is as habitat. This action best meets the objectives of the *Sargassum* plan and the Magnuson-Stevens Act mandates related to habitat and is based on the best available data as provided by the NMFS Southeast Fisheries Science Center.

Rejected Options for Action 4:

Rejected Option 1. No Action.

Biological Impacts

Not setting an overfishing level for a managed species that is considered essential fish habitat is not consistent with the Council's approach used for other species managed as habitat (e.g., coral, coral reefs, and live/hard bottom habitat) and does not meet the objectives of the plan or the mandates of the Magnuson-Stevens Act.

Economic Impacts

This definition is a statutory requirements of an FMP and the "no action" alternative would not allow full implementation of the FMP, thereby limiting future opportunities to manage the resource. This option could lead to excessive harvest of pelagic *Sargassum* and reduced net economic benefits.

Social Impacts

Since defining the overfished and overfishing conditions for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. These definitions are statutory requirements of an FMP and the "no action" alternatives would not allow full implementation of the FMP, thereby limiting future opportunity to manage the resource. Since public opinion has strongly favored management of the resource, failure to achieve full implementation of the FMP would likely precipitate the most negative public behavior and would result in more social conflict between those groups who have an interest in this fishery management plan.

Conclusion

Designation of MFMT and MSST thresholds are an integral part of establishing stock status criteria in any FMP, and thus the actions that identify these thresholds would be consistent with the requirements of the Magnuson-Stevens Act. The Council concluded not specifying an overfishing level would not be consistent with the objectives of the *Sargassum* plan or the Magnuson-Stevens Act and therefore rejected this option.

Rejected Option 2. Overfishing occurs when any harvest occurs (any quantity) or when the fishing mortality rate is greater than zero.

Biological Impacts

Specifying overfishing to be any harvest of pelagic *Sargassum*, considered essential fish habitat, would have been consistent with the Council's approach used for other species managed as habitat (e.g., coral, coral reefs, and live/hard bottom habitat). This action would have ensured no net loss of essential fish habitat and would have protected essential fish habitat-habitat areas of particular concern for species in the snapper grouper and coastal migratory pelagics management units.

Pelagic *Sargassum* is a complex habitat type with resident, endemic, and transient species using *Sargassum* during various stages of their life history. Therefore, pelagic *Sargassum* is clearly an essential fish habitat as defined by the Magnuson-Stevens Act. Fish abundance has been found to be positively correlated with pelagic *Sargassum* biomass over the middle shelf throughout the year (Settle, 1993). Fish biomass was also positively correlated over the outer

shelf during the fall (Settle, 1993). The abundance of motile macrofauna (mostly invertebrates) has also been shown to be related to pelagic *Sargassum* biomass. Over 100 species of fishes have been collected or observed associated with pelagic *Sargassum* habitat with 21 species of Carangids (jacks) and 15 species of Balistids (triggerfishes) being the most conspicuous. Seasonal abundance of *Caranx* spp., *Elagatis bipinnulata*, Amberjack, Almaco Jack, Banded Rudderfish (*Seriola* spp.), Dolphin (*Coryphaena hippurus)*, Red Porgy *(Pagrus pagrus)*, Mullet *(Mugil* spp.), *Peprilus triacanthus*, and *Balistes capriscus* in pelagic *Sargassum* habitat illustrates the importance of this habitat to early-life-stages of these species. A number of other fishes including the Muraenids, Gonostomatids, Myctophids, Apogonids, Serranids, Gerreids, Scarids, Lutjanids, Chaetodontids, Acanthurids, Istiophorids, Scorpaenids, and Bothids use pelagic *Sargassum* habitat.

Economic Impacts

Specifying the overfished and overfishing definitions does not directly affect resource use and, therefore would not have any direct economic effects on existing fisheries and communities. Direct effects associated with resource use would only accrue to subsequent management action in response to an evaluation of the fishery with regards to these benchmarks. However, this option implies that there would be no harvest of pelagic *Sargassum* from the South Atlantic Council's area of jurisdiction. Thus harvesting revenue from this stock would be forgone, and the processing firm could be forced out of business. A detailed discussion of the impacts from prohibiting the harvest of *Sargassum* is contained in Section 4.2.8 (Action 7).

Social Impacts

Since defining the overfished and overfishing conditions for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. These definitions are statutory requirements of an FMP and this alternatives would allow full implementation of the FMP, thereby providing future opportunity to manage the resource.

Conclusion

Designation of MFMT and MSST thresholds are an integral part of establishing stock status criteria in any FMP, and thus the actions that identify these thresholds would be consistent with the requirements of the Magnuson-Stevens Act. Specifying overfishing to be any harvest of pelagic *Sargassum*, considered essential fish habitat, would have allowed the Council to more effectively meet the mandate to identify and describe essential fish habitat and essential fish habitat-habitat areas of particular concern. In addition, this would have ensured the Council addresses the degradation or loss of essential fish habitat for other species managed by the Council including species in the snapper grouper, coastal migratory pelagics, and dolphin and wahoo management units. Also this action would have protected habitat essential to other federally managed species including billfish, tunas, sharks, threatened and endangered sea turtles, and sea birds. The Council would have been able to meet the mandate to reduce the impact of fishing in the EEZ on essential fish habitat including eliminating potential conflicts between *Sargassum* harvest and fishing for other managed species. In addition, the Council would have been able to work more closely with permitting agencies to reduce the impact of non-fishing activities on pelagic *Sargassum* habitat.

The Council rejected this option only because the NMFS disapproved setting the overfishing level as any harvest of pelagic *Sargassum* in their letter rejecting the original FMP: "NMFS finds insufficient justification in the Council's selection of an optimum yield (OY) at zero harvest in the subject FMP. NMFS disagrees with the Council's position that any removal of pelagic Sargassum represents a net loss of EFH and thus is contradictory to the goals and objectives of the Council's Comprehensive Habitat Plan for the South Atlantic Region or to the Magnuson-Stevens Act. NMFS believes that the designation of a particular habitat as EFH does not preclude continued use of that habitat, nor would this position be consistent with other designations of EFH and EFH-HAPC in the Council's Habitat Plan."

Rejected Option 3. Overfishing occurs when MFMT > Fmsy.

Biological Impacts

Given that the current fishing effort is unquantified versus the estimated standing stock, it is not possible at the present time to determine fishing mortality rate. The proposed overfished and overfishing definitions do have an indirect effect on the resource by ensuring that sustainable quantities of *Sargassum* habitat are maintained. Establishment of an MFMT, in conjunction with other stock status criteria, form the basis for other regulatory actions to restrict harvest. The sole operation harvesting *Sargassum* would not be allowed to expand fishing effort, thus limiting the impacts on the resource.

Economic Impacts

Specifying the overfished and overfishing definitions does not directly affect resource use and, therefore would not have any direct effects on existing fisheries and communities. Direct economic effects associated with resource use would only accrue to subsequent management action in response to an evaluation of the fishery with regards to these benchmarks.

Social Impacts

Since defining the overfished and overfishing conditions for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. These definitions are statutory requirements of an FMP and this option would allow full implementation of the FMP, thereby providing future opportunity to manage the resource.

Conclusion

Designation of MFMT and MSST thresholds are an integral part of establishing stock status criteria in any FMP, and thus the actions that identify these thresholds would be consistent with the requirements of the Magnuson-Stevens Act. The Council rejected this option in favor of the proposed definitions based on the recommendations of the NMFS SEFSC Beaufort Lab that the proposed definition is based on the best available data.

Rejected Option 4. Overfishing occurs when MFMT > 0.5.

Biological Impacts

Given that the current fishing effort is unquantified versus the estimated standing stock, it is not possible at the present time to determine fishing mortality rate. The proposed overfished and overfishing definitions do have an indirect effect on the resource by ensuring that sustainable quantities of *Sargassum* habitat are maintained. Establishment of an MFMT, in conjunction with other stock status criteria, form the basis for other regulatory actions to restrict harvest. The sole operation harvesting *Sargassum* would not be allowed to expand fishing effort, thus limiting the impacts on the resource.

Economic Impacts

Specifying the overfished and overfishing definitions does not directly affect resource use and, therefore would not have any direct effects on existing fisheries and communities. Direct effects associated with resource use would only accrue to subsequent management actions in response to an evaluation of the fishery with regards to these benchmarks.

Social Impacts

Since defining the overfished and overfishing conditions for a fishery or resource does not directly affect current use of the resource by individuals or communities, there would be no behavioral changes by these individuals or communities and, therefore, no indirect effects attributed to such change. These definitions are statutory requirements of an FMP and this option would allow full implementation of the FMP, thereby providing future opportunity to manage the resource.

Conclusion

Designation of MFMT and MSST thresholds are an integral part of establishing stock status criteria in any FMP, and thus the actions that identify these thresholds would be consistent with the requirements of the Magnuson-Stevens Act. The Council rejected this option in favor of the proposed definitions based on the recommendations of the NMFS SEFSC Beaufort Lab that the proposed definition is based on the best available data.

4.2.5 ACTION 5. Identify Essential Fish Habitat (EFH) for pelagic *Sargassum* as where it occurs in the South Atlantic Council's EEZ and in the state waters off of North Carolina, South Carolina, Georgia, and the east coast of Florida. Essential fish habitat (EFH) for pelagic *Sargassum* includes the Gulf Stream because it provides a mechanism to disperse *Sargassum*. See Figure 4.

Because of the importance of the extra-jurisdictional pelagic *Sargassum* occurring in the Sargasso Sea outside the EEZ, the United States should pursue all other options under the Magnuson-Stevens Act and other laws to protect *Sargassum* in international waters.

Note: Refer to Section 3.0 of this document and the Habitat Plan (SAFMC, 1998a) for a more detailed description of habitat utilized by the managed species.

Biological Impacts

The identification of EFH for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Pelagic *Sargassum* is a complex habitat type with resident, endemic, and transient species using *Sargassum* during various stages of their life history. Therefore, pelagic *Sargassum* is clearly an essential fish habitat as defined by the Magnuson-Stevens Act. Over 100 species of fishes have been collected or observed associated with pelagic *Sargassum* habitat with 21 species of carangids and 15 species of balistids being the most conspicuous. Seasonal abundances of *Caranx* spp., *Elagatis bipinnulata*, *Seriola* spp., *Coryphaena hippurus*, *Pagrus pagrus*, *Mugil* spp., *Peprilus triacanthus*, and *Balistes capriscus* in pelagic *Sargassum* habitat illustrates the importance of this habitat to early-life-stages of these species. A number of other fishes including the Muraenids, Gonostomatids, Myctophids, Apogonids, Serranids, Gerreids, Scarids, Lutjanids, Chaetodontids, Acanthurids, Istiophorids, Scorpaenids, and Bothids use pelagic *Sargassum* habitat.

The identification of essential habitat for pelagic *Sargassum* will enable the Council to protect essential fish habitat effectively and take timely actions when necessary. Identifying and describing essential fish habitat is the first step in preventing decreases in biological productivity of pelagic *Sargassum* and other managed or prey species dependent on pelagic *Sargassum*.

The productivity of pelagic *Sargassum* is directly dependent on the larval fish utilizing this habitat (Lapointe, 1995; Lapointe et al., 1997). Species using pelagic *Sargassum* provide a primary source of nitrogen in an otherwise nutrient poor water column environment (SAFMC, 1997). Lapointe et al. (1977) indicated the relationship between fishes and pelagic *Sargassum* is mutualistic and more important than previously thought. Therefore, the productivity of pelagic *Sargassum* is tightly coupled to associated fish schools and explains how pelagic *Sargassum* sustains growth in oligotrophic (low nutrient) oceanic waters often devoid of dissolved nutrients (Lapointe et al., 1977).

For more detailed biological discussion see Sections 3.1.1 and 3.2.1, pages 15 through 33.

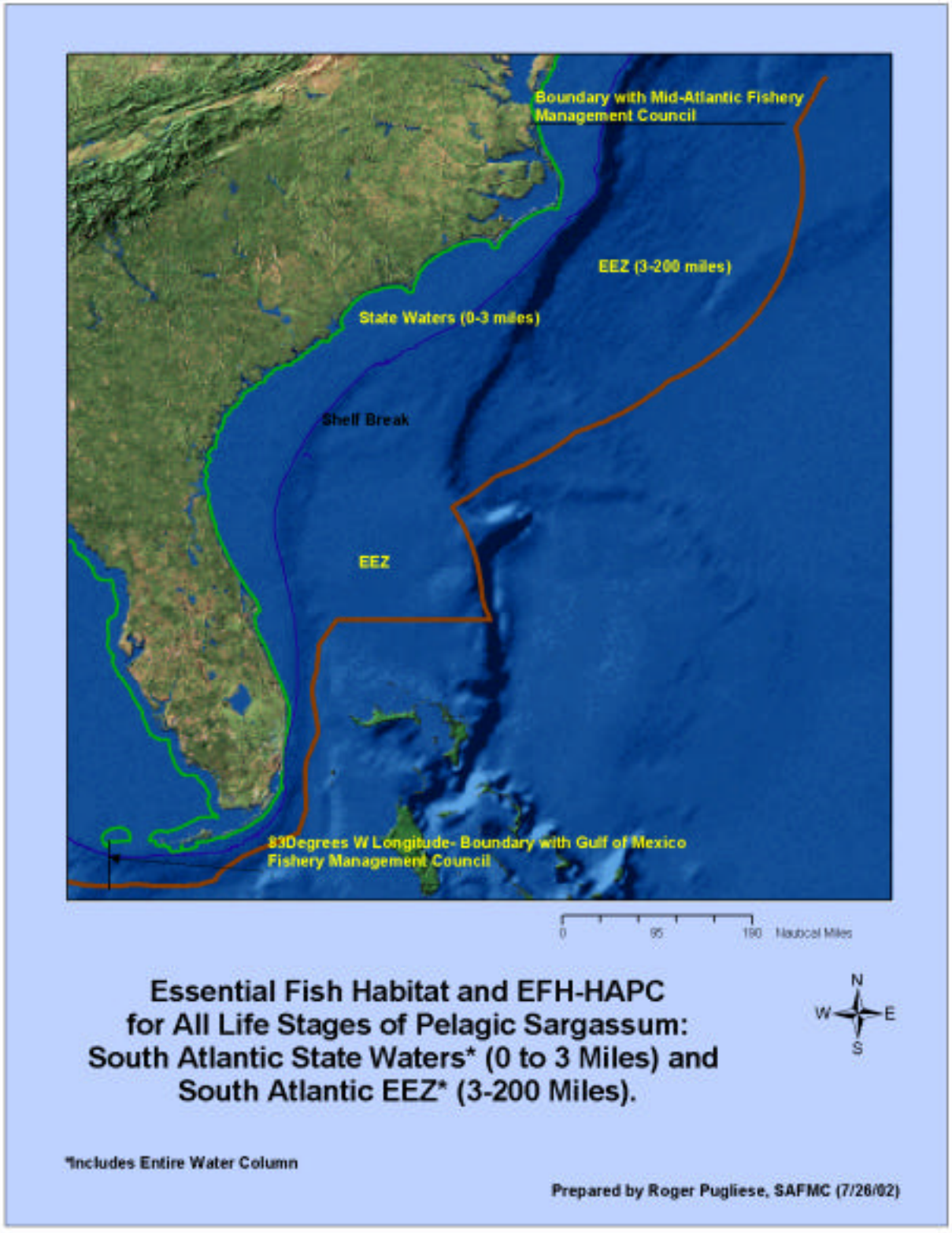


Figure 4. Essential Fish Habitat (EFH) and EFH-Habitat Areas Of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*.

Economic Impacts

The identification of essential fish habitat for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Designation of EFH will require that the Council consider all fishing activities that might result in identifiable adverse effects to EFH, and may trigger a consultation for any Federal action that may adversely affect the habitat. This would include, but not be limited to, any non-directed pelagic *Sargassum* harvesting activities such as finfish or invertebrate trawling, dredging, line fishing, or transit activities. The direct effects of this additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since all of these restrictions or consultation outcomes are unknown at this time, it is not possible to describe their effects.

Social Impacts

There would be few social impacts from this measure. The social impacts would most likely come from the actions that were associated with such a designation. The assumption would be that such designation would provide protection for habitat. In that case, the social impacts would be positive in the long-term. However, in some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose constraints on those who harvest habitat. This would impose negative short-term impacts that may be mitigated in the long-term if productivity is increased.

It is worth noting that the identification of essential fish habitat will alter the process by which permits for activities which impact essential fish habitat are issued. The potential for increased restrictions, mitigation, and permitting requirements may have impacts upon the behavior of individuals and agencies seeking permits. The nature and extent of those impacts are unknown and will undoubtedly vary depending upon the individual and/or agency.

Conclusion

Pelagic *Sargassum* is being designated essential fish habitat as was done for other species managed as habitat (e.g., coral, coral reefs, and live/hard bottom habitat). This action is consistent with the Council designations of *Sargassum* as essential fish habitat and essential fish habitat-habitat area of particular concern for species in the snapper grouper and coastal migratory pelagics management units. These designations are specified in the South Atlantic Council Habitat Plan (SAFMC, 1998a), the Comprehensive Amendment addressing Essential Fish Habitat in the South Atlantic region (SAFMC, 1998b), and in the Council's draft Dolphin/Wahoo FMP.

The Council concluded that the identification of essential habitat for pelagic *Sargassum* will enable the Council to protect essential fish habitat effectively and take timely actions when necessary. Identifying and describing pelagic *Sargassum* habitat is the first step in preventing decreases in biological productivity of pelagic *Sargassum* and other managed or prey species that depend on pelagic *Sargassum* for habitat. This could prevent decreases in biological productivity and may lead to possible increases in biological productivity.

Implementation of this measure would provide an additional resource concern by which the Council could intercede in Federal actions to further the conservation of EFH and dependent Federally-managed fisheries. Currently, areas considered for designation as EFH for pelagic *Sargassum* already have been specified as EFH for one or more of the various Council and NMFS managed fisheries: shrimp, red drum, snapper grouper, coastal migratory pelagics, and highly migratory species.

For EFH designated within the EEZ, the Council could implement conservation measures to minimize or avoid adverse impacts of any fishing activities under management of the Council and which could be determined to adversely impact the near-surface water column. Opportunities also would be available, within the EEZ and state waters, depending on the alternative designated, for the Council to influence decisions of Federal agencies which may permit, construct, or fund non-fishing activities that would substantially affect *Sargassum* EFH. Opportunities to manage or influence fishing and non-fishing activities in extraterritorial waters considered for designation as EFH do not exist.

Specifying EFH is a statutory requirement of an FMP. Its specification automatically triggers the requirement that Councils consider fishing activities that may result in identifiable adverse effects to EFH.

Rejected Options for Action 5:

Rejected Option 1. Do not identify EFH for pelagic *Sargassum*.

Biological Impacts

The Council would be limited in the future in terms of protecting the long-term biological productivity of the pelagic *Sargassum* habitat and minimizing gear related habitat damage from occurring.

Economic Impacts

The identification of EFH is a mandated requirement of an FMP. Therefore, this option would not allow the implementation of the *Sargassum* FMP and establishment of a platform for future management actions. Also, the Council would be limited in the future in terms of protecting pelagic *Sargassum* habitat and minimizing any possible habitat damage from occurring. This could result in reduced net economic benefits to society in the long-term.

Social Impacts

The no action alternative would not meet Magnuson-Stevens mandates to identify essential fish habitat. Although there would be few social impacts from no action, it is in the best interest of the Council and fishermen to identify this habitat. Designation of essential pelagic *Sargassum* habitat can facilitate expeditious Council action in the future to protect habitat.

Conclusion

The Council concluded that taking no action would limit future action to protect the long-term biological productivity of the pelagic *Sargassum* habitat and minimizing gear related habitat damage from occurring. Further, no action would not meet the mandates of the Magnuson-Stevens Act. Therefore, the Council rejected this option.

Rejected Option 2. Expand the EFH definition to include *Sargassum* where it occurs in the north Atlantic Gyre in the Sargasso Sea and the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream. See Figure 2 in Section 3.1.1.

Biological Impacts

The identification of EFH for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Expanding the identification of EFH to include the Sargasso Sea would enable the Councils to protect essential fish habitat effectively and take timely actions when necessary. This could prevent further decreases in biological productivity and may lead to possible increases.

Economic Impacts

The identification of EFH for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Designation of EFH will require the Council to consider all operations or actions that might interact with or affect EFH and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There would be few social impacts from this measure. The social impacts would most likely come from the actions that were associated with such a designation. The assumption would be that such designation would provide protection for habitat. In that case, the social impacts would be positive in the long-term. However, in some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose constraints on those who harvest habitat. This would certainly impose negative short-term impacts that may be mitigated in the long term if productivity is increased.

Conclusion

The Council rejected this option because it would have included *Sargassum* that is beyond the outer limit of the EEZ. NMFS and NOAA GC have advised that the Councils do not have authority beyond the EEZ. The Council determined this option was not the best way to achieve the goals and management objectives of the FMP.

Rejected Option 3. Identify EFH as the average location of the Gulf Stream Front.

The mean location of the Gulf Stream Front is shown in Figure 3b in Section 3.2.2 and is represented by the dark zone in Figure 5 below.

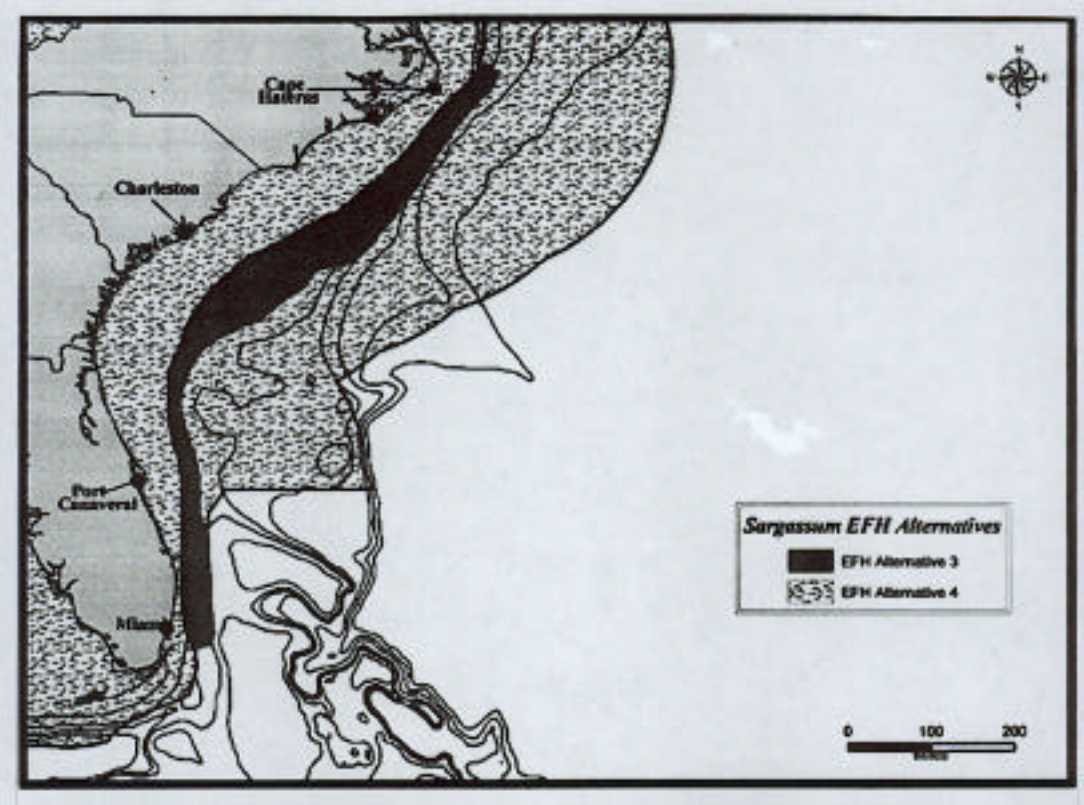


Figure 5. Rejected EFH Option 3 (Source: Keith Bickers, NMFS pers. comm. 2002).

Biological Impacts

The identification of EFH for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Economic Impacts

The identification of EFH for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Designation of EFH will require the Council to consider all operations or actions that might interact with or affect the EFH, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions

imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There would be few social impacts from this measure. The social impacts would most likely come from the actions that were associated with such a designation. The assumption would be that such designation would provide protection for habitat. In that case, the social impacts would be positive in the long-term. However, in some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose constraints on those who harvest habitat. This would certainly impose negative short-term impacts that may be mitigated in the long term if productivity is increased.

Conclusion

Implementation of this option would provide an additional resource concern by which the Council could intercede in Federal actions to further the conservation of EFH and dependent Federally-managed fisheries. Currently, areas considered for designation as EFH for pelagic *Sargassum* already have been specified as EFH for one or more of the various Council and NMFS managed fisheries: shrimp, red drum, snapper grouper, coastal migratory pelagics, and highly migratory species.

Specifying EFH is a statutory requirement of an FMP. Its specification automatically triggers the requirement that Councils consider fishing activities that may result in identifiable adverse effects to EFH.

The Council rejected this option because it would be difficult to identify the specific location. The Council determined this option was not the best way to achieve the goals and management objectives of the FMP.

Rejected Option 4. Identify EFH as the EEZ, Sargasso Sea, and Gulf Stream outside of the EEZ. See Figure 3b in Section 3.2.2.

Biological Impacts

The identification of EFH for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Economic Impacts

The identification of EFH for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Designation of EFH will require the Council to consider all operations or actions that might interact with or affect the EFH, and may trigger a consultation for any activity that may

affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There would be few social impacts from this measure. The social impacts would most likely come from the actions that were associated with such a designation. The assumption would be that such designation would provide protection for habitat. In that case, the social impacts would be positive in the long-term. However, in some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose constraints on those who harvest habitat. This would certainly impose negative short-term impacts that may be mitigated in the long term if productivity is increased.

Conclusion

The Council rejected this option because it includes *Sargassum* that is beyond the outer limit of the EEZ. NMFS and NOAA GC have advised that the Councils do not have authority beyond the EEZ. The Councils determined this option is not the best way to achieve the goals and management objectives of the FMP.

Rejected Option 5. Identify EFH for pelagic *Sargassum* as where it occurs in the water column. See Figure 2 in Section 3.1.1.

Biological Impacts

The identification of EFH for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Economic Impacts

The identification of EFH for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Identification of EFH will require the Council to consider all operations or actions that might interact with or affect the EFH, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There would be few social impacts from this measure. The social impacts would most likely come from the actions that were associated with such a designation. The assumption would be that such designation would provide protection for habitat. In that case, the social impacts would be positive in the long-term. However, in some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose constraints on those who harvest habitat. This would certainly impose negative short-term impacts that may be mitigated in the long term if productivity is increased.

Conclusion

The Council rejected this option because it would include *Sargassum* that is in State waters, the EEZ, and beyond the outer limit of the EEZ, that is, *Sargassum* in the water column beyond the EEZ. NMFS and NOAA GC have advised that the Councils do not have authority beyond the EEZ. The Councils determined this option is not the best way to achieve the goals and management objectives of the FMP.

Rejected Option 6. Modifies the preferred option by limiting the EFH identification to the upper 10 m of the surface. This area is the upper 10m of the surface of the area shown in Figure 2 in Section 3.1.1

Biological Impacts

The identification of EFH for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

In consideration of conditions limiting growth and survival of *Sargassum* and the known utilization of large rafts of *Sargassum* by early life stages of Federally managed fisheries and other marine species (Table 4), this alternative EFH designation only would encompass the uppermost 10 m of the marine water column.

Designation of near-surface oceanic and nearshore habitats as EFH for pelagic *Sargassum*, as an action independent of any others, would not impact the biological quality of those habitats. However, designation would provide an additional mechanism by which the Council could manage or influence man's activities which could cause or lead to the degradation of *Sargassum* EFH.

Economic Impacts

The identification of EFH for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Identification of EFH will require the Council to consider all operations or actions that might interact with or affect the EFH, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions

imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There would be few social impacts from this measure. The social impacts would most likely come from the actions that were associated with such a designation. The assumption would be that such designation would provide protection for habitat. In that case, the social impacts would be positive in the long-term. However, in some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose constraints on those who harvest habitat. This would certainly impose negative short-term impacts that may be mitigated in the long term if productivity is increased.

Conclusion

Implementation of this option would provide an additional resource concern by which the Council could intercede in Federal actions to further the conservation of EFH and dependent Federally-managed fisheries. Currently, areas considered for designation as EFH for pelagic *Sargassum* already have been specified as EFH for one or more of the various Council and NMFS managed fisheries: shrimp, red drum, snapper grouper, coastal migratory pelagics, and highly migratory species.

Specifying the EFH is a statutory requirement of an FMP. Its specification automatically triggers the requirement that Councils consider fishing activities that may result in identifiable adverse effects to EFH.

The Council determined this option is not the best way to achieve the goals and management objectives of the FMP. *Sargassum* does occur deeper than 10 meters and work presented during the *Sargassum* Workshop identified extensive rows of *Sargassum* contributing to the benthic habitat in the area off The Point in North Carolina. Therefore, the Council rejected this option based on the technical expertise of the Habitat Advisory Panel and the *Sargassum* Workshop participants.

4.2.6 Impacts of Fishing Gear on Habitat

Pelagic *Sargassum* was originally collected with unweighted shrimp trawls or 3 foot by 4 foot and 4 foot by 8 foot beam trawls constructed of iron pipe with 1.5 inch and 2 inch mesh bags that were 6 to 8 feet deep. See Section 3.3 for a completed assessment of present fishing activities. Action 7 requires that nets used to harvest Sargassum be constructed of 4 inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet. In addition, *Sargassum* is encountered when hooks are pulled through the water in recreational and commercial fisheries.

The habitat for *Sargassum* is the water column. Impacts from gear targeting *Sargassum* (trawls) and other fishing gear (black sea bass pots, golden crab pots, hook-and-line gear, etc.) on water molecules is unknown but not expected to be insignificant. Therefore, the Council did not consider any options to regulate such impacts.

4.2.7 ACTION 6. Establish the distribution of pelagic *Sargassum* within the South Atlantic Council's EEZ and within the state waters off of North Carolina, South Carolina, Georgia, and the east coast of Florida as an Essential Fish Habitat-Habitat Area of Particular Concern (EFH-HAPC).

See Figure 4.

Because of the importance of the extra-jurisdictional pelagic *Sargassum* occurring in the Sargasso Sea outside the EEZ, the United States should pursue all other options under the Magnuson-Stevens Act and other laws to protect *Sargassum* in international waters.

Note: Refer to Section 3.0 of this document and the Habitat Plan (SAFMC, 1998a) for a more detailed description of habitat utilized by the managed species. Additional discussion is also found under Action 5.

Biological Impacts

The final rule on essential fish habitat determinations recognizes that sub-units of EFH may be of particular concern. Such areas, termed Essential Fish-Habitat Areas of Particular Concern (EFH-HAPCs), can be identified using four criteria from the rule: a) importance of ecological functions; b) sensitivity to human degradation; c) probability and extent of effects from development activities; and d) rarity of the habitat. *Sargassun* clearly meets criteria a. and d. because it is the primary pelagic habitat existing in the EEZ (see Section 3.0).

The designation of EFH-HAPCs for pelagic *Sargassum* will enable the Council to protect essential fish habitat effectively and take timely actions when necessary. This could prevent decreases in biological productivity and may lead to possible increases in biological production.

Economic Impacts

The designation of EFH-HAPCs for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Designation of EFH-HAPCs will require that the Council consider all fishing activities that might result in identifiable adverse effects to EFH, and may trigger a consultation for any Federal action that may adversely affect the habitat. This would include, but not be limited to, any non-directed pelagic *Sargassum* harvesting activities such as finfish or invertebrate trawling, dredging, line fishing, or transit activities. The direct effects of this additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since all of these restrictions or consultation outcomes are unknown at this time, it is not possible to describe their effects.

Designation of an EFH-HAPC may generate more protective EFH Conservation Recommendations as a result of the EFH consultation process.

Social Impacts

There will be few social impacts from establishing EFH-HAPCs. The social impacts will most likely come from future actions that are associated with such designations. In some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose similar constraints on pelagic *Sargassum* fishermen or processors. This could conceivably impose negative short-term impacts.

It is worth noting that identification of essential fish habitat will alter the process by which permits for activities which impact essential fish habitat and EFH-HAPCs are issued. The potential for increased restrictions, mitigation, and permitting requirements may have impacts upon the behavior of individuals and agencies seeking permits. The nature and extent of those impacts are unknown and will undoubtedly vary depending upon the individual and/or agency.

Conclusion

The Council concluded that designation of EFH-HAPCs for pelagic *Sargassum* will enable the Council to protect essential fish habitat effectively and take timely actions when necessary. Identifying and describing pelagic *Sargassum* habitat is the first step in preventing decreases in biological productivity of pelagic *Sargassum* and other managed or prey species that depend on pelagic *Sargassum* for habitat. This could prevent decreases in biological productivity and may lead to possible increases in biological productivity.

Implementation of this measure would provide an additional resource concern by which the Council could intercede in Federal actions to further the conservation of EFH-HAPCs and dependent Federally-managed fisheries. Currently, areas considered for designation as EFH-HAPCs for pelagic *Sargassum* already have been specified as EFH-HAPCs for one or more of the various Council and NMFS managed fisheries: shrimp, red drum, snapper grouper, coastal migratory pelagics, and highly migratory species.

Rejected Options for Action 6:

Rejected Option 1. Do not establish EFH-HAPCs for pelagic *Sargassum*.

Biological Impacts

The no action alternative would limit the Council in the future in terms of protecting the long-term biological productivity of the pelagic *Sargassum* habitat and minimizing fishing related habitat damage from occurring in these fisheries.

Economic Impacts

This option by itself would not have a direct impact on short-term and long-term economic benefits. However, the Council would be limited in the future in terms of protecting pelagic *Sargassum* habitat and minimizing any likelihood of habitat damage. This could result in reduced net economic benefits to society in the long-term.

Social Impacts

Although there would be few social impacts from no action, it is in the best interest of the Council and fishermen to identify this habitat. Designation of EFH-HAPCs can facilitate expeditious Council action in the future to protect pelagic *Sargassum* habitat.

Conclusion

The Council concluded taking no action would have limited future actions to protect the long-term biological productivity of pelagic *Sargassum* habitat and minimize gear related habitat damage from occurring in these fisheries. The no action alternative would not have met the objectives of the *Sargassum* plan. Therefore, the Council rejected this option.

Rejected Option 2. Expand the EFH-HAPC definition to include *Sargassum* where it occurs in the north Atlantic Gyre in the Sargasso Sea and the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream. This area is the EEZ between 20° N. latitude and 40° N. latitude and 30° W. longitude and the western edge of the Gulf Stream presented in Figure 2 Section 3.1.1.

Biological Impacts

Expanding the designation of EFH-HAPC's to include the Sargasso Sea would enable the Councils to protect essential fish habitat effectively and take timely actions when necessary. This could prevent further decreases in biological productivity and may lead to possible increases.

Economic Impacts

The designation of EFH-HAPCs for pelagic *Sargassum* will not have any direct economic impacts. However, this measure will enable the Council to protect essential fish habitat effectively and take timely actions when necessary which could lead to increased net economic benefits to society.

Designation of EFH-HAPC will require the Council to consider all operations or actions that might interact with or affect the EFH-HAPC, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There will be few social impacts from establishing EFH-HAPCs. The social impacts will most likely come from future actions that are associated with such designations. In some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose similar constraints on pelagic *Sargassum* fishermen or processors. This could conceivably impose negative short-term impacts.

It is worth noting that identification of essential fish habitat will alter the process by which permits for activities which impact essential fish habitat and EFH-HAPCs are issued. The potential for increased restrictions, mitigation, and permitting requirements may have impacts upon the behavior of individuals and agencies seeking permits. The nature and extent of those impacts are unknown and will undoubtedly vary depending upon the individual and/or agency.

Conclusion

The Council rejected this option because it includes *Sargassum* that is beyond the outer limit of the EEZ. NMFS and NOAA GC have advised that the Councils do not have authority beyond the EEZ. The Councils determined this option is not the best way to achieve the goals and management objectives of the FMP.

Rejected Option 3. Establish the Charleston Bump and The Point as EFH-HAPCs. See Figure 6.

Biological Impacts

The designation of EFH-HAPCs for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, EFH-HAPC designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH-HAPCs would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Limiting the designation of EFH-HAPCs as described in this option would limit the Council's ability to protect EFH effectively.

Economic Impacts

Designation of EFH-HAPC will require the Council to consider all operations or actions that might interact with or affect the EFH-HAPC, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There will be few social impacts from establishing EFH-HAPCs. The social impacts will most likely come from future actions that are associated with such designations. In some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose similar constraints on pelagic *Sargassum* fishermen or processors. This could conceivably impose negative short-term impacts.

It is worth noting that identification of essential fish habitat will alter the process by which permits for activities which impact essential fish habitat and EFH-HAPCs are issued. The potential for increased restrictions, mitigation, and permitting requirements may have impacts upon the behavior of individuals and agencies seeking permits. The nature and extent of those impacts are unknown and will undoubtedly vary depending upon the individual and/or agency.

Conclusion

The Council rejected this option because it would only include a small portion of the *Sargassum* that is within State waters and the EEZ. These two areas are included in the Council's proposed action. The Council determined this option is not the best way to achieve the goals and management objectives of the FMP.

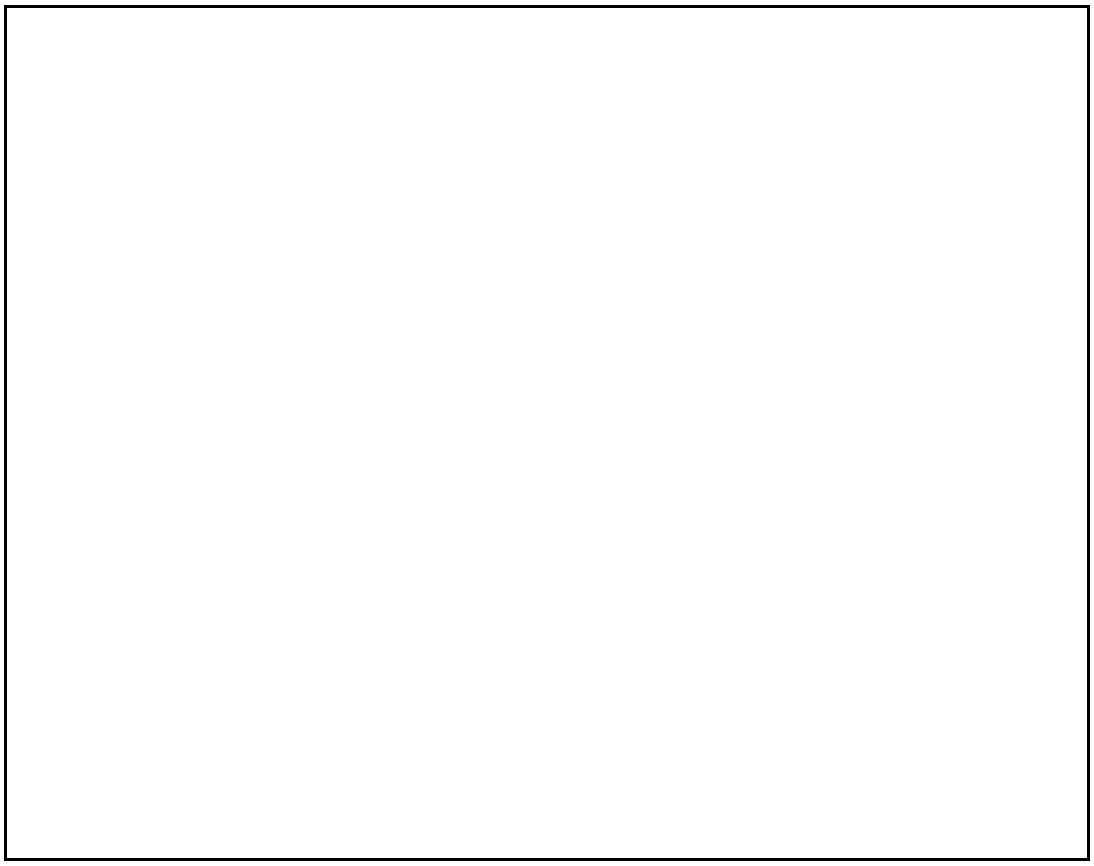


Figure 6. Rejected EFH-HAPC Option- Designate only The Charleston Bump and the Point as EFH-HAPCs (Source: Keith Bickers, NMFS pers. comm. 2002).

Rejected Option 4. Establish *Sargassum* in the EEZ, Sargasso Sea, and Gulf Stream outside of the EEZ as an EFH-HAPC. See Figure 2 in Section 3.1.1.

Biological Impacts

The designation of an EFH-HAPC for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, the EFH-HAPC designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH-HAPC would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Economic Impacts

Designation of EFH-HAPC will require the Council to consider all operations or actions that might interact with or affect the EFH-HAPC, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or

mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There will be few social impacts from establishing EFH-HAPCs. The social impacts will most likely come from future actions that are associated with such designations. In some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose similar constraints on pelagic *Sargassum* fishermen or processors. This could conceivably impose negative short-term impacts.

It is worth noting that the designation of essential fish habitat will alter the process by which permits for activities which impact essential fish habitat are issued. The potential for increased restrictions, mitigation, and permitting requirements may have impacts upon the behavior of individuals and agencies seeking permits. The nature and extent of those impacts are unknown and will undoubtedly vary depending upon the individual and/or agency.

Conclusion

The Council rejected this option because it would have included *Sargassum* that is beyond the outer limit of the EEZ. NMFS and NOAA GC have advised that the Councils do not have authority beyond the EEZ. The Councils determined this option is not the best way to achieve the goals and management objectives of the FMP.

Rejected Option 5. Modifies the preferred option by limiting the EFH-HAPC identification to the upper 10 m of the surface. See Figure 4. Note: This would only apply within the jurisdiction established through the preferred option.

Biological Impacts

The designation of an EFH-HAPC for pelagic *Sargassum* would not result in direct impacts to the biological resources of the west-central Atlantic Ocean. Rather, the EFH-HAPC designation under this option would provide a future opportunity for the Council to establish regulations to protect EFH from fishing activities in the EEZ and to review and recommend EFH conservation measures to protect surface waters from non-fishing activities which are undertaken, authorized, or funded by Federal agencies. Similarly, designation of pelagic *Sargassum* EFH-HAPC would require Federal agencies to consult with NMFS on activities which may adversely affect that habitat.

Additional discussion is presented under Rejected Option 6 for Action 5.

Economic Impacts

Designation of EFH-HAPC will require the Council to consider all operations or actions that might interact with or affect the EFH-HAPC, and may trigger a consultation for any activity that may affect the habitat. The direct effects of additional regulatory consideration would be the financial costs of a protracted regulatory process. Additional effects would accrue to any restrictions imposed as a result of the evaluation of impact of these activities. A consultation may incur costs associated with production delays, project/activity design modification, or mitigation measures. Since any restrictions that may subsequently be placed on these activities are unknown at this time, it is not possible to explicitly describe their effects.

Social Impacts

There will be few social impacts from establishing EFH-HAPCs. The social impacts will most likely come from future actions that are associated with such designations. In some cases, protection of habitat may mean harvesting restrictions in areas where harvesting presently takes place or other actions which may impose similar constraints on pelagic *Sargassum* fishermen or processors. This could conceivably impose negative short-term impacts.

It is worth noting that identification of essential fish habitat will alter the process by which permits for activities which impact essential fish habitat and EFH-HAPCs are issued. The potential for increased restrictions, mitigation, and permitting requirements may have impacts upon the behavior of individuals and agencies seeking permits. The nature and extent of those impacts are unknown and will undoubtedly vary depending upon the individual and/or agency.

Conclusion

The Council rejected this option because it would not have included Sargassum that is below 10 meters. Research results have shown that Sargassum occurs deeper than 10 meters and is an important component of the benthic habitat in certain areas (e.g., The Point off North Carolina).

The Council determined this option is not the best way to achieve the goals and management objectives of the FMP. Therefore, the Council rejected this option.

4.2.8 ACTION 7A. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).

ACTION 7B. Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.

ACTION 7C. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.

ACTION 7D. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.

ACTION 7E. Require that an official observer be present on each *Sargassum* harvesting trip.

ACTION 7F. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

The Council's preferred action requires 100% observer coverage. The sampling methodology will follow the methods of Settle (1993). Estimates of all species captured are to be provided in an annual SAFE report to be prepared by NMFS as required by the Magnuson-Stevens Act. The SAFE Report is to be provided to the Council by June 1st of each year and should cover the preceding calendar year.

Biological Impacts

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low

nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column.

Pelagic *Sargassum* has been identified as essential fish habitat (EFH) as well as being designated essential fish habitat - habitat area of particular concern (EFH-HAPC) for both snapper grouper and coastal migratory pelagics species (SAFMC, 1998a,b). Pelagic *Sargassum* is identified as essential fish habitat and essential fish habitat-habitat areas of particular concern for dolphin and wahoo in the Council's Dolphin/Wahoo FMP. Action 7 will prohibit harvest off South Carolina, Georgia, and the Florida East Coast, and allow very limited harvest off North Carolina. This action will prevent expansion of harvest of this important pelagic habitat.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles. This option would result in a take of less than 15 turtles. NMFS also concluded that implementation of actions to minimize impacts on *Sargassum* habitat would be consistent with the ESA by conserving significant habitat for sea turtles and reducing the take of sea turtle hatchlings that could occur during *Sargassum* harvesting efforts.

This action would immediately prohibit harvest of *Sargassum* (essential fish habitat) south of the North Carolina/South Carolina border and limit harvest off North Carolina to 5,000 pounds wet weight per year. Historically harvest has only occurred off of North Carolina. The Council is taking this action to limit the direct removal of this habitat. *Sargassum* serves as an oasis in a media otherwise devoid of structure. While the present level of harvest may be small relative to the unknown biomass of pelagic *Sargassum* in the region, the Council views the total prohibition off South Carolina, Georgia, and the Florida East Coast and the limit on harvest off North Carolina as a way of ensuring the fishery does not expand.

The Council is limiting harvest to the months of November through June to protect endangered sea turtles as outlined in the Biological Opinion dated June 21, 1999. The NMFS Office of Protected Resources notes that "Harvest, at any level, has the potential to adversely affect sea turtles."

The Council initially proposed limiting harvesting to 150 miles offshore which is the area of more recent harvest. However, due to vessel safety concerns, the Council modified this to 100 miles offshore. The 100-mile limit and seasonal limit of November through June maximize vessel safety while providing the necessary protection for *Sargassum* and threatened/endangered sea turtles.

Currently there is only one vessel in the fishery. Requiring an observer will allow the Council to determine if any additional vessels intend to operate which will improve our understanding of the fishery. The current operator in the fishery has been very cooperative in providing data, however, since the measures contained in this plan adversely impact him, he may not be as cooperative in the future. If additional individuals enter the fishery, data will need to be collected from those individuals. Observers will provide continued data collection which is necessary to improve our understanding of the fishery and *Sargassum* itself.

The 4-inch mesh size will allow more of the incidental species (juvenile fish and threatened/endangered sea turtles) to escape which will reduce bycatch. Juvenile sea turtles will generally pass through 4-inch mesh. The limit on the size of the frame (4 feet by 6 feet) will limit the amount of any one bed of *Sargassum* that can be harvested. This will help preserve some habitat for the remaining larval and juvenile fish and juvenile turtles after harvesting occurs.

Economic Impacts

Information on the one firm harvesting this resource is provided in Table 7. A total of 52 trips were made between 1976 and 1997 resulting in the harvest of 44,800 pounds (dry weight) of pelagic *Sargassum*. This is equivalent to 448,000 pounds wet weight using a conversion factor of 10 to convert from dry weight to wet weight. Thus, the average harvest per trip was 8,615 pounds wet weight. No harvest has occurred since 1997.

The last column of Table 7 shows the poundage of dry weight that was converted to liquid form each year. It should be noted that pelagic *Sargassum* was not harvested every year during the time period. However, there was always an inventory of dry pelagic *Sargassum.* Thus conversion to liquid form took place each year.

Based on information received from the firm, one pound of dry weight pelagic *Sargassum* is valued at $30. The cost of the liquefied product is not available, but it was indicated that 1,000 pounds of dry pelagic *Sargassum* can be converted to a couple of thousand gallons of liquefied product. The vessel harvesting *Sargassum* for this firm only engages in this activity at the present time. The firm estimates that the vessel laid idle 80% of the time during 1997. It was previously engaged in snapper grouper fishing, but problems with the two captains who held federal permits in the snapper grouper fishery led to the cancellation of the arrangement between the firm and the captains. No data are available on the cost of operating the vessel. Fishing activity was reported to have been concentrated in the Sargasso Sea during 1996 and 1997. Harvesting took place about 160 miles offshore of the North Carolina coast, at the edge of the continental shelf in 1,000 fathoms of water. This information was obtained through personal communication with Mr. William Campbell of Aqua-10 Laboratories (August 6, 1998).

The owner of Aqua-10 recommended that the Council allow a harvest of 50,000 pounds wet weight annually, which could be augmented by purchasing additional raw material from other countries (Summary Minutes of the South Atlantic Fishery Management Council Meeting, March 9, 2000; page 56). This would allow the company to operate profitably at its current capacity. Data on recent harvest trends indicate that during 1995 to 1997 *Sargassum* harvest did not exceed 20,000 pounds wet weight annually (Table 7). From 1995-1997, the most recent years in which this company harvested pelagic *Sargassum*, the company harvested an average of 14,333 pounds wet weight. At an average price of $30 per pound processed product, the average revenues generated from 1995-1997 harvests were $43,000 per year. Since 1997, it is presumed that the company has been processing inventory.

This management action could result in any one of the following outcomes:

1. The firm stops harvesting *Sargassum* and obtains substitute inputs from another source(s).
2. The firm harvests 5,000 pounds of *Sargassum* annually within the South Atlantic EEZ beyond 100 miles from shore in North Carolina during June to November, and harvests the remainder outside of the EEZ in the South Atlantic region.
3. The firm could cease business operations.

The value of pelagic *Sargassum* harvested in 1997 was estimated at $36,000 based on 1,200 pounds dry weight at $30 per pound. It is expected that the cost of purchasing algae from other sources would be higher than $30 per pound, and, thus, exceeds the value of the processed pelagic *Sargassum*. Thus, if the firm chooses to obtain all seaweed from other sources, then net revenue would decline. There is no information on the price of substitute algae products, plant and vessel operating costs, or value of the finished product to take this analysis any further.

Table 7. Pelagic *Sargassum* Harvested in the South Atlantic and Processed 1976 through 2002. (Source: William E. Campbell, Aqua-10 Laboratories, Beaufort, North Carolina. July 29, 1998; NMFS Beaufort Lab) **Note: No harvest has occurred since 1997.**

Year	**Number of Trips**	**Harvest region**	**Landings (wet weight in lb.) (approximately = 10x dry weight)**	**Weight of Dry** Pelagic ***Sargassum* Processed into Liquid Form**
1976	4	WCS-MCS-GS	30,000	300
1977	-			1,000
1978	-			1,000
1979	1	ECS-GS	22,000	2,000
1980	-			2,000
1981	3	ECS-GS	20,000	1,500
1982	2	GS	11,000	1,500
1983	1	ECS	1,000	1,000
1984	3	GS	30,000	2,000
1985	1	ECS	10,000	1,500
1986	1	GS	9,000	1,500
1987	7	SS	50,000	3,000
1988	3	SS	22,000	4,500
1989	-			3,000
1990	14	SS	200,000	3,000
1991	-			2,000
1992	-			3,000
1993	-			2,500
1994	-			2,400
1995	4	ECS-GS-SS	11,000	2,000
1996	6	SS	20,000	2,200
1997	2	SS	12,000	1,500
Total as of June 2002	**52**		**448,000**	**44,400**

Notes: WCS - West of Continental Shelf ECS - East of Continental Shelf
MCS - Mid Continental Shelf GS - Gulf Stream SS - Sargasso Sea

The firm involved in harvesting pelagic *Sargassum* operates outside the range of most fisheries and no longer harvests pelagic *Sargassum* from inshore waters. Thus, it is possible that the vessel could harvest additional quantities of pelagic *Sargassum* outside of the EEZ. However, the vessel may require safety upgrades to operate in these offshore waters. Fuel costs would increase if harvests have traditionally been within 200 miles from shore. Harvest costs may also increase due to increased search time for the resource in the more distant waters if the resource is more sparsely distributed. In addition, the observer requirement would increase costs to society if there is a 5,000 pound harvest in the allowable region within the EEZ. This course of action, in

response to these management regulations, would increase operating costs and increase costs to society.

Another option is that these regulations could force the firm to cease business operations. Mr. Campbell has stated that alternative sources of algae are too expensive for his firm. In addition, he testified at the SAFMC March 2000 Council meeting that it may be unsafe to harvest *Sargassum* beyond 150 miles, and also questioned the availability of this resource in these areas. If the firm ceases to operate, then all revenue obtained from pelagic *Sargassum* harvesting and processing will be forgone. The value of pelagic *Sargassum* harvested in 1997 is estimated at $36,000 based on 1,200 pounds dry weight at $30 per pound. The value of the finished product is unknown, but it is believed that substantial value is added to the liquefied finished product. It is not possible to determine the indirect effects of the elimination of the processed pelagic *Sargassum* on the production or markets for plant and yield stimulants, fertilizer concentrate, and animal feed supplements that utilize processed pelagic *Sargassum* since information on alternative sources of product (pelagic *Sargassum* substitute) is unavailable.

In addition to the lost revenue, there is also investment in a vessel used for harvesting *Sargassum* and in processing equipment. Unless alternative uses could be found for them, capital investment in the vessel and equipment would be lost. This business entity reported acquisition of a 63 foot fishing vessel in 1995. This vessel fished for snapper grouper species in addition to harvesting pelagic *Sargassum* in the past, under arrangements with two captains that had federal snapper grouper permits. When purchased, the vessel was to continue to participate in the snapper grouper fishery and subsequently be used for directed trips to harvest pelagic *Sargassum*. These arrangements have since been canceled. The owner of this vessel could purchase permits to enter the snapper grouper, wreckfish, or golden crab fisheries, or sell the vessel. The company would have to purchase a permit in order to reenter the snapper grouper fishery that would cost approximately $15,000. Average annual revenues for snapper-grouper fishermen fishing in the northern portion of the South Atlantic (off North Carolina) in 1993 were approximately $16,000 (in 2001 $) for all gear types and approximately $26,000 (in 2001 $) using sea bass pots. If the company enters the snapper/grouper fishery there should be no indirect effects on the snapper grouper fishery since it is a limited access fishery and the vessel would have to purchase two permits from current participants and retire one permit.

Processing equipment would likely remain idle as there is no indication that the processing facility can be converted to another use without incurring significant expense. There are no data to assess the level of capital investment in processing.

The company employs three persons on a full-time, year-round basis and other local inhabitants on a part time, irregular basis. Displaced employees would have to seek other employment opportunities that exist in the immediate area, though the number of displaced employees is not large.

In conclusion, even if this measure did not cause the firm to cease operating, there would be a reduction in net business revenue.

The harvest of pelagic *Sargassum* is estimated to take juvenile endangered sea turtles at the rate of 30 loggerhead turtles per 50,000 pounds wet weight of pelagic *Sargassum*, and 1 turtle per year of all other species combined. This measure will result in the taking of less than 15 turtles per year. Other than the impact on sea turtles, there is little data on the ecosystem services (that is, indirect benefits to other user groups) that pelagic *Sargassum* provides. Also, at this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests. As a result it is not

possible to determine whether the forgone net revenue would be offset by the incremental increase in use and non-use benefits to society from reducing or curtailing *Sargassum* harvest.

Social Impacts

Of all these proposed actions, the one that is most critical to determine social impacts is 7D, which establishes a TAC of 5,000 pounds landed wet weight of *Sargassum*. The only harvester of *Sargassum* has made it clear that with a TAC of 5,000 pounds, he cannot expect to remain in business unless he were to substitute products, and substitution is in question.

However, while the singular impacts on this individual are great, the social impacts of setting a TAC at 5,000 pounds landed wet weight are not determined to be as substantial. It is understood that Aqua-10 (the company in question) employs three persons on a full-time, year-round basis (the owner, his wife, and one other employee). Other local inhabitants are employed on an irregular, as-needed basis, supposedly for less than a few days at any one time. Thus the social impacts of not having such an employment opportunity exist would be very minimal, and workers can reasonably be expected to substitute other employment opportunities that exist in the immediate area. Furthermore, as far as can be determined, there is no historical or current culture of *Sargassum* harvesting in the region, so no other social and cultural impacts from this firm going out of business should occur.

Public sentiment has been overwhelming in favor of a total prohibition of *Sargassum* harvest. Comments were received from 33 States and Puerto Rico, and from 16 foreign countries. A total of 235 comments were received on the original FMP (175 from individuals and 60 from agencies/organizations). All comments were in favor of the Council's proposed action to prohibit harvest except the comment from Mr. William Campbell and one suggestion that additional research was needed. The Council's current proposed action is a low level of harvest, and the many non-use stakeholders would derive social benefits from this action.

The proposed action is consistent with the requirements of the Magnuson-Stevens Act for existing fisheries and communities.

Conclusion

The *Sargassum* community represents a highly evolved ecotype with organisms (e.g., Sargassum fish, Sargassum pipefish, Sargassum shrimp, and Sargassum crab) which have evolved cryptic coloration and feeding mechanisms to survive and thrive in this habitat. In addition, many organisms (e.g., bryozoans) live attached to the *Sargassum* and feed on phytoplankton in the water column and associated with the habitat. These species would be lost in removal of this habitat. Recent research indicates the essential nature of the fish and other marine organisms using pelagic *Sargassum* in providing the nutrients for growth of the algae. Therefore, the determination that all *Sargassum* is essential fish habitat, as well as an essential fish habitat-habitat area of particular concern, is further supported by this interrelationship between the inhabitants and the growth of *Sargassum*.

This action would immediately prohibit harvest of *Sargassum* (essential fish habitat) south of the North Carolina/South Carolina border and limit harvest off North Carolina to 5,000 pounds wet weight per year. The Council is taking this action to limit the direct removal of this habitat. *Sargassum* serves as an oasis in a media otherwise devoid of structure. While the present level of harvest may be small relative to the unknown biomass of pelagic *Sargassum* in the region, the Council views the total prohibition off South Carolina, Georgia, and the Florida East Coast, and the limit on harvest off North Carolina, as a way of ensuring the fishery does not expand.

The Council concluded the removal of pelagic *Sargassum* habitat constitutes a net loss of essential fish habitat in the South Atlantic region. Also, the Council concluded that the harvest of pelagic *Sargassum* above 5,000 pounds wet weight per year is a violation of Council, NMFS, and NOAA habitat policies. The harvest of *Sargassum* is contradictory to the goals and objectives of the Habitat Plan (SAFMC, 1998a), the Habitat Comprehensive Amendment (SAFMC, 1998b), and the Pelagic Sargassum Habitat Plan (SAFMC, 1998d and 2000) however, the Council had no choice but to allow a limited harvest in order to have the fishery management plan approved. An experimental fishing provision (a process whereby fishermen may apply to NMFS to use gear on an experimental basis) was considered but dropped because the Council determined this activity constituted a violation of Council habitat policy and goes against the intent of the Magnuson-Stevens Act's mandate to address essential fish habitat. This action would meet the directive to identify, describe, and protect essential fish habitat. An acceleration and/or continuation of harvest could degrade the quality of habitat.

Apart from increases in the non-consumptive values discussed below, the Council concluded severe limitation on harvest is likely to increase productivity of marine life in the ecosystem. In particular, dolphin-fish and threatened/endangered sea turtles would be protected from any potential negative impacts and could result in increased abundance depending on additional measures implemented.

The Council recognized the impact of the 5,000 pound annual TAC. Further that this action may result in the affected business going out of business. However, the Council concluded maintaining the integrity of the non-consumptive values and the value to other species as habitat greatly outweigh the costs resulting from severely limiting harvest. Like any natural resource, *Sargassum* commands what has been termed non-use values; specifically existence value, bequest value, and option value. Existence value refers to the satisfaction individuals derive from the knowledge that a natural resource exists and will continue to exist in the future even though they may never use or see the resource. Bequest value is the benefit associated with endowing a natural resource to future generations. Option value refers to the benefit individuals obtain from retaining the option to use the resource in the future by conserving it now. These values are undoubtedly difficult to measure, but measurement has been done in a few instances (e.g., Amazonian rainforest and Australian Great Barrier Reef).

In terms of non-consumptive uses, the Council concluded severely limiting harvest will reduce further loss of essential fish habitat; increase the possibility of enhancing ecosystem function and marine productivity; and increase existence, bequest, and option values. After implementation, most of the direct benefits will go to the non-consumptive users; some will accrue to consumptive users. The other values, existence, bequest, and option are likely to increase at a faster rate. There is no direct method to estimate these benefits. Indirect benefits will accrue to consumptive users to the extent productivity of harvested species (e.g., dolphin-fish) are increased.

The following points noted in Manooch et al. (1984). Table 8, developed from information presented in Manooch et al. (1984), further emphasizes the complexity of the *Sargassum* community and the importance of pelagic *Sargassum* habitat to pelagic fishes especially dolphin (*Coryphaena hippurus*). This material further supports the Councils conclusions.

"One major contribution of this paper is that we have documented the importance of the Sargassum community to dolphin, and therefore to anglers that fish for the species. Traditionally, fishermen seek weed-lines to land dolphin and other pelagic fishes. Seasonal angling success has been associated with the distribution of Sargassum along the southeastern United States. For instance, Rose and Hassler (1974) suggested that diminished landings of dolphin off North Carolina were probably caused by lack of tide-lines (usually caused by floating rows of Sargassum) rather than overfishing in previous years as some believed."

"Much of the material indicated that dolphin frequently feed at the surface and ingest fishes, crustaceans, insects, plants, and inorganic items that are associated with floating Sargassum."

"Sargassum which occurred in 48.6% of the stomachs, was considered to be consumed incidental to normal foods."

"The relative contribution of the Sargassum community to the diet may be indicative of physiological constraints on the foraging behavior of these pelagic predators. The pursuit and capture of free-swimming prey in the open ocean is energetically expensive, while grazing on relatively sessile animals associated with Sargassum can be accomplished without great energy expenditure. The tunas consume a greater proportion of pelagic, adult fishes and take less prey from the Sargassum community than do dolphin. Although both tunas and dolphin are capable of high speed pursuit, tunas have highly vascularized locomotion muscles enabling sustained aerobic metabolism. Dolphin, with a much smaller portion of red muscle, must rely primarily on anaerobic metabolic pathways (mainly glycolosis), and therefore are limited to short bursts of acceleration. Thus, the energetic strategy for dolphin seems to be forage primarily on smaller prey from the Sargassum community, but also to capture larger prey with short bursts of high speed pursuit if the opportunity arises."

"A relatively small, but ecologically significant portion of the diet comprised of insects, typically terrestrial and probably transported by winds offshore, where they became concentrated on rafts of floating Sargassum."

The Council weighed all benefits and costs and concluded prohibiting harvest of pelagic *Sargassum* in the South Atlantic EEZ south of the North Carolina/South Carolina border and limiting harvest of North Carolina best meets the objectives of the plan, requirements of Magnuson-Stevens related to habitat, and results in net benefits to society. A total prohibition would best maintain the integrity of the Council's protection of essential fish habitat and essential fish habitat-habitat areas of particular concern and also minimize bycatch; however, this proposed action is the closest to a total prohibition the Council believes that the NMFS would approve. The Council chose to balance the economic impacts on the one business operating off North Carolina by establishing an annual TAC of 5,000 pounds wet weight. The Council concluded this level of landings provides an opportunity for the business to pursue other sources (e.g., culture) and/or products thereby moderating the short-term negative impacts.

Table 8. Percentages occurrence of Sargassum in the stomachs of dolphin *Coryphaena hippurus* and yellowfin tuna (Data Source: Manooch et al., 1984; Rose and Hassler, 1974; and Manooch and Mason, 1983).

	Species	Number	Season or Size (FL)	% Occurrence of *Sargassum* in stomach
Rose and Hassler (1974)	Dolphin	396	All	28%
Manooch et al. (1984)	Dolphin	2,219	All	48.6%
Manooch et al. (1984)	Dolphin	158	Spring	55.1%
Manooch et al. (1984)	Dolphin	845	Summer	50.9%
Manooch et al. (1984)	Dolphin	61	Fall	29.5%
Manooch et al. (1984)	Dolphin	14	Winter	41.2%
Manooch et al. (1984)	Dolphin	13	≥300 mm	23%
Manooch et al. (1984)	Dolphin	987	≥300-500 mm	49%
Manooch et al. (1984)	Dolphin	686	≥500-700 mm	55%
Manooch et al. (1984)	Dolphin	192	≥700-900 mm	43.8%
Manooch et al. (1984)	Dolphin	189	≥900-1,100 mm	43%
Manooch et al. (1984)	Dolphin	71	≥1,100 mm	38%
Manooch and Mason (1983)	Yellowfin tuna			26.5%
Manooch and Mason (1983)	Blackfin tuna			12.4%

The Council is limiting harvest to the months of November through June to protect endangered sea turtles as outlined in the Biological Opinion dated June 21, 1999. The NMFS Office of Protected Resources notes that "Harvest, at any level, has the potential to adversely affect sea turtles." The Biological Opinion contained the following "Conservation Recommendations":

1. Limit the harvest of Sargassum to outside the months of July through October, or minimize, to the greatest extent possible, the number of harvest trips between July and October. These months coincide with the sea turtle hatching season and NMFS believes that harvesting for Sargassum during these months is more likely to result in take of pelagic hatchlings associated with the Sargassum. A closed harvest during the month of July 1 through October 31, or a reduction in harvesting during these months, has the potential of greatly minimizing the risk of take of post-hatchling sea turtles.

2. Studies should be performed on the abundance, seasonality, life cycle, and reproductive strategies of Sargassum and the role this species plays in the marine environment, not only as an essential fish habitat, but as a unique pelagic algae. The research recommendations of this FMP were based primarily on managing Sargassum as essential fish habitat for species managed under the MSFCMA. Research needs should also be identified that consider the Sargassum community, as well as the individual species of this community that are associated with, and/or dependent on, pelagic Sargassum. Human-induced (tanker oil discharge; trash) and natural threats (storm events) to Sargassum need to be researched for the purpose of protecting and conserving this natural resource.

3. Cooperative research partnerships should occur between the council, NMFS Protected Resources Division, and state agencies since many of the needs to a) research pelagic Sargassum, and b) protect and conserve pelagic Sargassum habitat, are the same for both managed fish species and listed sea turtles.

4. Specific research needs should be included in the plan which further address the association between pelagic *Sargassum* habitat and post-hatchling sea turtles.

The Council initially proposed limiting harvesting to 150 miles offshore which is the area of more recent harvest. However, due to vessel safety concerns, the Council modified this to 100 miles offshore. The Council concluded that the 100-mile limit and seasonal limit of November through June maximize vessel safety while providing the necessary protection for *Sargassum*.

Allowing harvest of *Sargassum* will result in the take of endangered species. NMFS concluded the following in the Biological Opinion for the original *Sargassum* FMP (see Biological Opinion): "Based on the available scientific data describing the occurrence and abundance of pealgic sea turtle hatchlings, historical landing data (including total landings, number of tows, and amount of harvest/tow) and expected increases in harvesting efforts, loggerhead (particularly post-hatchlings), leatherback, green, Kemp's ridley, and hawksbill sea turtles may occur in the action area and may be taken in the trawl net used in the proposed action. A level of incidental take is anticipated; therefore, terms and conditions necessary to minimize and monitor takes are established. NMFS anticipates that up to thirty (30) loggerhead neonate (post-hatchling) or pelagic immature sea turtles to be taken by capture during the life of the quota as a result of this proposed action. [Added Note: The original quota was 50,000 pounds versus the proposed annual TAC of 5,000 pounds. Therefore, it is estimated that 30 turtles will be taken per 10-year period.] For green, kemp's, hawksbill and leatherback turtles, the level of take by capture is unlikely to exceed one neonate/pelagic immature individual from all species combined in a year. Due to the highly variable distribution of pelagic sea turtles in the Florida Current and throughout the *Sargassum* weed lines, numbers in take per tow can be expected to vary greatly with many tows having zero take. …… The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of sea turtles: 1) An on-board NMFS observer will accompany each trip in the harvesting of *Sargassum* to monitor for incidental take and assist in the release of incidentally captured individuals in a manner which best eliminates harm and possible recapture. In order to be exempt from the prohibitions of Section 9 of the ESA, the OSF must comply with the following terms and conditions are non-discretionary:

1. An on-board NMFS observer will accompany every trip to monitor for incidental take that may occur due to the harvesting of pelagic *Sargassum*. The on-board observer will oversee all monitoring and record keeping on the take of sea turtles during *Sargassum* harvesting. For each trawl, the observer, to locate captured sea turtles, will sort through the collected *Sargassum* at the moment the trawl is brought aboard and placed on deck. This observer will be trained to identify the neonate/post-hatchling, juvenile, and sub-adult life stages of the sea turtle species, and will be properly trained in the use of calipers for measuring carapace width and length. The observer will record the length of tow time, location of the trawl (GPS reading), actual number of individuals taken, species, carapace length and width (using calipers), and the apparent condition of the individuals. The observer will take a frontal and dorsal photograph of each sea turtle taken. Captured individuals will be returned with approximately 1 m^2 of *Sargassum* to the ocean and must be placed back in the ocean in a manner that eliminate or minimize the probability of recapture. The Captain of the vessel may use his/her discretion to determine the method of release that will best reduce or eliminate any risk of recapture.

2. NMFS Southeast Regional Office will be notified by the observer for each trip when leaving and returning to port and will be informed on return to port of the following: a) if there was any take or not, b) if in the case of take, the number, species, and disposition of the individuals taken, c) the location at the time of take, d) the total number of trips to date, and e) the total number of trawls/trip."

The Council is requiring 100% observer coverage and is also requiring that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet. The sampling methodology will follow the methods of Settle (1993). Estimates of all species captured are to be provided in an annual SAFE report to be prepared by NMFS. The Council concluded the proposed action meets the requirements to collect data necessary to estimate bycatch and also meets the requirement to minimize bycatch. A total prohibition on harvest would better prevent bycatch but NMFS would not implement a total prohibition.

The Council considered requiring logbooks but concluded the observer can collect the necessary data. In addition, the Council considered requiring vessel permits but concluded the 100% observer requirement and notification process described above would adequately identify vessels intending to harvest *Sargassum*. The net requirements will allow for captured turtles to escape if they are small enough and will also limit the amount of a *Sargassum* mat that can be harvested at any one time. This will result in *Sargassum* remaining to provide habitat for any captured turtles which are subsequently released.

The NMFS will conduct another Section 7 consultation under the Endangered Species Act which may result in additional requirements. The Council is in favor of any additional requirement that minimizes the take of endangered species.

The Council concluded the proposed action is consistent with the requirements of the Magnuson-Stevens Act.

Rejected Options for Action 7:

Rejected Option 1. No Action.

Biological Impacts

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, over 100 species of fishes, four species of sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column.

Pelagic *Sargassum* has been designated essential fish habitat as well as an essential fish habitat-habitat area of particular concern for both snapper grouper and coastal migratory pelagics species (SAFMC, 1998a,b). Pelagic *Sargassum* is designated essential fish habitat and essential fish habitat-habitat areas of particular concern for dolphin and wahoo. This option would allow current harvest to continue and would also allow for an expansion of the fishery. Bycatch of fishes and threatened/endangered sea turtles would continue.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental

take of approximately 31 turtles. The no action option would not limit the take of turtles. In addition, the bycatch of other species would not be limited. This option would maximize the negative biological impacts.

Economic Impacts

This option could result in unrestrained harvest of pelagic *Sargassum*, which would have a significant negative impact not only on sea turtle populations but other fish species that depend on *Sargassum* habitat. Hence, this option could result in adverse effects if a large quantity of *Sargassum* is harvested resulting in reduced net economic benefits to society in the long-term. However, this would not have the impacts on the one firm harvesting *Sargassum* outlined under the Council's preferred action.

Social Impacts

No action would allow for the continued harvest of *Sargassum* and would likely have few social impacts on the harvesting and processing sectors. However, it is not known if allowing harvest of *Sargassum* would have attracted others to begin operations similar to that which presently exists. If harvesting were to increase substantially, the Council would likely have to address this increased effort. Also, the Council and NMFS may face legal actions for not meeting the mandate of the Magnuson-Stevens Act to protect essential fish habitat. The Council phased-out the harvest of live rock to protect that habitat. A similar action may have been prudent with regard to *Sargassum* had the Council chosen to allow no harvest. No action would have continued the impacts on recreational fishermen and other's concerned about *Sargassum* habitat.

Conclusion

Taking no action would have allowed the continued, unregulated harvest of pelagic *Sargassum* habitat which would have been a violation of the Council's habitat policy and against the intent of the Magnuson-Stevens Act mandate to address essential fish habitat. No action would have a large negative impact on threatened and endangered sea turtles and on the many fish species that depend on *Sargassum* habitat. This option would not have met the directive to identify, describe, and protect essential fish habitat, and would not have met the plan's objectives. Therefore, the Council rejected the no action option.

Rejected Option 2. Prohibit harvest and/or possession of pelagic *Sargassum* in the South Atlantic EEZ.

Biological Impacts

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, over 100 species of fishes, four species of sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column.

Pelagic *Sargassum* has been designated essential fish habitat as well as an essential fish habitat - habitat area of particular concern for both snapper grouper and coastal migratory pelagics species (SAFMC, 1998a,b). Pelagic *Sargassum* is designated essential fish habitat and essential fish habitat-habitat areas of particular concern for dolphin and wahoo. This action

would have prohibited existing and prevent expansion of harvest of this important pelagic habitat which serves as essential fish habitat and essential fish habitat - habitat area of particular concern for federally managed species.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles. This option would prevent any take of turtles and would prevent the bycatch of other species.

Economic Impacts

This action would have ended the harvesting activity of the one firm presently known to be involved in this fishery. The value of pelagic *Sargassum* harvested in 1997 is estimated at $36,000 based on 1,200 pounds dry weight at $30 per pound. The value of the finished product is unknown, but it is believed that substantial value is added to the liquefied finished product.

Mr. Campbell testified that it would not be possible to travel beyond 200 miles from shore to harvest *Sargassum* (Minutes of the SAFMC Council Meeting, March 9, 2000). The other option open to this firm is to purchase *Sargassum* substitutes from another source(s). This option would increase firm operating costs and thus reduce profitability.

Another outcome of this option would be for the firm to cease business operation. Mr. Campbell testified that the cost of alternative sources of algae would be too high. These substitute products would have to have been imported and the firm would not have been able to operate profitably in the long-term. No information is available on capital investment and operating costs of the firm, nor on the price of the substitute production inputs. Mr. Campbell also stated that it would not have been possible to harvest outside of the South Atlantic EEZ.

It is uncertain whether the vessel used to harvest *Sargassum* could have been employed in another fishery, as there are few open access fisheries in the South Atlantic region. The owner of this vessel could have purchased permits to enter the snapper grouper, wreckfish, or golden crab fisheries. Processing equipment would likely have remained idle, as there was no indication that the processing facility could be converted to another use without incurring significant expense.

Society derives benefit from the ecosystem services provided by *Sargassum* that translates into use value to sport fishing and commercial fishing sectors, non-consumptive use value, and non-use benefits (existence value). Without information on the incremental value to society that would result from this prohibition on harvest, it is not possible to determine whether this option would maximize benefits to society in the long-term.

Social Impacts

The outright prohibition of *Sargassum* presents a dilemma for the Council because both arguments, to disallow or allow the harvest, have some merit. The dilemma is not new to the management of natural resources and in fact has been debated many times before, especially

with regard to management of forestry resources. At issue are both the economic and social impacts of prohibiting the harvest of *Sargassum* and a new mandate to protect essential fish habitat. Harvest prohibition drew overwhelming support from the public during the comment periods.

However, the owner of the one firm involved in the harvesting and processing of *Sargassum* has informed the Council that prohibiting the harvest of *Sargassum* would have forced him of business, unless he could find a suitable substitute for *Sargassum*. Even if a substitute is found, the cost of replacement may have also posed a threat to the continuance of his business.

While the singular impact on this individual is great, the social impacts of prohibiting harvest are not determined to be as substantial. It is understood that Aqua-10 (the company in question) employs three persons on a full-time, year-round basis (the owner, his wife, and one other employee). Other local inhabitants are employed on an irregular, as-needed basis, supposedly for less than a few days at one time. The disappearance of this employment opportunity would have had minimal social impact, and would could have been expected to substitute other local employment opportunities. Furthermore, as far as can be determined, there is no historical culture of *Sargassum* harvesting, so no other social and cultural impacts due to the firm going out of business should occur.

There may be positive social impacts for groups of persons who consider themselves to be defined in some manner by their interest in environmental ethics. This benefit is less tangible and so, harder to measure than, for example, an increase in wages. However, the preservation of *Sargassum* is seen by this group as a good for society as a whole. There is a need for further research into the above-mentioned issues.

There would also have been positive impacts for those persons in the recreational sector who fish along the “windrows” of Sargassum for dolphin, wahoo, and billfish.

Conclusion

This action would have prohibited the current harvest of essential fish habitat as well as prevented expansion of harvest of this important pelagic habitat. *Sargassum* serves as an oasis in a media otherwise devoid of structure. While the present level of harvest may be small relative to the unknown biomass of pelagic *Sargassum* in the region, the Council viewed the total prohibition as a way of ensuring the fishery did not expand. Thus the removal of pelagic essential fish habitat would have ceased under this option.

The *Sargassum* community represents a highly evolved ecotype with organisms (e.g., *Sargassum* fish, *Sargassum* pipefish, *Sargassum* shrimp, and *Sargassum* crab) which have evolved cryptic coloration and feeding mechanisms to survive and thrive in this habitat. In addition, many organisms (e.g., bryozoans) live attached to the *Sargassum* and feed on phytoplankton in the water column and associated with the habitat. These species would be lost in any removal of this habitat. Recent research indicates the essential nature of the fish and other marine organisms using pelagic *Sargassum* provide the nutrients for growth of the algae. Therefore, the determination that all *Sargassum* is essential fish habitat as well as an essential fish habitat area of particular concern is further supported by this interrelationship between the inhabitants and the growth of *Sargassum*.

The Council rejected this option only because the NMFS disapproved prohibiting any harvest of pelagic *Sargassum* in their letter rejecting the original FMP: “NMFS finds insufficient justification in the Council’s selection of an optimum yield (OY) at zero harvest in the subject

FMP. NMFS disagrees with the Council's position that any removal of pelagic Sargassum represents a net loss of EFH and thus is contradictory to the goals and objectives of the Council's Comprehensive Habitat Plan for the South Atlantic Region or to the Magnuson-Stevens Act. NMFS believes that the designation of a particular habitat as EFH does not preclude continued use of that habitat, nor would this position be consistent with other designations of EFH and EFH-HAPC in the Council's Habitat Plan."

Rejected Option 3. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border. Cap harvest at 50,000 pounds wet weight (determined dockside after being off-loaded) in the area bounded by the latitude lines representing the North Carolina/Virginia border and the North Carolina/South Carolina border and the longitude line representing 100 miles seaward from the North Carolina shoreline until January 1, 2001 when all harvest will end. In addition, harvesters will be required to: (a) acquire a federal permit, (b) allow on board observers if requested, (c) maintain logbooks, (d) call into the NMFS Southeast Regional Law Enforcement Office when leaving and returning to port, and (e) require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger.

[Note: This option was considered in the original plan well prior to January 1, 2001. That date has passed but the option is included to present a full record of all options considered by the Council.]

It would have been the Council's intent to prohibit all harvest and possession of *Sargassum* in or from the South Atlantic EEZ.

For a person aboard a fishing vessel to fish for *Sargassum* in the portion of the exclusive economic zone (EEZ) defined above, possess *Sargassum* in or from the EEZ, off-load *Sargassum* from the EEZ, or sell *Sargassum* in or from the EEZ, a vessel permit for *Sargassum* must be issued to the vessel and be on board.

A fee would have been charged to cover the administrative costs of issuing federal vessel permits. Because all catches occur in the EEZ (*Sargassum* occurs within state waters but is not harvested in state waters), it is a rebuttable presumption that a vessel with *Sargassum* aboard harvested the *Sargassum* from the EEZ. Applications for permits must be made within 30 days after publication of the final rule in the Federal Register. Permits are to be implemented 90 days after implementation of the final rule. It is the Council's intent that the permit be issued for the period beginning 90 days after implementation of the final rule through December 31, 2000. Permits will become null and void when the 50,000 pound wet weight cap is landed.

The owner or operator of a vessel for which a permit for *Sargassum* has been issued must maintain a daily logbook form for each fishing trip on a form available from the NMFS Science and Research Director. Among other things, the logbook forms provide a record of fishing locations, time fished, fishing gear used, and numbers of each bycatch species discarded. The forms should also provide for the recording of economic data such as variable costs and prices paid. Logbook forms must be submitted to the NMFS Science and Research Director postmarked not later than the 7th day after landing of *Sargassum* from a trip. If no fishing occurred during a month, a report so stating must be submitted and postmarked not later than 7 days after the end of that month.

If selected, the owner or operator of a vessel must provide data and must comply with any requirements regarding landing *Sargassum* and any associated bycatch. Continued data collection is necessary to further our understanding of *Sargassum*. Also, if selected, the owner or operator of a vessel must make their catch available for biological sampling and if required, must carry an observer.

Biological Impacts

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of sea turtles, and numerous marine birds. Pelagic *Sargassum* contributes a small fraction to total primary production in the North Atlantic, however, within the oligotrophic (low nutrient) waters of the Sargasso Sea, it may constitute as much as 60% of total production in the upper meter of the water column.

Pelagic *Sargassum* has been designated essential fish habitat (EFH) as well as an essential fish habitat - habitat area of particular concern (EFH-HAPC) for both snapper grouper and coastal migratory pelagics species (SAFMC, 1998a, b). Pelagic *Sargassum* will be designated essential fish habitat and essential fish habitat-habitat areas of particular concern for dolphin and wahoo. This action would phase-out harvest off North Carolina and prevent expansion of harvest of this important pelagic habitat which serves as essential fish habitat and essential fish habitat - habitat area of particular concern for federally managed species.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of individuals of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles. This option would result in a take of less than 15 turtles. NMFS also concluded that implementation of actions to minimize impacts on *Sargassum* habitat would be consistent with the ESA by conserving significant habitat for sea turtles and reducing the take of sea turtle hatchlings that could occur during *Sargassum* harvesting efforts.

Currently there is only one vessel in the fishery. Requiring a permit would have allowed the Council to determine if any additional vessels intend to operate which will improve our understanding of the fishery. The current operator in the fishery has been very cooperative in providing data. The data reporting requirements will provide continued data collection which is necessary to improve our understanding of the fishery.

The 4-inch mesh size would have allowed more of the incidental species (juvenile fish and threatened/endangered sea turtles) to escape which will reduce bycatch. The call-in requirement would have improved enforcement and prevented the 50,000 pound wet weight cap from being exceeded which would have provided positive biological impacts.

Economic Impacts

The owner of Aqua-10 recommended that the Council allow a harvest of 50,000 pounds wet weight annually, which could be augmented by purchasing additional raw material from other countries. This level of harvest would have allowed the firm to operate profitably (Summary of Minutes South Atlantic Fishery Management Council Meeting, March 9, 2000; page 56). During 1995 to 1997, *Sargassum* harvest did not exceed 20,000 pounds wet weight annually (Table 7).

Since the *Sargassum* Plan did not go into effect January, 2001, the impact of this option would be the same as Rejected Option 2 (immediate prohibition on harvest).

Social Impacts

While this option appeared more lenient for the harvesting firm in question, allowing a temporary continuance of harvesting until the beginning of 2001, the end result would have been the same: Aqua-10 would have gone out of business.

However, while the singular impact on this individual would have been great, the social impacts of the eventual prohibition of harvest were not determined to be as substantial. It is understood that Aqua-10 (the company in question) employs three persons on a fulltime, year-round basis (the owner, his wife, and one other employee). Other local inhabitants are employed on an irregular, as-needed basis, supposedly for less than a few days at one time. Thus the social impacts of not having such an employment opportunity exist would have been very minimal, and workers could reasonably have been expected to be able to substitute other employment opportunities that exist in the immediate area.

Furthermore, as far as can be determined, there is no historical culture of *Sargassum* harvesting, so no other social and cultural impacts due to the firm going out of business would have occurred.

There may have been positive social impacts for groups of persons who consider themselves to be defined in some manner by their interest in environmental ethics. This benefit is less tangible and so, harder to measure than, for example, an increase in wages. However, the preservation of *Sargassum* is seen by this group as a good for society as a whole. There is a need for further research into the above-mentioned issues.

Conclusion

This action would have immediately prohibited harvest of *Sargassum* (essential fish habitat) south of the North Carolina/South Carolina border and prohibited harvest off North Carolina effective January 1, 2001. The Council would have been taking this action to prevent the direct removal of this habitat. *Sargassum* serves as an oasis in a media otherwise devoid of structure. While the present level of harvest may be small relative to the unknown biomass of pelagic *Sargassum* in the region, the Council viewed the total prohibition as a way of ensuring the fishery did not expand. Thus the removal of pelagic essential fish habitat would have ceased after the phase-out off North Carolina.

The *Sargassum* community represents a highly evolved ecotype with organisms (e.g., *Sargassum* fish, *Sargassum* pipefish, *Sargassum* shrimp, and *Sargassum* crab) which have evolved cryptic coloration and feeding mechanisms to survive and thrive in this habitat. In addition, many organisms (e.g., bryozoans) live attached to the *Sargassum* and feed on phytoplankton in the water column and associated with the habitat. These species would have been lost in any removal of this habitat. Recent research indicates the essential nature of the fish and other marine organisms using pelagic *Sargassum* in providing the nutrients for growth of the

algae. Therefore, the determination that all *Sargassum* is essential fish habitat, as well as an essential fish habitat-habitat area of particular concern, is further supported by this interrelationship between the inhabitants and the growth of *Sargassum*.

The Council concluded the removal of pelagic *Sargassum* habitat constitutes a net loss of essential fish habitat in the South Atlantic region. Also, the Council concluded that the harvest of pelagic *Sargassum* is a violation of Council, NMFS, and NOAA habitat policies. The harvest of *Sargassum* is contradictory to the goals and objectives of the Habitat Plan (SAFMC, 1998a), the Habitat Comprehensive Amendment (SAFMC, 1998b), and the Pelagic *Sargassum* Habitat Plan (SAFMC, 1998d and 2000). An experimental fishing provision was considered but dropped because the Council determined this activity constituted a violation of Council habitat policy and goes against the intent of the Magnuson-Stevens Act mandate to address essential fish habitat. This action would not have met the directive to identify, describe, and protect essential fish habitat. An acceleration and/or continuation of harvest could have degraded the quality of habitat.

Apart from increases in the non-consumptive values discussed below, the Council concluded prohibition of harvest would have been likely to increase productivity of marine life in the ecosystem. In particular, dolphin-fish and turtles would have been protected from any potential negative impacts and could have resulted in increased abundance depending on additional measures implemented.

The Council recognized the impact of $61,000 annually based on value of dry product. Further that this action may have resulted in the affected business ceasing operation sometime after January 1, 2001. However, the Council concluded maintaining the integrity of the non-consumptive values and the value to other species as habitat would have greatly outweighed the costs resulting from prohibiting harvest. Like any natural resource, *Sargassum* commands what has been termed non-use values; specifically existence value, bequest value, and option value. Existence value refers to the satisfaction individuals derive from the knowledge that a natural resource exists and will continue to exist in the future even though they may never use or see the resource. Bequest value is the benefit associated with endowing a natural resource to future generations. Option value refers to the benefit individuals obtain from retaining the option to use the resource in the future by conserving it now. These values are undoubtedly difficult to measure, but measurement has been done in a few instances (e.g., Amazonian rainforest and Australian Great Barrier Reef).

In terms of non-consumptive uses, the Council concluded prohibiting harvest would have reduced further loss of essential fish habitat; increased the possibility of enhancing ecosystem function and marine productivity; and increased existence, bequest, and option values. After implementation, all the direct benefits would have gone to the non-consumptive users. The other values, existence, bequest, and option were likely to have increased at a faster rate. There is no direct method to estimate these benefits. Indirect benefits will accrue to consumptive users to the extent productivity of harvested species (e.g., dolphin-fish) are increased.

The Council weighed all benefits and costs and concluded prohibiting harvest of pelagic *Sargassum* in the South Atlantic EEZ best meets the objectives of the plan, requirements of Magnuson-Stevens related to habitat, and results in net benefits to society. A prohibition was necessary to maintain the integrity of the Council's protection of essential fish habitat and essential fish habitat-habitat areas of particular concern. The Council chose to balance the economic impacts on the one business operating off North Carolina by establishing a 50,000 pound wet weight cap on harvest until January 1, 2001 when all harvest and possession would have been prohibited. The Council specified 50,000 pounds as the total cap because this

represents the largest quantity harvested annually with the exception of the 200,000 pounds in 1990 when the intent was to stockpile product (Table 7). The Council concluded this phase-out would have provided an opportunity for the business to pursue other sources (e.g., culture) and/or products thereby moderating the short-term negative impacts. In addition, 50,000 pounds represented more than the quantity harvested in 1995, 1996, 1997 and 1998 (zero harvested in 1998). The phase-out should have allowed the business to operate at least four years after the prohibition based on past harvest and processing rates.

The Council chose to modify this option because the NMFS disapproved this action in their letter rejecting the original FMP: "NMFS finds insufficient justification in the Council's selection of an optimum yield (OY) at zero harvest in the subject FMP. NMFS disagrees with the Council's position that any removal of pelagic Sargassum represents a net loss of EFH and thus is contradictory to the goals and objectives of the Council's Comprehensive Habitat Plan for the South Atlantic Region or to the Magnuson-Stevens Act. NMFS believes that the designation of a particular habitat as EFH does not preclude continued use of that habitat, nor would this position be consistent with other designations of EFH and EFH-HAPC in the Council's Habitat Plan."

Rejected Option 4. Establish a TAC of 20,000 pounds wet weight per year.

Biological Impacts

Harvest has only occurred off of North Carolina and there have been no landings since 1997 when 12,000 pounds wet weight was landed. The one company engaged in *Sargassum* harvest projected its operation would expand to result in landings as great as 500,000 pounds (226.8 metric tons) wet weight annually between 1999 and 2005 (SAFMC, 2001); however, this has not materialized thus far. This option would provide for harvest up to 20,000 pounds wet weight per year. This option would not approach MFMT.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of individuals of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles. This option would result in a take of less than 15 turtles. NMFS also concluded that implementation of actions to minimize impacts on *Sargassum* habitat would be consistent with the ESA by conserving significant habitat for sea turtles and reducing the take of sea turtle hatchlings that could occur during *Sargassum* harvesting efforts.

There would be few indirect effects on the *Sargassum* resource itself from the establishment of TAC. There would be unquantifiable indirect benefits to other fishery resources that use *Sargassum* during some stage of their life-cycle, such as dolphin or billfish, and to the fisheries that target these resources. Maintaining sustainable quantities of *Sargassum* would support survival of protected resources known to use this habitat for protection and foraging during their early developmental stages.

The harvest restrictions would control the manner in which the fishery is prosecuted, but fishing activity restrictions would have little direct biological effect on the *Sargassum* resource itself.

Economic Impacts

This option would allow harvest at the maximum level reported over the three most recent harvest years (Table 7). The one firm harvesting *Sargassum* would like to harvest 50,000 pounds annually in order to increase future revenue. This option would put some constraint on this planned expansion but would not curtail current activities since the average production in recent years is estimated at 14,333 pounds per year; however, no harvest has occurred since 1997 (Table 7). This level of *Sargassum* harvest would result in the loss of 13 turtles (12 loggerheads and 1 other) annually.

Other than the impact on sea turtles, there is little data on the ecosystem services (that is, indirect benefits to other user groups) that pelagic *Sargassum* provides. Also, at this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests.

Social Impacts

It is not possible to determine the indirect effects of the elimination of the processed pelagic *Sargassum* on the production or markets for plant and yield stimulants, fertilizer concentrate, and animal feed supplements that utilize processed pelagic *Sargassum* since information on alternative sources of product (pelagic *Sargassum* substitute) is unavailable. Public sentiment has been overwhelmingly in favor of a total prohibition of harvest. Thus, a total prohibition may generate the greatest positive public behavior. Some public comment has argued, however, that some level of directed harvest is justified, given the magnitude of the resource and its ability to replenish itself. It is not possible to determine which of the options that allow continued harvest would be most acceptable, though TAC greater than 20,000 pounds would be sufficiently large to suggest it would be an unacceptable compromise to those wishing total harvest prohibition.

Conclusion

Establishment of an appropriate TAC is consistent with National Standard 1 of the Magnuson-Stevens Act to prevent overfishing. Selection of an appropriate TAC would also ensure the adequate protection and conservation of *Sargassum* habitat. The Council rejected this option in favor of the preferred action because of the greater conservation provided to protected species and *Sargassum* as EFH.

Rejected Option 5. Establish a TAC of 100,000 metric tons wet weight per year.

Biological Impacts

Harvest has only occurred off of North Carolina and there have been no landings since 1997 when 12,000 pounds wet weight was landed. The one company engaged in *Sargassum* harvest projected its operation would expand to result in landings as great as 500,000 pounds (226.8 metric tons) wet weight annually between 1999 and 2005 (SAFMC, 2001); however, this has not materialized thus far. This option would provide for harvest up to 100,000 metric tons wet weight per year which would equal MSY. This option may exceed the MFMT.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of individuals of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles. A TAC of 100,000 metric tons would have a possible incidental take of approximately 136,685 turtles based on an expansion from 31 turtles taken under a harvest of 50,000 pounds. NMFS also concluded that implementation of actions to minimize impacts on *Sargassum* habitat would be consistent with the ESA by conserving significant habitat for sea turtles and reducing the take of sea turtle hatchlings that could occur during *Sargassum* harvesting efforts.

There would be few indirect effects on the *Sargassum* resource itself from the establishment of TAC. There would be unquantifiable indirect benefits to other fishery resources that use *Sargassum* during some stage of their life-cycle, such as dolphin or billfish, and to the fisheries that target these resources. Maintaining sustainable quantities of *Sargassum* would support survival of protected resources known to use this habitat for protection and foraging during their early developmental stages.

The harvest restrictions would control the manner in which the fishery is prosecuted, but fishing activity restrictions would have little direct biological effect on the *Sargassum* resource itself.

Economic Impacts

The one firm harvesting *Sargassum* would like to harvest 50,000 pounds annually in order to increase future revenue. This option would allow the firm to expand operations beyond current capacity and possibly allow other firms to harvest *Sargassum*.

Other than the very large impact on sea turtles, there is little data on the ecosystem services (that is, indirect benefits to other user groups) that pelagic *Sargassum* provides. However, at this level of harvest it is expected that there would be some negative effects on species that depend on *Sargassum* as essential fish habitat. Some of the finfish species are economically important to recreational and commercial fisheries. In addition, other sectors of society place economic value on the existence of these species and also derive benefit from noncomsumptive use of these fisheries. There is little information on these non-use and non-consumptive use values. Thus, at this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests.

Social Impacts

It is not possible to determine the indirect effects of the elimination of the processed pelagic *Sargassum* on the production or markets for plant and yield stimulants, fertilizer concentrate, and animal feed supplements that utilize processed pelagic *Sargassum* since information on alternative sources of product (pelagic *Sargassum* substitute) is unavailable. Public sentiment has been overwhelmingly in favor of a total prohibition of harvest. Thus, a

total prohibition may generate the greatest positive public behavior. Some public comment has argued, however, that some level of directed harvest is justified, given the magnitude of the resource and its ability to replenish itself. It is not possible to determine which of the options that allow continued harvest would be most acceptable, though TAC greater than 20,000 pounds would be sufficiently large to suggest it would be an unacceptable compromise to those wishing total harvest prohibition.

Conclusion

Establishment of an appropriate TAC is consistent with National Standard 1 of the Magnuson-Stevens Act to prevent overfishing. Selection of an appropriate TAC would also ensure the adequate protection and conservation of *Sargassum* habitat. The Council rejected this option in favor of the preferred action because of the greater conservation provided to protected species and *Sargassum* as EFH.

Rejected Option 6. Establish a TAC of 200,000 pounds wet weight per year.

Biological Impacts

Harvest has only occurred off of North Carolina and there have been no landings since 1997 when 12,000 pounds wet weight was landed. The one company engaged in *Sargassum* harvest projected its operation would expand to result in landings as great as 500,000 pounds (226.8 metric tons) wet weight annually between 1999 and 2005 (SAFMC, 2001); however, this has not materialized thus far. This option would provide for harvest up to 200,000 pounds wet weight per year. This option would not approach MFMT.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, green) as post-hatching developmental and foraging habitat. The presence of post-hatchling turtles, especially loggerhead turtles, in *Sargassum* has been documented repeatedly (Carr and Meylan 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a Biological Opinion (BO), dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that the harvest of *pelagic Sargassum* was likely to adversely affect threatened and endangered sea turtles. The incidental take of individuals of sea turtles, particularly, loggerhead post-hatchlings was anticipated. The BO calculated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles. A TAC of 200,000 pounds would have a possible incidental take of approximately 124 turtles based on an expansion from 31 turtles taken under a harvest of 50,000 pounds. NMFS also concluded that implementation of actions to minimize impacts on *Sargassum* habitat would be consistent with the ESA by conserving significant habitat for sea turtles and reducing the take of sea turtle hatchlings that could occur during *Sargassum* harvesting efforts.

There would be few indirect effects on the *Sargassum* resource itself from the establishment of TAC. There would be unquantifiable indirect benefits to other fishery resources that use *Sargassum* during some stage of their life-cycle, such as dolphin or billfish, and to the fisheries that target these resources. Maintaining sustainable quantities of *Sargassum* would support survival of protected resources known to use this habitat for protection and foraging during their early developmental stages.

The harvest restrictions would control the manner in which the fishery is prosecuted, but fishing activity restrictions would have little direct biological effect on the *Sargassum* resource itself.

Economic Impacts

This TAC would accommodate the highest level of annual *Sargassum* harvest observed in the South Atlantic Council's area of jurisdiction (Table 7). The one firm harvesting *Sargassum* would like to harvest 50,000 pounds annually in order to increase future revenue. This option would allow the firm to expand operations beyond current capacity and possibly allow other firms to harvest *Sargassum*. It is expected that the maximum revenue earned from this option would be $600,000 (value of the dried product) annually.

Other than the large impact on sea turtles, there is little data on the ecosystem services (that is, indirect benefits to other user groups) that pelagic *Sargassum* provides. However, at this level of harvest it is expected that there would be some negative effects on species that depend on *Sargassum* as essential fish habitat. Some of the finfish species are economically important to recreational and commercial fisheries. In addition, other sectors of society place economic value on the existence of these species and also derive benefit from noncomsumptive use of these fisheries. There is little information on these non-use and non-consumptive use values. Thus, at this time, it is not possible to estimate the forgone use and non-use benefits from allowing this level of harvest, nor the long-term benefits from preventing higher future harvests.

Social Impacts

It is not possible to determine the indirect effects of the elimination of the processed pelagic *Sargassum* on the production or markets for plant and yield stimulants, fertilizer concentrate, and animal feed supplements that utilize processed pelagic *Sargassum* since information on alternative sources of product (pelagic *Sargassum* substitute) is unavailable. Public sentiment has been overwhelmingly in favor of a total prohibition of harvest. Thus, a total prohibition may generate the greatest positive public behavior. Some public comment has argued, however, that some level of directed harvest is justified, given the magnitude of the resource and its ability to replenish itself. It is not possible to determine which of the options that allow continued harvest would be most acceptable, though TAC greater than 20,000 pounds would be sufficiently large to suggest it would be an unacceptable compromise to those wishing total harvest prohibition.

Conclusion

Establishment of an appropriate TAC is consistent with National Standard 1 of the Magnuson-Stevens Act to prevent overfishing. Selection of an appropriate TAC would also ensure the adequate protection and conservation of *Sargassum* habitat. The Council rejected this option in favor of the preferred action because of the greater conservation provided to protected species and *Sargassum* as EFH.

Rejected Option 7. Modify the Council's preferred option by dropping the gear restriction, moving harvest 150 miles offshore, and allowing harvest between November to April.

Note: The discussion under the Council's preferred action includes analyses of the additional measures.

Biological Impacts

Harvest has only occurred off of North Carolina and there have been no landings since 1997 when 12,000 pounds wet weight was landed. The one company engaged in *Sargassum* harvest projected its operation would expand to result in landings as great as 500,000 pounds (226.8 metric tons) wet weight annually between 1999 and 2005 (SAFMC, 2001); however, this has not materialized thus far. This option would provide for harvest up to 5,000 pounds wet weight per year (same as preferred) but would move harvest 50 additional miles offshore and would not allow harvest during May and June. This option would not approach MFMT. There may be additional biological benefits from pushing harvest farther offshore.

The harvest restrictions will control the manner in which the fishery is prosecuted, but fishing activity restrictions will have little direct biological effect on the *Sargassum* resource itself.

Economic Impacts

Fishing activity was reported to have been concentrated in the Sargasso Sea during 1996 and 1997. Harvesting took place about 160 miles offshore of the North Carolina coast, at the edge of the continental shelf in 1,000 fathoms of water. This information was obtained through personal communication with Mr. William Campbell of Aqua-10 Laboratories (August 6, 1998). Thus, the restriction on harvesting beyond 150 miles offshore would not have an impact on the cost of harvesting *Sargassum*. The common practice in this fishery is to use gear constructed of 4 inch stretched mesh. Thus, dropping the gear restriction would not have an immediate effect on harvesting costs for *Sargassum*. If the firm were to switch to smaller mesh in the future there would be lower escapement rates for species associated with *Sargassum*, and a higher loss of ecosystem services per pound of harvested seaweed. Pelagic *Sargassum* has been harvested using different gear configurations, and at least one configuration would accommodate the preferred net size specifications.

There are no data on the value of ecosystem services pelagic *Sargassum* produces. Thus, there is no information on the indirect benefits to these other resources or user groups that would be lost from harvesting any quantity of pelagic *Sargassum* annually. Therefore, with the exception of reducing sea turtle mortality, there is no demonstration of compensating benefits that offset the costs associated with reducing harvests from historical levels, causing the single harvesting company to cease operation, or the costs associated with precluded expanded harvest.

Social Impacts

It is not possible to determine the indirect effects of the additional two month elimination of the processed pelagic *Sargassum* on the production or markets for plant and yield stimulants, fertilizer concentrate, and animal feed supplements that utilize processed pelagic *Sargassum* since information on alternative sources of product (pelagic *Sargassum* substitute) is unavailable. Public sentiment has been overwhelmingly in favor of a total prohibition of harvest. Thus, a total prohibition may generate the greatest positive public behavior. Some public comment has argued, however, that some level of directed harvest is justified, given the magnitude of the resource and its ability to replenish itself. It is not possible to determine which of the options that allow continued harvest would be most acceptable.

Conclusion

Establishment of an appropriate TAC is consistent with National Standard 1 of the Magnuson-Stevens Act to prevent overfishing. Selection of an appropriate TAC would also ensure the adequate protection and conservation of *Sargassum* habitat. However, the Council concluded the additional two month prohibition on harvest and moving harvest another 50 miles offshore are unnecessary given the level of protection provided by the Council's preferred action. The additional 50 miles offshore would raise vessel safety concerns. This option would also drop the gear restrictions which would reduce the level of biological protection.

The Council rejected this option in favor of the preferred action because of the conservation provided to protected species and *Sargassum* as EFH, and because of increased vessel safety.

4.3 Unavoidable Adverse Effects

The following summarizes the short-term losses which will be mitigated by long-term gains with the effective protection of essential fish habitat and essential fish habitat-habitat areas of particular concern (see Table 1 and the discussion under each action item for more details):

Action 1. Establish a Management Unit for pelagic *Sargassum* throughout the South Atlantic EEZ and state waters. There is no impact on the firm harvesting pelagic *Sargassum*. However, other actions could impact the activity of this firm.

Action 2. Maximum Sustainable Yield (MSY) for South Atlantic pelagic *Sargassum* is estimated to be 100,000 metric tons (220,460,000 pounds) wet weight per year. There is no impact on the firm harvesting pelagic *Sargassum*. However, other actions could impact the activity of this firm.

Action 3. Specify Optimum Yield (OY) for pelagic *Sargassum* as 5,000 pounds wet weight per year. There is no direct economic impact. However, this measure would imply a more restrictive total allowable harvest level.

Action 4. Specify Overfishing Level to meet Magnuson-Stevens Mandate for pelagic *Sargassum*. Overfishing is defined as the rate of harvest which compromises the stock's ability to produce MSY. There is no impact on the firm harvesting pelagic *Sargassum*. However, other actions could impact the activity of this firm.

Action 5. Identify Essential Fish Habitat (EFH) for pelagic *Sargassum*. There should be no impact on the fishery. However, future actions resulting from proposed Action 5 could have impacts on the fishery and protect habitat.

Action 6. Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for pelagic *Sargassum*. There should be no impact on the fishery. However, future actions resulting from proposed Action 6 could have impacts on the fishery and protect habitat within EFH-HAPCs.

Action 7. 7A. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).

7B. Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.

7C. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.

7D. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.

7E. Require that an official observer be present on each *Sargassum* harvesting trip.

7F. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

Action 7 would reduce net revenue to the firm harvesting and processing *Sargassum*, and in the extreme case, this firm could go out of business.

4.4 Relationship of Short-term and Long-term Productivity

The measures proposed are necessary to protect essential fish habitat (EFH) and essential fish habitat-habitat areas of particular concerns (EFH-HAPC's). However, proposed Action 7, if implemented, will prohibit the harvest of pelagic *Sargassum* off South Carolina, Georgia, and the Florida East Coast, and severely limit harvest off North Carolina. This proposed action could force the one firm in the fishery to go out of business. Given the nature of pelagic *Sargassum* habitat, the limited knowledge of the life cycle, abundance, regeneration capacity, etc. it cannot be determined quantitatively whether this TAC will result in higher net economic benefits to society in the long-term. The Council reviewed the best available information and based on a qualitative evaluation, concluded that this level of harvest will result in higher net economic benefits to society in the long-term.

4.5 Irreversible and Irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of resources associated with the proposed actions. If the Council does not take action to establish a fishery management plan for pelagic *Sargassum* and regulate the impact of fishing activities on this EFH and EFH-HAPC's there may be loss of this essential pelagic habitat and reduction in yields of other managed species dependent on this habitat.

4.6 Effects of the Fishery on the Environment

4.6.1 Damage to Ocean and Coastal Habitat

The proposed actions, and their alternatives, are not expected to have any adverse effect on the ocean and coastal habitats. Habitat concerns from the continued harvest are discussed under Action . The Council concluded the pelagic *Sargassum* fishery, as presently prosecuted, does substantially impact the pelagic *Sargassum* habitat that is essential to a number of species under Council management. The Council has proposed the regulations contained in this plan to mitigate and minimize damage to pelagic *Sargassum* habitat essential to other species under management.

4.6.2 Physical Environment

The proposed actions in this plan will have a positive impact on the physical environment by limiting continued removal of pelagic *Sargassum* habitat. In considering *Sargassum* as habitat, and thus as "physical" environment for its associated faunal community, the proposed actions would provide indirect benefit to the physical environment by limiting/managing continued removal of pelagic *Sargassum* habitat.

Unique Geographic Areas

The proposed actions would have no effect on any park lands, prime farmlands, wetlands, or wild and scenic rivers because those resources are onshore or nearshore, not in state waters or the EEZ. The proposed actions would have an effect on ecologically critical areas as discussed in the section addressing endangered species and marine mammals.

Significant Historical Resources

The area affected by the proposed actions would encompass identified scientific, cultural, and historic resources, such as the Monitor National Marine Sanctuary, but would have no effect on these resources, as all proposed actions would address the pelagic ocean environment and not the benthic environment where these resources are found.

The proposed action to implement harvesting restrictions would effect other designated Marine Sanctuaries, such as Gray's Reef and the Florida Keys, by prohibiting the removal of *Sargassum* from the surface waters, which provides habitat for use by the associated epipelagic faunal community, including managed finfish species and threatened and endangered sea turtles.

EFH and EFH-HAPC

Sargassum and the marine water column have been designated as EFH and EFH-HAPC for managed finfish species, and as such, would be considered ecologically important habitat. *Sargassum* is also known to provide habitat for young threatened and endangered sea turtles that use the habitat for protection and forage. The proposed actions would protect and conserve this habitat, and thus, would be beneficial.

4.6.3 Effects on Wetlands

The proposed plan will have no effect on any flood plains, wetlands, trails, or rivers.

4.6.4 Fishery Resource

The proposed actions are intended to protect pelagic *Sargassum* habitat which serves as essential fish habitat (EFH) and essential fish habitat-habitat area of particular concern (EFH-HAPC) for other species under Council management.

4.6.5 Human Environment

The one firm harvesting pelagic *Sargassum* may be forced out of business unless an alternative source can be located (see Section 4.2.8). The Council concluded the long-term benefits are expected to exceed the short-term loss.

4.6.6 Public Health and Safety

The proposed actions, and their alternatives, are not expected to have any substantial adverse impact on public health or safety. The proposed harvesting restrictions would require the one known firm to have a vessel capable of reaching the designated fishing grounds offshore

of North Carolina. The current vessel identified to be in use by this firm would not meet those requirements; this does not preclude the firm from upgrading the safety specifications of the current vessel or acquiring a new vessel.

4.6.7 Endangered Species and Marine Mammals

The proposed actions, and their alternatives, are not expected to affect adversely any endangered or threatened species or marine mammal population. Prohibiting harvest and possession of pelagic *Sargassum* off South Carolina, Georgia, and the Florida East Coast and severely limiting harvest and possession off North Carolina will reduce any interaction with turtles.

Sargassum in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, and green) as post-hatching developmental and foraging habitat, particularly for the loggerhead turtle. The presence of post-hatchling turtles in *Sargassum* has been documented repeatedly (Carr and Meylan, 1980; Richardson and McGillivary, 1991; Witherington, 1994, 1998). A formal ESA Section 7 consultation resulting in a BO, dated June 21, 1999, was conducted for the original FMP submitted by the Council. In that BO, NMFS concluded that implementation of actions to minimize impacts on *Sargassum* habitat would be consistent with the ESA by conserving significant habitat for seas turtles and reducing the take of sea turtle hatchlings that could occur during *Sargassum* harvesting efforts.

Six species of listed whales (humpback, right, sperm, blue, fin, and sei) are known to occur in the action area. Reported interactions of these species with fisheries in the deeper waters of the Atlantic Ocean are rare. Detailed information on the biology and distribution of these whales documented in the ESA Section 7 Biological Opinion is incorporated by reference and summarized here. Blue and sei whales sightings are uncommon in the southern U.S. EEZ. Humpback, sperm, and fin whales migrate seasonally through the action area, moving north in the summer to feeding grounds and south in the winter to mating and calving grounds. Most appear to only transit the action area, however a significant number of humpbacks, are observed in mid- and high-latitude regions in the winter (Swingle et al., 1993). Based on sighting and stranding information, it appears that young humpbacks in particular have increased in occurrence along the coasts of Virginia and North Carolina during the winter (Wiley et al., 1995). Right whales also use mid-Atlantic waters as a migratory pathway between their summer feeding grounds and winter calving grounds. During the winter, a segment of the population, consisting mainly of pregnant females, migrates southward to calving grounds off the coastal waters of the southeastern United States. Located off the coasts of southern Georgia and northern Florida, a right whale critical habitat was designated by NMFS on June 3, 1994 (59 FR 28793). It is considered highly unlikely that interactions will occur between these whales and the pelagic *Sargassum* fishery in the defined action area. Therefore, NMFS has determined that these listed whale species are not likely to be adversely affected by the action and will not be discussed further.

4.6.8 Bycatch

Implementation of regulations proposed in this plan will eliminate the problem identified as removing pelagic *Sargassum* with all associated organisms immediately south of the North Carolina/South Carolina border and reduce the problem off North Carolina. The 4-inch mesh requirement will reduce bycatch during harvest off North Carolina (post hatchling sea turtles using *Sargassum* habitat will generally pass through 4-inch mesh). Fishes collected or observed in association with pelagic *Sargassum* are shown in Table 4.

The density, diversity, and abundance of fauna associated with *Sargassum* diminishes with distance from shore and in colder weather; the proposed harvesting restrictions would allow fishing only in these more faunally-depauperate areas, thus reducing the impact on the fauna associated with the habitat. Furthermore, the alternative of addressing minimum mesh requirement would allow organisms to escape during fishing efforts.

The Council's preferred action requires 100% observer coverage. The bycatch sampling methodology will follow the methods of Settle (1993). Estimates of all species captured are to be provided in an annual SAFE report to be prepared by NMFS. The SAFE Report is to be provided to the Council by June 1st of each year and should cover the preceding calendar year.

4.6.9 Cumulative Effects

The proposed actions, and their alternatives, are not expected to result in cumulative adverse effects that could have a substantial effect on pelagic *Sargassum* or any related stocks, including endangered and threatened species, such as turtles. In fact, the proposed measures will protect essential fish habitat and essential fish habitat-habitat areas of particular concern of federally managed species including threatened and endangered sea turtles. See Section 3.4 and 4.3 of the Habitat Plan (SAFMC, 1998a).

4.7 Public and Private Costs

Preparation, implementation, enforcement, and monitoring of this and any federal action involves expenditure of public and private resources which can be expressed as costs associated with the regulation. Costs associated with the development of the fishery management plan for pelagic *Sargassum* habitat include:

Council costs of document preparation, meetings, scoping meetings, workshops, public hearings, and information dissemination	$100,000
NMFS administrative costs of document preparation, meetings and review	$20,000
NMFS law enforcement and monitoring costs	$(?)
Total	$120,000+

4.8 Effects on Small Businesses: Initial Regulatory Flexibility Analysis

The Regulatory Flexibility Act requires an assessment of the economic impacts of proposed actions on small entities. It provides for certifying that a proposed rule would not have a significant economic impact on a substantial number of small entities if the factual basis for the certification is provided. If a certification cannot be made, an initial regulatory flexibility analysis (IRFA) must be prepared. The IRFA, using information from the analysis of the economic impacts of the various alternatives contained in the document should demonstrate that:

- Reasonable alternatives from among which to select a proposal are identified.
- The proposal selected reflects a wise choice from among reasonable alternatives.
- Managers have fair warning whether their proposal will generate loud complaint.
- The proposal competes well against other social goals, regardless of legislative mandates, in light of other administration priorities.
- The proposal will move rapidly through the regulatory process at OMB and SBA's Office of Advocacy.
- The proposal is likely to withstand legal challenge.

The definition of a "small entity" is taken from Part 121 of Title 13, Code of Federal Regulation (CFR), which classifies businesses by SIC code as small or large. The established size standards are as follows:

- Any fish harvesting business is a small entity if it is independently owned and operated and not dominant in its field of operation and if it has annual gross receipts not in excess of $3.5 million.

There is one firm commercially harvesting *Sargassum* and therefore affected by the proposed management actions. This firm will qualify as a small business entity because its gross revenues are less than $3.5 million annually. Hence, it is clear that the criterion of a substantial number of the small business entities comprising the *Sargassum* harvesting industry being affected by the proposed rule will be met. Evaluation of whether a proposed rule will result in a "significant impact" is less clear. Recent guidelines provided by the National Marine Fisheries Service recommend that the criteria of profitability and disproportionality be used in this determination (NMFS, 2000):

1. Disproportionality. A comparison must be made of the effect of the proposed rule on small and large entities.
2. Profitability. The analysis should focus on the short and medium-term effect on profits of small entities.

Disproportionality

There is only one firm that will be affected by these proposed actions and thus the issue of disproportionality is not relevant.

Profitability

Under the Council's plan the following actions would not have an impact on the firm harvesting *Sargassum*:

Action 1: Setting a Management Unit
Action 2: Set MSY for South Atlantic Pelagic *Sargassum*
Action 3: Specify Optimum Yield (OY) for pelagic *Sargassum*
Action 4: Specify Overfishing Levels
Action 5: Identify Essential Fish Habitat.
Action 6: Establish Essential Fish Habitat-Habitat Areas of Particular Concern.

Only the measure that directly restricts harvest of *Sargassum* would affect the profitability of Aqua 10 Labs. Action 7A. Prohibit all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude). Action 7B. Prohibit all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border. Action 7C. Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June. Action 7D. Establish an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight. Action 7E. Require that an official observer be present on each *Sargassum* harvesting trip. Action 7F. Require that nets used to harvest *Sargassum* be constructed of four inch stretched mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

A detailed analysis of the impacts of this measure is contained in Section 4.2 of the *Sargassum* plan. The firm currently harvesting Sargassum would not be affected by the prohibition on harvest outside of North Carolina (Action 7A) and the prohibition within 100 miles from shore (Action 7B) since harvest has only been recorded off North Carolina waters outside of 150 miles from shore. The seasonal restriction on harvest from November through June (Action 7C) is not expected to have an impact on the firm harvesting Sargassum and was stipulated to protect endangered sea turtles as outlined in the Biological Opinion dated June 21, 1999. The requirements for an official observer (Action 7E) and the gear restrictions (Action 6F) could result in some small increases in cost of harvesting *Sargassum*.

The most significant effect on the firm will result from the harvest restriction of 5,000 pounds wet weight annually. The owner of Aqua-10 recommended that the Council allow a harvest of 50,000 pounds wet weight annually, which would allow the company to expand operations and operate at full capacity. There has been no documented harvest of *Sargassum* since 1997. During the last three years during which there were recorded landings (1995-1997) this company harvested an average of 11,443 pounds of *Sargassum*, and in any one year harvest did not exceed 20,000 pounds wet weight. A restriction on harvest could result in any one of the following outcomes:

1. The firm stops harvesting *Sargassum* and obtains substitute inputs from another source(s).
2. The firm harvests 5,000 pounds of *Sargassum* annually within the South Atlantic EEZ beyond 100 miles from shore in North Carolina during June to November, and harvests the remainder outside of the EEZ in the South Atlantic region.
3. The firm could cease business operations.

The value of pelagic *Sargassum* harvested in 1997 is estimated at $36,000 based on 1,200 pounds dry weight at $30 per pound. The cost of harvesting *Sargassum* is not available and thus the true cost of producing one pound of the dried product is unknown. If it is assumed that the firm remains in business under this harvest restriction, it is expected that some or all of the inputs will be purchased elsewhere, and it is expected that the cost of purchasing algae from other sources would be higher than $30 per pound plus the harvesting cost per pound. Thus, net revenue would decline. There is no information on the price of substitute algae products, plant and vessel operating costs, or value of the finished product to take this analysis any further. In addition, there is no information on the overall economic performance of the firm in terms of overall annual sales and net profit. This measure would reduce profitability of the firm and in the extreme case could result in the firm ceasing business operations. Therefore, the proposed rule is significant under the Regulatory Flexibility Act.

A complete prohibition on harvest (Rejected Option 2) of *Sargassum* would also result in a reduction in profitability. A prohibition on harvest would be more likely to result in the firm going out of business.

Description of the reasons why action by the agency is being considered: Refer to Section 1.0, Purpose and Need. The Magnuson-Stevens Act directs the Council to identify, describe, and protect essential fish habitat for all species or species complexes managed by the Council. Section 303(a)(7) of the Magnuson-Stevens Act requires that the Councils minimize to the extent practicable adverse effects on EFH. The Council, viewing pelagic *Sargassum* as an important pelagic habitat in the South Atlantic Region, decided to prepare a fishery management plan to address the following problems: (1) No management structure exists to protect pelagic *Sargassum* habitat; (2) Harvest represents removal of essential fish habitat for other federally managed species including threatened/endangered sea turtles; (3) Potential conflicts could arise if harvest occurs where recreational fishing is occurring; and (4) Limited information on distribution, production, and ecology of pelagic *Sargassum* habitat.

Statement of the objectives of, and legal basis for, the proposed rule: The following objectives are a part of these actions: (1) Establish a management structure to manage pelagic *Sargassum* habitat; (2) Reduce the impact of the pelagic *Sargassum* fishery on essential fish habitat; (3) Reduce the potential for conflict; and (4) As a federally managed species/habitat, direct needed research to better determine distribution, production, and ecology of pelagic Sargassum habitat. The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) as amended through October 11, 1996 provides the legal basis for the rule. Section 305 (b) directed the Secretary of Commerce (through NMFS) to establish regulatory guidelines that assist the Councils in the description and identification of essential fish habitat (EFH) in fishery management plans (including adverse impacts on such habitat). The guidelines also assist in the consideration of actions to ensure the conservation and enhancement of such habitat. Essential fish habitat is defined in the Act as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.”

Description and estimate of the number of small entities to which the proposed rule will apply: The proposed rule will apply to one firm that harvests pelagic *Sargassum.* This firm, Aqua 10-Laboratory, is located in North Carolina and employs three persons on a full-time basis and other workers on an as needed part-time basis. Pelagic *Sargassum* is sun dried, powdered, fermented, and extracted to provide a processed liquid used by Aqua-10 in plant and yield stimulants (soil

and foliar), fertilizer concentrate (soil and foliar), poultry feed supplement, and livestock feed supplement.

Description of the projected reporting, record keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The proposed rule will require an observer on board the vessel to monitor harvest of *Sargassum* and associated bycatch.

Identification of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule: No duplicative, overlapping, or conflicting Federal rules have been identified.

Description of significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities:
There will be no direct impacts on small entities from Actions 1 through 6 and hence the following discussion focuses on Action 7 and summarizes the rationale for the Council's choice of proposed Action 7 in comparison to the alternatives considered for that action item (refer to Section 4.2 for a detailed discussion):

Rejected Options under Action 7:
Rejected Option 1 : No Action
Rejected Option 2: TAC=0 pounds wet weight per year.
Rejected Option 3: TAC=50,000 pounds prior to January 1, 2001 and TAC=0 after this date.
Rejected Option 4: TAC=20,000 pounds wet weight per year.
Rejected Option 5: TAC=100,000 metric tons wet weight per year.
Rejected Option 6: TAC=200,000 pounds wet weight per year.
Rejected Option 7: TAC=5,000 pounds wet weight per year plus other restrictions.

If the one firm that harvests *Sargassum* is forced out of business by the 5,000 pound TAC restriction there would be no difference between Rejected Option 2 (no harvest), Rejected Option 3, and the Council's proposed measure. If the firm manages to operate profitably under the 5,000 pound harvest restriction then the Council's proposed measure would have less of an impact on the firm than these two rejected options. Also, under the Council's proposed action there will be some loss of ecosystem services and thus benefits to other stakeholder groups from this limited harvest.

Taking no action (Rejected Option 1) would have allowed the continued, unregulated harvest of pelagic *Sargassum* habitat which would have been a violation of the Council's habitat policy and against the intent of the Magnuson-Stevens Act mandate to address essential fish habitat.

The other alternatives would not have an impact on firm profitability since the harvest levels allowed would exceed the firm's annual capacity to process this product. However, these options could have serious effects on species that depend on *Sargassum* as essential habitat. In particular the no action alternative (Rejected Option 1) could result in expansion of this fishery and possibly excessive harvest of *Sargassum* in the future.

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including over 100 species of fishes, fungi, micro-and macro-epiphytes, at least 145 species of invertebrates, four species of sea turtles, and numerous marine birds. Pelagic *Sargassum* has been designated

essential fish habitat (EFH) as well as an essential fish habitat-habitat area of particular concern (EFH-HAPC) for both snapper grouper and coastal migratory pelagics species (SAFMC, 1998a,b) and is designated essential fish habitat and essential fish habitat-habitat areas of particular concern for dolphin and wahoo. *Sargassum* in the offshore waters of the Western Atlantic may be used by all five species of sea turtles (leatherback, loggerhead, Kemp's Ridley, hawksbill, and green) as post-hatching developmental and foraging habitat. It is estimated that a total harvest of 50,000 pounds wet weight of *Sargassum* would have a possible incidental take of approximately 31 turtles.

There would be few indirect effects on the *Sargassum* resource itself from the establishment of a TAC. There would be unquantifiable indirect benefits to other fishery resources that use *Sargassum* during some stage of their life-cycle, such as dolphin or billfish, and to the fisheries that target these resources. Maintaining sustainable quantities of *Sargassum* would support survival of protected resources known to use this habitat for protection and foraging during their early developmental stages.

Apart from increases in non-use values, the Council concluded that severe limitation on harvest is likely to increase productivity of marine life in the ecosystem and thus increase use and non-consumptive use values. Furthermore, the Council concluded that maintaining these non-consumptive, non-use, and indirect use benefits (value to other species as habitat) greatly outweigh the costs resulting from severely limiting harvest.

In addition, there was overwhelming support for a measure to prohibit the directed harvest of *Sargassum*. Public sentiment has been overwhelming in favor of a total prohibition. A total of 235 comments were received on the original FMP (175 from individuals and 60 from agencies/organizations) and all but one was in favor of a total prohibition. Comments were received from 33 States and Puerto Rico, and from 16 foreign countries. Given all of the above the Council proposed very limited harvest of *Sargassum*.

5.0 ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS

Established policies and procedures of the SAFMC and the NMFS (Appendix N in the Comprehensive Habitat Amendment (SAFMC, 1998b) provide the framework for conserving and enhancing essential fish habitat. Integral components of this framework include adverse impact avoidance and minimization; provision of compensatory mitigation whenever the impact is significant and unavoidable; and incorporation of enhancement as a fundamental component of fishery resource recovery. New and expanded responsibilities contained in the MSFCMA will be met through appropriate application of these policies and principles. In assessing the potential impacts of proposed projects, the SAFMC, the NMFS, and USFWS are guided by the following general considerations:

- The extent to which the activity would directly and indirectly affect the occurrence, abundance, health, and continued existence of fishery resources;

- The extent to which the goal of "no net-loss of wetlands" would be attained;

- The extent to which an unacceptable precedent may be established or potential for a significant cumulative impact exists;

- The extent to which adverse impacts can be avoided through project modification or other safeguards;

- The availability of alternative sites and actions that would reduce project impacts;

- The extent to which the activity is water dependent if loss or degradation of EFH is involved; and

- The extent to which mitigation may be used to offset unavoidable loss of wetland habitat functions and values.

5.1 SAFMC Essential Fish Habitat and Environmental Protection Policy

In recognizing that managed species are dependent on the quantity and quality of their essential habitats, it is the policy of the SAFMC to protect, restore, and develop habitats upon which species fisheries depend; to increase the extent of their distribution and abundance; and to improve their productive capacity for the benefit of present and future generations. For purposes of this policy, "habitat" is defined as the physical, chemical, and biological parameters that are necessary for continued productivity of the species that is being managed. The objectives of the SAFMC policy will be accomplished through the recommendation of no net loss or significant environmental degradation of existing habitat. A long-term objective is to support and promote a net-gain of fisheries habitat through the restoration and rehabilitation of the productive capacity of habitats that have been degraded, and the creation and development of productive habitats where increased fishery production is probable. The SAFMC will pursue these goals at state, Federal, and local levels. The Council shall assume an aggressive role in the protection and enhancement of habitats important to species, and shall actively enter Federal, decision-making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

5.2 SAFMC Essential Fish Habitat Policy Statements Affecting *Sargassum*

5.2.1 SAFMC Policy Statements on Activities Affecting Habitat

5.2.1.1 SAFMC Policy Statement Concerning Dredging and Dredge Material Disposal Activities

5.2.1.1.1 Ocean Dredged Material Disposal Sites (ODMDS) and SAFMC Policies

The shortage of adequate upland disposal sites for dredged materials has forced dredging operations to look offshore for sites where dredged materials may be disposed. These Ocean Dredged Material Disposal Sites (ODMDSs) have been designated by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (COE) as suitable sites for disposal of dredged materials associated with berthing and navigation channel maintenance activities. The South Atlantic Fishery Management Council (SAFMC; the Council) is moving to establish its presence in regulating disposal activities at these ODMDSs. Pursuant to the Magnuson Fishery Conservation and Management Act of 1976 (the Magnuson Act), the regional fishery management Councils are charged with management of living marine resources and their habitat within the 200 mile Exclusive Economic Zone (EEZ) of the United States. Insofar as dredging and disposal activities at the various ODMDSs can impact fishery resources or essential habitat under Council jurisdiction, the following policies address the Council's role in the designation, operation, maintenance, and enforcement of activities in the ODMDSs:

The Council acknowledges that living marine resources under its jurisdiction and their essential habitat may be impacted by the designation, operation, and maintenance of ODMDSs in the South Atlantic. The Council may review the activities of EPA, COE, the state Ports Authorities, private dredging contractors, and any other entity engaged in activities which impact, directly or indirectly, living marine resources within the EEZ.

The Council may review plans and offer comments on the designation, maintenance, and enforcement of disposal activities at the ODMDSs.

ODMDSs should be designated or redesignated so as to avoid the loss of live or hard bottom habitat and minimize impacts to all living marine resources.

Notwithstanding the fluid nature of the marine environment, all impacts from the disposal activities should be contained within the designated perimeter of the ODMDSs.

The final designation of ODMDSs should be contingent upon the development of suitable management plans and a demonstrated ability to implement and enforce that plan. The Council encourages EPA to press for the implementation of such management plans for all designated ODMDSs.

All activities within the ODMDSs are required to be consistent with the approved management plan for the site.

The Council's Habitat and Environmental Protection Advisory Panel when requested by the Council will review such management plans and forward comment to the Council. The Council may review the plans and recommendations received from the advisory sub-panel and comment to the appropriate agency. All federal agencies and entities receiving a comment or recommendation from the Council will provide a detailed written response to the Council regarding the matter pursuant to 16 U.S.C. 1852 (i). All other agencies and entities receiving a comment or recommendation from the Council should provide a detailed written response to the Council regarding the matter, such as is required for federal agencies pursuant to 16 U.S.C. 1852 (i).

ODMDSs management plans should indicate appropriate users of the site. These plans should specify those entities/ agencies which may use the ODMDSs, such as port authorities, the

U.S. Navy, the Corps of Engineers, etc. Other potential users of the ODMDSs should be acknowledged and the feasibility of their using the ODMDSs site should be assessed in the management plan.

Feasibility studies of dredge disposal options should acknowledge and incorporate ODMDSs in the larger analysis of dredge disposal sites within an entire basin or project. For example, Corps of Engineers analyses of existing and potential dredge disposal sites for harbor maintenance projects should incorporate the ODMDSs. as part of the overall analysis of dredge disposal sites.

The Council recognizes that EPA and other relevant agencies are involved in managing and/or regulating the disposal of all dredged material. The Council recognizes that disposal activities regulated under the Ocean Dumping Act and dredging/filling carried out under the Clean Water Act have similar impacts to living marine resources and their habitats. Therefore, the Council urges these agencies apply the same strict policies to disposal activities at the ODMDSs. These policies apply to activities including, but not limited to, the disposal of contaminated sediments and the disposal of large volumes of fine-grained sediments. The Council will encourage strict enforcement of these policies for disposal activities in the EEZ. Insofar as these activities are relevant to disposal activities in the EEZ, the Council will offer comments on the further development of policies regarding the disposal/ deposition of dredged materials.

The Ocean Dumping Act requires that contaminated materials not be placed in an approved ODMDS. Therefore, the Council encourages relevant agencies to address the problem of disposal of contaminated materials. Although the Ocean Dumping Act does not specifically address inshore disposal activities, the Council encourages EPA and other relevant agencies to evaluate sites for the suitability of disposal and containment of contaminated dredged material. The Council further encourages those agencies to draft management plans for the disposal of contaminated dredge materials. A consideration for total removal from the basin should also be considered should the material be contaminated to a level that it would have to be relocated away from the coastal zone.

5.2.1.1.2 Offshore and Nearshore Underwater Berm Creation

The use of underwater berms in the South Atlantic region has recently been proposed as a disposal technique that may aid in managing sand budgets on inlet and beachfront areas. Two types of berms have been proposed to date, one involving the creation of a long offshore berm, the second involving the placement of underwater berms along beachfronts bordering an inlet. These berms would theoretically reduce wave energy reaching the beaches and/or resupply sand to the system.

The Council recognizes offshore berm construction as a disposal activity. As such, all policies regarding disposal of dredged materials shall apply to offshore berm construction. Research should be conducted to quantify larval fish and crustacean transport and use of the inlets prior to any consideration of placement of underwater berms. Until the impacts of berm creation in inlet areas on larval fish and crustacean transport is determined, the Council recommends that disposal activities should be confined to approved ODMDSs. Further, new offshore and near shore underwater berm creation activities should be reviewed under the most rigorous criteria, on a case-by-case basis.

5.2.1.1.3 Maintenance Dredging and Sand Mining for Beach Renourishment

The Council recognizes that construction and maintenance dredging of the seaward portions of entrance channels and dredging borrow areas for beach re-nourishment occur in the EEZ. These activities should be done in an appropriate manner in accordance with the policies adopted by the Council.

The Council acknowledges that endangered and threatened species mortalities have occurred as a result of dredging operations. Considering the stringent regulations placed on commercial fisherman, dredging or disposal activities should not be designed or conducted so as to adversely impact rare, threatened or endangered species. NMFS Protected Species Division should work with state and federal agencies to modify proposals to minimize potential impacts on threatened and endangered sea turtles and marine mammals.

The Council has and will continue to coordinate with Minerals Management Service (MMS) in their activities involving exploration, identification and dredging/mining of sand resources for beach renourishment. This will be accomplished through membership on state task forces or directly with MMS. The Council recommends that live bottom/hard bottom habitat and historic fishing grounds be identified for areas in the South Atlantic region to provide for the location and protection of these areas while facilitating the identification of sand sources for beach renourishment projects.

5.2.1.1.4 Open Water Disposal

The SAFMC is opposed to the open water disposal of dredged material into aquatic systems which may adversely impact habitat that fisheries under Council jurisdiction are dependent upon. The Council urges state and federal agencies, when reviewing permits considering open water disposal, to identify the direct and indirect impacts such projects could have on fisheries habitat.

The SAFMC concludes that the conversion of one naturally functioning aquatic system at the expense of creating another (marsh creation through open water disposal) must be justified given best available information.

5.2.1.2 SAFMC Policy on Oil & Gas Exploration, Development, and Transportation

The SAFMC urged the Secretary of Commerce to uphold the 1988 coastal zone inconsistency determination of the State of Florida for the respective plans of exploration filed with Minerals Management Service (MMS) by Mobil Exploration and Producing North America, Inc. for Lease OCS-G6520 (Pulley Ridge Block 799) and by Union Oil Company of California for Lease OCS-G6491/6492 (Pulley Ridge Blocks 629 & 630). Both plans of exploration involve lease blocks lying within the lease area comprising the offshore area encompassed by Part 2 of Lease Sale 116, and south of 26° North latitude. The Council's objection to the proposed exploration activities is based on the potential degradation or loss of extensive live bottom and other habitat essential to fisheries under Council jurisdiction.

The SAFMC also supported North Carolina's determination that the plans of exploration filed with MMS by Mobil Exploration and Producing North America, Inc. for Lease OCS Manteo Unit are not consistent with North Carolina's Coastal Zone Management program.

The Council has expressed concern to the Outer Continental Shelf Leasing and Development Task Force about the proposed area and recommends that no further exploration or production activity be allowed in the areas subject to Presidential Task Force Review (the section of Sale 116 south of 26° N. latitude).

The SAFMC recommends the following to the MMS when considering proposals for oil and gas activities for previously leased areas under Council jurisdiction:

1) That oil or gas drilling for exploration or development on or closely associated with live bottom habitat, or other special biological resources essential to commercial and recreational fisheries under Council jurisdiction, be prohibited.

2) That all facilities associated with oil and gas exploration, development, and transportation be designed to avoid impacts on coastal wetlands and sand sharing systems.

3) That adequate spill containment and cleanup equipment be maintained for all development and transportation facilities and, that the equipment be available on site within the trajectory time to land, and have industry post a bond to assure labor or other needed reserves.

4) That exploration and development activities should be scheduled to avoid northern right whales in coastal waters off Georgia and Florida as well as migrations of that species and other marine mammals off South Atlantic states.

5) That the EIS for lease Sale 56 be updated to address impacts from activities related to specifically natural gas production, safety precautions which must be developed in the event of a discovery of a “sour gas” or hydrogen sulfide reserve, the potential for southerly transport of hydrocarbons to near shore and inshore estuarine habitats resulting from the cross-shelf transport by Gulf Stream spin-off eddies, the development of contingency plans to be implemented if problems arise due to the very dynamic oceanographic conditions and the extremely rugged bottom, and the need for and availability of onshore support facilities in coastal North and South Carolina, and an analysis of existing facilities and community services in light of existing major coastal developments.

The SAFMC recommends the following concerns and issues be addressed by the MMS prior to approval of any application for a permit to drill any exploratory wells in Lease Sale 56 and that these concerns and issues also be included in the Environmental Impact Statement for the Outer Continental Shelf (OCS) Leasing Plan for 1992-1997:

1) Identification of the on-site fisheries resources, including both pelagic and benthic communities, that inhabit, spawn, or migrate through the lease sites with special focus on those specific lease blocks where industry has expressed specific interest in the pre-lease phases of the leasing process. Particular attention should be given to critical life history stages. Eggs and larvae are most sensitive to oil spills, and seismic exploration has been documented to cause mortality of eggs and larvae in close proximity.

2) Identification of on-site species designated as endangered, threatened, or of special concern, such as shortnose sturgeon, striped bass, blueback herring, American shad, sea turtles, marine mammals, pelagic birds, and all species regulated under federal fishery management plans.

3) Determination of impacts of all exploratory and development activities on the fisheries resources prior to MMS approval of any applications for permits to drill in the Exploratory Unit area, including effects of seismic survey signals on fish behavior, eggs and larvae; temporary preclusion from fishing grounds by exploratory drilling; and permanent preclusion from fishing grounds by production and transportation.

4) Identification of commercial and recreational fishing activities in the vicinity of the lease or Exploratory Unit area, their season of occurrence and intensity.

5) Determination of the physical oceanography of the area through field studies by MMS or the applicant, including on-site direction and velocity of currents and tides, sea states, temperature, salinity, water quality, wind storms frequencies, and intensities and icing conditions. Such studies must be required prior to approval of any exploration plan submitted in order to have an adequate informational database upon which to base subsequent decision making on-site specific proposed activities.
6) Description of required existing and planned monitoring activities intended to measure environmental conditions, and provide data and information on the impacts of exploration activities in the lease area or the Exploratory Unit area.
7) Identification of the quantity, composition, and method of disposal of solid and liquid wastes and pollutants likely to be generated by offshore, onshore, and transportation operations associated with oil and gas exploration development and transportation.
8) Development of an oil spill contingency plan which includes oil spill trajectory analyses specific to the area of operations, dispersant-use plan including a summary of toxicity data for each dispersant, identification of response equipment and strategies, establishment of procedures for early detection and timely notification of an oil spill including a current list of persons and regulatory agencies to be notified when an oil spill is discovered, and well defined and specific actions to be taken after discovery of an oil spill.
9) Studies should include detailing seasonal surface currents and likely spill trajectories.
10) Mapping of environmentally sensitive areas (e.g., spawning aggregations of snappers and groupers); coral resources and other significant benthic habitats (e.g., tilefish mudflats) along the edge of the continental shelf (including the upper slope); the calico scallop, royal red shrimp, and other productive benthic fishing grounds; other special biological resources; and northern right whale calving grounds and migratory routes, and subsequent deletion from inclusion in the respective lease block(s).
11) Planning for oil and gas product transport should be done to determine methods of transport, pipeline corridors, and onshore facilities. Siting and design of these facilities as well as onshore receiving, holding, and transport facilities could have impacts on wetlands and endangered species habitats if they are not properly located.
12) Develop understanding of community dynamics, pathways, and flows of energy to ascertain accumulation of toxins and impacts on community by first order toxicity.
13) Determine shelf-edge down-slope dynamics and resource assessments to determine fates of contaminants due to the critical nature of canyons and steep relief to important fisheries (e.g., swordfish, billfish, and tuna).
14) Discussion of the potential adverse impacts upon fisheries resources of the discharges of all drill cuttings that may result from activities in, and all drilling muds that may be approved for use in the lease area or the Exploration Unit area including: physical and chemical effects upon pelagic and benthic species and communities including their spawning behaviors and effects on eggs and larval stages; effects upon sight feeding species of fish; and analysis of methods and assumptions underlying the model used to predict the dispersion and discharged muds and cuttings from exploration activities.
15) Discussion of secondary impacts affecting fishery resources associated with on-shore oil and gas related development such as storage and processing facilities, dredging and dredged material disposal, roads and rail lines, fuel and electrical transmission line routes, waste disposal, and others.

The following section addresses the recommendations, concerns and issues expressed by the South Atlantic Council (Source: Memorandum to Regional Director, U.S. Fish and Wildlife

Service, Atlanta, Georgia from Regional Director, Gulf of Mexico OCS Region dated October 27, 1995):

"The MMS, North Carolina, and Mobil entered into an innovative Memorandum of Understanding on July 12, 1990, in which the MMS agreed to prepare an Environmental Report (ER) on proposed drilling offshore North Carolina. The scope of the ER prepared by the MMS was more comprehensive than an EIS would be. The normal scoping process used in preparation of a NEPA-type document would not only "identify significant environmental issues deserving of study" but also "deemphasize insignificant issues, narrowing the scope" (40 CFR 1500.4) by scoping out issues not ripe for decisions.

Of particular interest to North Carolina are not the transient effects of exploration, but rather the downstream and potentially broader, long-term effects of production and development. The potential effects associated with production and development would normally be "scoped out" of the (EIS-type) document and would be the subject of extensive NEPA analysis only after the exploration phase proves successful, and the submittal of a full-scale production and development program has been received for review and analysis. The ER addressed three alternatives: the proposed Mobil plan to drill a single exploratory well, the no-action alternative; and the alternative that the MMS approve the Mobil plan with specific restrictions (monitoring programs and restrictions on discharges). The ER also analyzes possible future activities, such as development and production, and the long-term environmental and socioeconomic effects associated with such activities. The MMS assured North Carolina that all of the State's comments and concerns would be addressed in the Final ER (USDOI MMS, 1990).

The MMS also funded a Literature Synthesis study (USDOI MMS, 1993a) and a Physical Oceanography study (USDOI MMS, 1994), both recommended by the Physical Oceanography Panel and the Environmental Sciences Review Panel (ESRP). Mobil also submitted a draft report to the MMS titled, Characterization of Currents at Manteo Block 467 off Cape Hatteras, North Carolina. The MMS also had a Cooperative Agreement with the Virginia Institute of Marine Science to fund a study titled, Seafloor Survey in the Vicinity of the Manteo Prospect Offshore North Carolina (USDOI MMS, 1993b). The MMS had a Cooperative Agreement with East Carolina University to conduct a study titled, Coastal North Carolina Socioeconomic Study (USDOI MMS, 1993c). The above-mentioned studies were responsive to the ESRP's recommendations as well as those of the SAFMC and the State of North Carolina.

Citations:

USDOI, MMS. 1990. Atlantic Outer Continental Shelf, Final Environmental Report on Proposed Exploratory Drilling Offshore North Carolina, Vols. I-III.

USDOI, MMS. 1993a. North Carolina Physical Oceanography Literature Study. Contract No. 14-35- 0001-30594.

USDOI, MMS. 1993b. Benthic Study of the Continental Slope Off Cape Hatteras, North Carolina. Vols. I-III. MMS 93-0014, -0015, -0016.

USDOI, MMS. 1993c. Coastal North Carolina Socioeconomic Study. Vols. I-V. MMS 93-0052, -0053, -0054, -0055, and -0056.

USDOI, MMS. 1994. North Carolina Physical Oceanographic Field Study. MMS 94-0047.

Copies of these studies can be acquired from the address below:

Minerals Management Service; Technical Communication Services; MS 4530;
381 Elden Street; Herndon, VA 22070-4897
(703) 787-1080

5.2.1.3 SAFMC Policy Statement on Ocean Dumping

The SAFMC is opposed to ocean dumping of industrial waste, sewage sludge, and other harmful materials. Until ocean dumping of these materials ceases, the SAFMC strongly urges state and Federal agencies to control the amount of industrial waste, sludge, and other harmful materials discharged into rivers and the marine environment , and these agencies should increase their monitoring and research of waste discharge. The SAFMC requests that the Environmental Protection Agency continue to implement and enforce all legislation, rules, and regulations with increased emphasis on the best available technology requirements and pretreatment standards. The SAFMC requests that EPA require each permitted ocean dumping vessel (carrying the above described material) to furnish detailed information concerning each trip to the dump site. This might be monitored with transponders, locked Loran C recorder plots of trips to and from dump sites, phone calls to the EPA when a vessel leaves and returns to port, or other appropriate methods. Also the EPA should take legal action to enforce illegal (short or improper) dumping. The SAFMC requests that fishermen and other members of the public report to the EPA, Coast Guard, and the Councils any vessels dumping other than in approved dump sites. The SAFMC supports the phase out of ocean dumping of the above described materials.

5.3 Activity Based Policies

5.3.1 Oil and Gas Exploration and Production

Exploration and production of oil and gas resources in wetlands usually have adverse impacts since excavation and filling are generally required to accommodate access and production needs. In open marine waters, dredging and filling is usually not necessary, but special stipulations are required to minimize adverse impacts to living marine resources. In addition to the above recommendations for navigation channels, access canals, and pipeline installation, the following apply:

A. In coastal wetlands:

a. Activities should avoid wetland use to the extent practicable. Alternatively, the use of uplands, existing drilling sites and roads, canals, and naturally deep waters should be encouraged. When wetland use is unavoidable, work in unvegetated and disturbed wetlands is generally preferable to work in high quality and undisturbed wetlands;

b. Temporary roadbeds (preferably plank roads) generally should be used instead of canals for access to well sites;

c. Water crossings should be bridged or culverted to prevent alteration of natural drainage patterns;

d. Culverts or similar structures should be installed and maintained at sufficient intervals (never more than 500-feet apart) to prevent blockage of surface drainage or tidal flow;

e. Petroleum products, drilling muds, drill cuttings, produced water, and other toxic substances should not be placed in wetlands;

f. If the well is productive, the drill pad and levees should be reduced to the minimum size necessary to conduct production activities; and

g. Defunct wells and associated equipment should be removed and the area restored to the extent practicable. Upon abandonment of wells in coastal wetlands, the well site, various pits, levees, roads, and work areas should be restored to preproject conditions by restoring natural elevations and planting indigenous vegetation whenever practicable. Abandoned well access canals should generally be plugged at their origin (mouths) to minimize bank erosion and saltwater intrusion, and spoil banks should be graded back into borrow areas or breached at regular intervals to establish hydrological connections.

B. In open estuarine waters:
Activities in estuarine waters should be conducted as follows:

a. Existing navigable waters already having sufficient width and depth for access to mineral extraction sites should be used to the extent practicable;

b. Petroleum products, drilling muds, drill cuttings, produced water, and other toxic substances should not be placed in wetlands; and

c. Defunct equipment and structures should be removed.

C. On the continental shelf:
Activities should be conducted so that petroleum-based substances such as drilling mud, oil residues, produced waters, or other toxic substances are not released into the water or onto the sea floor. The following measures may be recommended with exploration and production activities located close to hard banks and banks containing reef building coral:

a. Drill cuttings should be shunted through a conduit and discharged near the sea floor, or transported ashore or to less sensitive, NMFS-approved offshore locations. Usually, shunting is effective only when the discharge point is deeper than the site that is to be protected;

b. Drilling and production structures, including pipelines, generally should not be located within one mile of the base of a live reef;

c. All pipelines placed in waters less than 300 feet-deep should be buried to a minimum of three feet beneath the sea floor, where possible. Where this is not possible and in deeper waters where user-conflicts are likely, pipelines should be marked by lighted buoys and/or lighted ranges on platforms to reduce the risk of damage to fishing gear and the pipelines. Pipeline alignments should be located along routes that minimize damage to marine and estuarine habitat. Buried pipelines should be examined periodically for maintenance of adequate earthen cover.

5.3.2 Other Mineral Mining/Extraction

a. Proposals for mining mineral resources (sand, gravel, shell, phosphate, etc.) from or within 1,500 feet of exposed shell reefs and vegetated wetlands, and within 1,500 feet of shorelines are unacceptable except when the material is to be used for oyster cultch; and

b. All other proposals will be considered on a case-by-case basis.

5.4 Federal Habitat Protection Laws, Programs, and Policies

A listing and brief description of environmental laws directly, or indirectly, protecting marine resources and the habitat they depend on is included as Appendix B.

5.5 State Habitat Protection Programs

5.5.1 North Carolina

The Coastal Area Management Act was passed in 1974 to protect North Carolina's fragile coastal resources through planning and management at the state and local level. The Department of Environment, Health and Natural Resources administers the program. Policy direction is provided by the Coastal Resources Commission, a group of citizens appointed by the Governor. The Division of Coastal Management (DCM), under authority from the Coastal Resources Commission (CRC), is responsible for implementing the North Carolina Coastal Management Program for the protection, preservation, orderly development and management of the state's twenty coastal counties. DCM is part of the Department of Environment, Health and Natural Resources. Present activities of DCM include: Permitting and enforcing regulations in Areas of Environmental Concern; Reviewing consistency of government and larger private activities in the coastal zone for compliance with the Coastal Area Management Act; Planning for the Ocean Resources in North Carolina's jurisdictional waters; Providing for effective disposal of boat sewage; Identifying high priority watersheds; Developing strategies for managing secondary and cumulative impacts; Transferring technology and information to local governments; Identifying wetlands in the coastal area; Assessing the relative significance of wetlands on the landscape; and Identifying and prioritizing wetland restoration sites.

5.5.2 South Carolina

The Office of Ocean and Coastal Management implements the Coastal Management Act. The Office has authority to formulate and implement a comprehensive coastal management program and direct control through a permit program that oversees activities in critical areas that include coastal waters, tidelands, beaches, and primary ocean-front sand dunes. Indirect management authority of coastal resources is granted to the Office in counties containing one or more of the critical areas. In issuing permits, the Coastal Management Act requires that the Office consider the effects of proposed alterations on the production of fish, shrimp, oysters, crab, or any marine life, wildlife, or other natural resources.

5.5.3 Georgia

On April 22, 1997, Governor Miller signed the Georgia Coastal Management Act into law which established the Department of Natural Resources Coastal Resource Division as the authority to create the program, receive and dispense funds, and to coordinate with federal and state agencies regarding Coastal Management issues. On January 26, 1998 the Georgia Coastal Management Program received official approval. This approval marks the end of a six year combined effort by state and local government in partnership with private citizens to develop an integrated, networked program. The program uses existing State laws to manage Georgia's critical coastal resources. With the approval of the Georgia Coastal Management Program comes over $1 million in federal funds annually. Most of the funds will be allocated to local communities and organizations through the "Coastal Incentive Grant" program. The Coastal Resources Division has completed and submitted the first grant award request and expects to begin dispersing the Coastal Incentive Grants in the eleven county service area April 1st of this year. Incentive grants will be presented to local governments and universities to address critical

local issues in coastal Georgia such as water management, local government planning and small scale construction projects.

5.5.4 Florida

The Florida Legislature adopted the Florida Coastal Management Act in 1978. This act authorized the development of a coastal management program and its submittal to the appropriate federal agency. In 1981, the Florida Coastal Management Program (FCMP) was approved by the Secretary of the United States Department of Commerce. Florida's goal in creating the FCMP was not to create a new agency or new statutes concerned with coastal issues, but instead to use existing agencies and laws to address Florida's coastal needs. Florida's rules and laws adequately protected the coast, but were not always effectively implemented because of breakdowns in communication between agencies and administrative shortcomings. The FCMP was created to bridge these gaps and to open the lines of communication among the agencies so that their actions could be coordinated.

The FCMP, as it exists today, is a network of ten state agencies and five water management districts using 23 statutes to protect Florida's coastal interests. The agencies most directly involved in issues that affect Essential Fish Habitat are listed below.

The Department of Community Affairs (DCA) is the lead agency for the FCMP, serving as coordinator of coastal issues and as the liaison between the state agencies and the federal government. DCA also houses the State Clearinghouse and serves as the state's land planning agency and emergency management agency.

The Department of Environmental Protection (DEP), formed by the merger of the former Department of Environmental Regulation and the former Department of Natural Resources, serves as the state's chief environmental regulatory agency and the manager and steward of many of its natural resources. Among the natural resources over which the DEP has jurisdiction are submerged lands within state estuarine and marine waters. The Department of Health regulates on-site sewage disposal. The five water management districts, organized along watershed lines, act in partnership with DEP in regulating activities in wetlands and waters of the state and the use of water resources.

The Florida Fish and Wildlife Conservation Commission was created by a Constitutional Amendment in 1999 and has full rule-making authority for fisheries and marine life including endangered species. The Commission is presently composed of nine members which reduces to seven members as terms expire. The Commission has authority for rule creation, law enforcement, and research.

5.6 International Protection of *Sargassum* and the Sargasso Sea

Because of the importance of the extra-jurisdictional pelagic *Sargassum* occurring in the Sargasso Sea outside the EEZ, the United States should pursue all other options under the Magnuson-Stevens Act and other laws to protect *Sargassum* in international waters.

5.7 Recommendations to States

Because of the importance of pelagic *Sargassum* occurring in State waters, the Council recommends harvest and possession of *Sargassum* from State waters be prohibited. The Council concluded such actions are necessary to protect essential fish habitat (EFH) and achieve the objectives of the plan.

6.0 PELAGIC *SARGASSUM* HABITAT RESEARCH NEEDS

The following constitutes the basic structure of the Council's essential fish habitat (EFH) research and monitoring program contained in the Habitat Plan (SAFMC, 1998a). This general structure provides research recommendations the Council, the National Marine Fisheries Service (NMFS), and other habitat partners in the South Atlantic region view as necessary for carrying out the EFH management mandate.

The Council has determined that the NMFS, in cooperation with other Federal, State and regional habitat partners in the south Atlantic region, will develop the necessary understanding, using basic and applied research and literature syntheses, to help conserve, protect, and restore EFH of living marine resources managed by the Council. Statutes and international conventions and treaties which authorize the NMFS to conserve and restore marine habitat include but are not limited to the Magnuson Fishery Conservation and Management Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, the National Marine Sanctuaries Act, the Clean Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund"), and Oil Pollution Act (OPA).

Additional research is necessary to insure sufficient information is collected to support a higher level of description and identification of *Sargassum* habitat. In addition, research is needed to identify and evaluate existing and potential adverse effect on *Sargassum* habitat, including but not limited to, direct physical loss or alteration; impaired habitat quality or function; cumulative impacts from fishing; and non-gear related fishery impacts.

The Council recommends NMFS apply their adopted Habitat Research Plan to direct and conduct research and transfer results to management components within NMFS. The Council coordinates with NMFS management components to provide information on permit and policy activities, fishery and EFH information for fishery management plans. The NMFS plan is designed to develop the necessary expertise to accomplish or oversee the restoration, creation, or acquisition of habitat to benefit living marine resources. The plan provides guidance in four areas: ecosystem structure and function, effects of alterations on habitat, development of habitat restoration methods, and development of indicators of impact and recovery of habitat. A fifth area is the need for synthesis and timely scientific information to managers.

The Council worked with NMFS and other NOAA programs, including the Office of Ocean and Coastal Resource Management, Coastal Ocean Program, Center for Coastal Ecosystem Health (Charleston, SC), and National Sea Grant Program, to meet the goals of NOAA. NMFS will work closely with other federal agencies to increase cooperation and partnerships, maximize research information, and reduce potential duplication of research efforts. The Council has adopted the same general structure for the research and monitoring program. In addition, a list of research needs for *Sargassum* habitat is included.

6.1 Essential Fish Habitat Research Needs

6.1.1 Ecosystem Structure and Function

Understanding the structure and function of natural ecosystems, their linkages to one another, and the role they play in supporting and sustaining living marine resources, their abundance, distribution, and health -- is critical. Knowing when and how systems are affected, assessing the cause and degree of impact, and providing the basis for restoring and maintaining these systems are integral to this research area, and must be evaluated in terms of landscape ecology. Research on ecosystem structure and function will provide the necessary foundation for linking all areas to provide the basis for making fundamentally sound management decisions.

Thus, assessment of habitat impacts, development of restoration methods and evaluation of restoration effectiveness, development of indicators of impact and recovery, and synthesis and transfer of information for the development of management policy and regulations all are dependent on a comprehensive understanding of ecosystem structure and functioning.

Research in this area will include studies on the relationship between habitat and yield of living marine resources including seasonality and annual variabilities and the influence of chemical and physical fluxes on these relationships. These research efforts will be dependent upon knowledge of basic life histories, habitat structural integrity and limiting factors, and must be evaluated within the context of habitat mosaics or habitat heterogeneity. Therefore, data on habitat location are integral to this research area. Information on essential fish habitat, variability in yield of fishery resources as a function of material fluxes, habitat type, location and scale should be generated. This research area provides the foundation for understanding cause and effect relationships and development and evaluation of protection and restoration strategies.

6.1.2 Effect of Habitat Alterations

Knowledge of the causes of damage to ecosystems is critical to restoring past losses and preventing future degradation and loss of habitats essential for maintaining and enhancing living marine resources. Therefore, quantification of the response of habitats and living marine resources to natural and anthropogenic alterations is not only a prerequisite to determining the degree of impact, predicting the rate of recovery, and recommending the most effective restoration procedures, but it also is a requisite to establishing effective protective measures.

The basis for determining cause and effect relationships depends on an understanding of the natural structure and function of an ecosystem. Individual living marine resource requirements and population characteristics. The Council is interested in both maintaining sustainable living marine resource populations and protecting the essential fish habitat they depend upon. Habitat partners should conduct research to relate non-fishing impacts observed at the individual level to effects at the population level which would link habitat impacts ultimately to living marine resource populations.

Studies should include cause and effect research designed to evaluate responses of living marine resource and habitats to physical and chemical modifications of coastal and estuarine systems. Research is encouraged that considers downstream responses to upland modification, the role of buffers zones, as well as living marine resource and habitat responses to physical and waterflow alterations and water quality modifications. Information should be generated on responses to both individual and cumulative impacts so as to provide the basis for policy statements, guidelines, and regulations to protect habitats. These cause and effect databases will furnish information pertinent not only to permit-related activities, but also to NMFS mandated responsibilities in restoration planning and implementation.

6.1.3 Habitat Restoration Methods

Not applicable.

6.1.4 Indicators of Habitat and Living Marine Resources Impacts and Recovery

Increasing and extensive exploitation of coastal resources demands that indicators be used to simplify the process of determining whether an ecosystem, habitat, or living marine resource is healthy, degraded, or is recovering. The development of indicators of habitat/living marine resource impacts and recovery is critical for managers judging the status of essential fish habitat or fishery resources, and determining the need for corrective actions.

The development of habitat or resource indicators must be based on information derived from comparative research on the structure and function of disturbed, natural, and/or restored habitats of different ages and geographical locations for a suite of biological, chemical, and physical parameters; time-dependent biotic population analyses; and contaminant level follow-up evaluations for sediment, biota, and water. This type of research will help managers identify essential fish habitat status; standardize indicators for specific habitats through comparisons across geographic gradients and scales; and develop recommendations on chemical "cleanup" techniques and most appropriate measures to assess success. The Council encourages NMFS, in cooperation with the other habitat partners in the Southeast, to utilize such guideposts to develop and improve best management practice approaches.

6.1.5 Synthesis and Information Transfer

The synthesis and timely transfer of information derived from research findings and the existing literature is a key element of the essential fish habitat research and monitoring program, and this program. Decisions on permitting, regulation, enforcement, redirection of research efforts, and development and implementation of restoration plans must be made with the best available information. Scientists must step back from their research long enough to provide timely information syntheses to habitat managers. Likewise, it is imperative that State and Federal habitat managers recognize that generic information generated by the scientific community does have powerful application to their site-specific problems.

Technology and information transfer will be expedited through the use of all available information sources and the application of "user-friendly" information bases. Geographical Information Systems provide the opportunity to amass and array large quantities of complex data, thereby, providing potential for relational observations by decision-makers; such use is strongly encouraged. Many areas of synthesis and transfer have been indicated in the earlier four research areas and will not be repeated here. Additional examples include information syntheses on essential fish habitat and essential fish habitat-habitat areas of particular concern and modes of protection and restoration, and synthesis of available information on landscape approaches to basinwide management including permitting and restoration. Such collations of current and evolving information bases are important to the Council and those charged with the conservation and management of fishery resources as well as to State and Federal habitat managers concerned about developing and implementing policy. These syntheses could be done within NMFS, through partnerships with other agencies, and by contract. It is important, however, that syntheses be provided in a useable format and even published in outlets available to both scientific and management communities. The scientific community must participate in the synthesis and transfer process.

6.1.6 Implementation

The five inter-linked areas provide a framework for the type of research and continuity needed to effectively manage EFH. In some instances this linkage between research areas may be hierarchical. Research on ecosystem structure and function provides the foundation for linking all areas. For example, knowledge of the structure and function of the ecosystem must be known before one can actually determine the effects of habitat alterations, develop restoration methods, or develop indicators of impact and recovery. Elements shown for each research area depict the stages and continuity of information required to develop a comprehensive database for making important resource decisions. Research founded on this approach will provide State and Federal habitat managers with a broad information base that is scientifically and ecologically

credible, and responsive to management needs. The Council will coordinate with and support NMFS Southeast Regional Office and Fisheries Science Centers in their effort to determine habitat research and management priorities. Research conducted to address the EFH mandate in the southeast region should: address regional management and research needs pertinent to the Council, NMFS or other habitat partner responsible for conservation or management of EFH or species which depend on EFH; be consistent with the Council's, NMFS's and other habitat partner's long-term goals or habitat policies; and provide information about the benefit of protecting EFH or living marine resources.

Cooperative efforts between NMFS research and management staffs and with other federal/state agencies, industry, and academia are encouraged. This approach will create greater and improved partnerships, which will be required if we are to meet the Council's, NOAA's, and NMFS's goal to protect, conserve, and restore essential fish habitat through sound habitat research. In addition, the Council will support programmatic EFH research proposals when requested from and developed by NMFS SEFSC.

6.2 *Sargassum* Research Needs

Habitat and species specific research needs identified in Council fishery management plans are presented below for pelagic *Sargassum* habitat.

Summarized from Pelagic Water Column Workshop, Research and Monitoring Workshop, and Settle (1997):

1. What is the areal abundance of pelagic *Sargassum* off the southeast U.S.?
2. Does the abundance change seasonally?
3. Can pelagic *Sargassum* be assessed remotely using aerial or satellite technologies (e.g., Synthetic Aperture Radar)?
4. What is the relative importance of pelagic *Sargassum* weedlines and oceanic fronts for early life stages of managed species?
5. Are there differences in abundance, growth rate, and mortality?
6. What is the age structure of reef fishes (e.g., red porgy, gray triggerfish, and amberjacks) that utilize pelagic *Sargassum* habitat as a nursery and how does it compare to the age structure of recruits to benthic habitats?
7. Is pelagic *Sargassum* mariculture feasible?
8. What is the species composition and age structure of species associated with pelagic *Sargassum* when it occurs deeper in the water column?
9. Additional research on the dependencies of pelagic *Sargassum* productivity on the marine species using it as habitat.
10. Quantify the contribution of nutrients to deepwater benthic habitat by pelagic *Sargassum*.

In addition, the following research needs were identified in the NMFS Biological Opinion and are included:

11. Studies should be performed on the abundance, seasonality, life cycle, and reproductive strategies of Sargassum and the role this species plays in the marine environment, not only as an essential fish habitat, but as a unique pelagic algae. The research recommendations of this FMP were based primarily on managing *Sargassum* as essential fish habitat for species managed under the MSFCMA. Research needs should also be identified that consider the *Sargassum* community, as well as the individual species of this community that are associated with, and/or dependent on, pelagic *Sargassum*. Human-induced (tanker oil discharge; trash) and natural threats (storm events) to *Sargassum* need to be researched for the purpose of protecting and conserving this natural resource.
12. Cooperative research partnerships should occur between the council, NMFS Protected Resources Division, and state agencies since many of the needs to a) research pelagic *Sargassum*, and b) protect and conserve pelagic *Sargassum* habitat, are the same for both managed fish species and listed sea turtles.
13. Specific research needs should be included in the plan which further address the association between pelagic *Sargassum* habitat and post-hatchling sea turtles.

Additional research needs are included in the SIA/FIS Section.

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SAFMC GIS Species Distribution and Habitat Utilization Sub-Group Workshop:
Essential Fish Habitat Workshop #2 July 30-31, 1997

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SAFMC Water Issues Habitat Sub-Group Workshop:
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Dr. Paul Carlson	FDEP, Florida Marine Research Institute
Doug Rader	NC Environmental Defense Fund
J. Heyward Robinson	DHEC, Office of Ocean and Coastal Management
James Holland	GA Commercial Fisherman
Rebecca Shortland	The Georgia Conservancy
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SAFMC Habitat Sub-Group Workshop (Pelagic Habitat - *Sargassum* and Water Column):
Workshop #9 October 7-8, 1997

Dr. Ford "Bud" Cross	NMFS, SEFSC Beaufort Laboratory
Lawrence R. Settle	NMFS, SEFSC Beaufort Laboratory
Dr. Donald E. Hoss	NMFS, SEFSC Beaufort Laboratory
Sherry E. Eperly	NMFS, SEFSC Beaufort Laboratory
Dr. Jeff J. Govoni	NMFS, SEFSC Beaufort Laboratory
Dr. Charles Manooch III	NMFS, SEFSC Beaufort Laboratory
Dr. John V. Merriner	NMFS, SEFSC Beaufort Laboratory
Dr. Dave S. Peters	NMFS, SEFSC Beaufort Laboratory
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Robert H. Dunlap Jr.	SCDNR, Marine Resources Div.
Dr. L. Dorsey Worthy	Coastal Services Center, NOAA
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SAFMC Habitat Research and Monitoring Sub-Group:
Workshop #10 November 17, 1997

Dr. Ford "Bud" Cross	NMFS, SEFSC Beaufort Laboratory
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Dr. Peter Rubec	FDEP, Florida Marine Research Institute
Dr. Wilson Laney	U. S. Fish Wildlife Service
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The following individuals aided in the development of this plan by making presentations to the Habitat and Environmental Protection Committee on pelagic *Sargassum* habitat on December 2, 1998 at the Ramada Inn in Kill Devil Hills, North Carolina:

Larry Settle, NMFS SEFSC Beaufort Lab	Larval/juvenile fish use of *Sargassum*
Dr. Gerald Ault, Univ. of Miami, RSMAS	Billfish use of *Sargassum*
Dr. Brian LaPointe, Harbor Branch Inst.	Interdependance of *Sargassum* and fish
Blair Witherington, FDEP	Sea turtles use of *Sargassum*

The following individuals aided in review and development of this plan including the public hearing document:

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8.0 LIST OF AGENCIES AND ORGANIZATIONS

Responsible Agency

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List of Agencies, Organizations, and Persons Consulted

SAFMC Law Enforcement Advisory Panel
SAFMC Habitat Advisory Panel
SAFMC Coral Advisory Panel
SAFMC Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Georgia Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Department of Environmental Protection
Florida Marine Fisheries Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Department of Environment, Health, and Natural Resources
South Carolina Department of Health and Environmental Control
Gulf and South Atlantic Fisheries Development Foundation
GMFMC, CFMC, MAFMC & NEFMC
National Marine Fisheries Service
- Washington Office
- Office of Ecology and Conservation
- Southeast Region
- Beaufort Lab
- Charleston Lab
- Southeast Fisheries Science Center

National Oceanic and Atmospheric Administration
- General Counsel
- SEA Division/ORCA
- Coastal Services Center

United States Fish and Wildlife Service
United States Coast Guard
United States Environmental Protection Agency, Region IV
Center for Marine Conservation
National Fisheries Institute
Florida Sea Grant
Atlantic Coast Conservation Association
Atlantic States Marine Fisheries Commission
North Carolina Fisheries Association
Organized Fishermen of Florida
Southeastern Fisheries Association
The Georgia Conservancy
Reefkeeper International
Harbor Branch Institute
Monroe County Commercial Fishermen, Inc.

9.0 OTHER APPLICABLE LAW

9.1 Vessel Safety

PL. 99-659 amended the Magnuson Act to require that a fishery management plan or amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of the vessels.

No vessel will be forced to participate in the fishery under adverse weather or ocean conditions as a result of the imposition of management regulations set forth in this amendment. Therefore, no management adjustments for fishery access will be provided.

There are no fishery conditions, management measures, or regulations contained in this amendment which would result in the loss of harvesting opportunity because of crew and vessel safety effects of adverse weather or ocean conditions. No concerns have been raised by people engaged in the fishery or the Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions. Therefore, there are no procedures for making management adjustments in this amendment due to vessel safety problems because no person will be precluded from a fair or equitable harvesting opportunity by the management measures set forth.

There are no procedures proposed to monitor, evaluate, and report on the effects of management measures on vessel or crew safety under adverse weather or ocean conditions. The Council initially proposed limiting harvesting to 150 miles offshore; however, due to vessel safety concerns, the Council modified this to 100 miles offshore.

9.2 Coastal Zone Consistency

Section 307(c)(1) of the federal Coastal Zone Management Act of 1972 requires that all federal activities which directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the Council to have complementary management measures with those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based upon the assessment of this amendment's impacts in previous sections, the Council has concluded this amendment is an improvement to the federal management measures for snapper grouper species.

The Council has determined the plan to be consistent with the Coastal Zone Management Plans of Florida, Georgia, South Carolina, and North Carolina to the maximum extent practicable.

This determination was submitted to the responsible state agencies under Section 307 of the Coastal Zone Management Act administering approved Coastal Zone Management Programs in the states of Florida, Georgia, South Carolina, and North Carolina.

The States of Florida, Georgia, South Carolina, and North Carolina submitted responses verifying the Council's actions were consistent with State CZM Programs.

9.3 Endangered Species and Marine Mammal Acts

The Sustainable Fisheries Act of 1996 established certain requirements and standards the Councils and the Secretary must meet in managing fisheries under the Magnuson-Stevens Act. Implementing the provisions in the SFA will not have any negative impacts on the listed and protected species under the Endangered Species Act (ESA) and Marine Mammals Protection Act (MMPA) including:

	Whales:	Date Listed
(1)	Northern right whale- *Eubalaena glacialis* (ENDANGERED)	12/2/70
(2)	Humpback whale- *Magaptera novaeangliae* (ENDANGERED)	12/2/70
(3)	Fin whale- *Balaenoptera physalus* (ENDANGERED)	12/2/70
(4)	Sei whale- *Balaenoptera borealis* (ENDANGERED)	12/2/70
(5)	Sperm whale- *Physeter macrocephalus* (ENDANGERED)	12/2/70
(6)	Blue whale- *Balaenoptera musculus* (ENDANGERED)	12/2/70

	Sea Turtles:	Date Listed
(1)	Kemp's ridley turtle- *Lepidochelys kempii* (ENDANGERED)	12/2/70
(2)	Leatherback turtle- *Dermochelys coriacea* (ENDANGERED)	6/2/70
(3)	Hawksbill turtle- *Eretmochelys imbricata* (ENDANGERED)	6/2/70
(4)	Green turtle- *Chelonia mydas* (THREATENED/ENDANGERED)	7/28/78
(5)	Loggerhead turtle- *Caretta caretta* (THREATENED)	7/28/78

	Other Species Under U.S. Fish and Wildlife Service Jurisdiction:	Date Listed
(1)	West Indian manatee- *Trichechus manatus* (ENDANGERED)	3/67
	(Critical Habitat Designated)	1976
(2)	American crocodile - *Crocodulus acutus* (ENDANGERED)	9/75
	(Critical Habitat Designated)	12/79

9.4 Paperwork Reduction Act

The purpose of the Paperwork Reduction Act is to control paperwork requirements imposed on the public by the federal government. The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

9.5 Federalism

No federalism issues have been identified relative to the actions proposed in this amendment and associated regulations. The affected states have been closely involved in developing the proposed management measures and the principal state officials responsible for fisheries management in their respective states have not expressed federalism related opposition to adoption of this plan.

9.6 National Environmental Policy Act

The discussion of the need for this amendment, proposed actions and alternatives, and their environmental impacts are contained in Sections 1.0 and 2.0 of this amendment and the supplemental environmental impact statement. A description of the affected environment is contained in Section 3.0 and Council recommendations for protection of essential fish habitat and are contained in Section 5.0.

The proposed plan is a major action having a significant positive impact on the quality of the marine and human environment of the South Atlantic. The proposed action will have a significant positive impact by reducing fishing gear-related habitat impacts and prohibit the harvest of pelagic *Sargassum* which is essential fish habitat.

A Draft Environmental Impact Statement (DEIS) for *Sargassum* Habitat was brought to public hearing in the Habitat Plan (SAFMC, 1998a), Comprehensive Habitat Amendment (SAFMC, 1998b), and the Sustainable Fisheries Act Amendment (SAFMC, 1998c). A Final EIS was filed on October 5, 1999 with the Original Sargassum FMP (SAFMC, 1998d). A second DEIS was sent to NMFS on October 8, 2001 and NMFS prepared a SDEIS which was filed on January 1, 2002. This document consolidates the information and the Final EIS for *Sargassum* Habitat into one document.

Mitigating measures related to proposed actions are unnecessary. No unavoidable adverse impacts on protected species, wetlands, or the marine environment are expected to result from the proposed management measures in this plan.

Overall, the benefits to the nation resulting from implementation of this amendment are greater than management costs.

Environmental Significance and Impact of the Fishery, Proposed Action and Alternatives.

Section 4.0 describes the Council's management measures in detail. Section 1508.27 of the CEQ Regulations list 10 points to be considered in determining whether or not impacts are significant. The analyses presented below are based on the detailed information contained in Section 4.0 Environmental Consequences including the Regulatory Impact Review, Regulatory Flexibility Determination, and Social Impact Assessment.

Beneficial and Adverse Impacts

There are beneficial and adverse impacts from the proposed actions. The impacts are described for each action in Section 4.0 and summarized in Section 2.0.

Summary of Adverse Impacts: For a detailed discussion of the biological, social, and economic adverse impacts of the proposed measures refer to the biological, social, and economic impact discussions under each Action in Section 4.2.

Summary of Beneficial Impacts: For a detailed discussion of the biological, social, and economic beneficial impacts of the proposed measures refer to the biological, social, and economic impact discussions under each Action in Section 4.2.

Public Health or Safety

The proposed actions, and their alternatives, are not expected to have any substantial adverse impact on public health or safety.

Unique Characteristics

The proposed actions have no impacts on characteristics of the area such as proximity to historic or cultural resources, park lands, wetlands, or ecologically critical areas.

Controversial Effects

The proposed actions are not expected to have significant controversial effects. The Council provided extensive opportunity for input by holding public hearings, receiving public comment at Council meetings, and by providing the opportunity for interested persons to provide written comments. During development of this plan, the Council incorporated suggestions from the public. Additionally, states incorporate public input into their management measures. The Council is requesting the States of North Carolina, South Carolina, Georgia, and Florida to prohibit harvest and/or possession of *Sargassum*.

Uncertainty or Unique/Unknown Risks

The proposed actions are not expected to have any significant effects on the human environment that are highly uncertain or involve unique or unknown risks. Benefits from management cannot be quantified but the direction and relative magnitude are known and are positive. If the proposed actions were not implemented there would be a high level of uncertainty as to the future status of pelagic *Sargassum* habitat and the managed species dependent on this essential fish habitat.

Precedent/Principle Setting

The proposed actions are not expected to have any significant effects by establishing precedent and do not include actions which would represent a decision in principle about a future consideration.

Relationship/Cumulative Impact

The proposed actions are not expected to have any significant cumulative negative impacts that could have a substantial effect on resources or any related stocks, including sea turtles. The limitation of present harvest off North Carolina and the prohibition of harvest and/or possession off South Carolina, Georgia, and the Florida East Coast will prevent cumulative negative impacts on managed species including threatened/endangered sea turtles.

Historical/Cultural Impacts

The proposed actions are not expected to have any significant effects on historical sites listed in the National Register of Historic Places and will not result in any significant impacts on significant scientific, cultural, or historical resources.

Endangered/Threatened Species Impacts

The proposed actions are not expected to have significant negative effects on any endangered or threatened species or marine mammal population. In fact, the proposed actions to protect *Sargassum* and other essential fish habitat used by threatened or endangered species will have a positive effect. Critical habitats, established under ESA, have been designated in the South Atlantic for the Northern Right Whale and Johnson's Seagrass.

Therefore, the Council has concluded that neither the proposed management measures in the Fishery Management Plan for Pelagic *Sargassum* Habitat nor the fisheries managed by the Council will adversely affect the recovery of endangered or threatened species, or their critical habitat.

Interaction With Existing Laws for Habitat Protection

The proposed actions are expected to have a positive interaction with existing Federal requirements imposed for the protection of the environment. The proposed actions will enhance existing federal regulations protecting fisheries under the jurisdiction of the South Atlantic Council and coordinate with State, Federal, and regional efforts to protect essential fish habitat and EFH-HAPCs.

Effects of the Fishery on the Environment

Section 4.2 of the Habitat Plan (SAFMC, 1998a)contains a discussion on threats to essential habitat from fishing activities. The Council evaluated the effects of fisheries under their jurisdiction on the environment and concluded that the harvest of pelagic *Sargassum* is a removal of essential fish habitat. Implementation of the management measures proposed under this plan will reduce to the maximum extent practicable the impact of South Atlantic fisheries on essential fish habitat.

Bycatch

Bycatch of larval and juvenile managed species and threatened turtles would be severely limited if the proposed measures are implemented. During the limited harvest off North Carolina, the four-inch mesh will minimize any bycatch.

The Council's preferred action requires 100% observer coverage. The sampling methodology will follow the methods of Settle (1993). Estimates of all species captured are to be provided in an annual SAFE report to be prepared by NMFS as required by the Magnuson-Stevens Act. The SAFE Report is to be provided to the Council by June 1st of each year and should cover the preceding calendar year.

Effort Directed at or From Other Fisheries

Measures proposed in this plan could result in a shift of one former snapper grouper vessel into other fisheries.

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11.0 PUBLIC HEARING/PUBLIC COMMENT LOCATIONS AND DATES.

All public hearings began at 6:00 p.m. at the following locations:

June 15-16, 1998
Ponce de Leon
4000 U.S. Hwy. 1 North
St. Augustine, Florida

June 22, 1998
Town & Country Inn
2008 Savannah Highway
Charleston, South Carolina

June 23, 1998
Carteret Community College
3505 Arendell Street
Morehead City, North Carolina

June 24, 1998
Holiday Inn Savannah
Highway 17 South at I-95
Richmond Hill, Georgia

June 25, 1998
Holiday Inn Express
7151 Okeechobee Road
Ft. Pierce, Florida

June 26, 1998
Hawk's Cay Resort
Mile Marker 61
Marathon, Florida

March 6, 2002 (1:30 p.m.)
Hilton Savannah DeSoto
15 E. Liberty Street
Savannah, Georgia

Public Comment Periods:

September 23, 1998
Town & Country Inn
2008 Savannah Highway
Charleston, South Carolina

December 3, 1998
Ramada Inn
1701 South Virginia Dare Trail
Kill Devil Hills, North Carolina

March 9, 2000
Ocean Plaza Beach Resort
Oceanfront at 15th Street
Tybee Island, Georgia

March 7, 2002
Hilton Savannah DeSoto
15 E. Liberty Street
Savannah, Georgia

12.0 APPENDICES

Appendix A. Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (Source: Larry Settle, NMFS Beaufort Lab, personal communication.)

Family Genus and Species	Common name
Elopidae	tarpons
Elops saurus	ladyfish
Megalops atlanticus	tarpon
Albulidae	bonefishes
Albula vulpes	bonefish
Anguillidae	freshwater eels
Anguilla rostrata	American eel
Moringuidae	spaghetti eels
unidentified	spaghetti eel
Muraenidae	morays
Gymnothorax sp(p).	moray
unidentified	moray
Serrivomeridae	sawtooth eels
unidentified	sawtooth eel
Ophichthidae	snake eels
Apterichtus ansp	academy eel
Apterichtus kendalli	finless eel
Callechelys guiniensis	shorttail snake eel
Callechelys sp.	eel
Echiophis intertinctus	spotted spoon-nose eel
Echiophis punctifer	snapper eel
Gordiichthys ergodes	irksome eel
Myrichthys ocellatus	goldspotted eel
Myrichthys sp.	eel
Myrophis punctatus	speckled worm eel
Ophichthus gomesi	shrimp eel
Ophichthus puncticeps	palespotted eel
Ophichthus sp.	eel
unidentified	snake eel
Nemichthyidae	snipe eels
unidentified	snipe eel
Nettastomatidae	duckbill eels
Saurenchelys cognita	longface eel
unidentified	eel
Congridae	conger eels
Ariosoma sp.	conger eel
Paraconger sp.	conger eel
Rhechias dubia	conger eel
Rhynchoconger gracilior/guppyi	conger
unidentified	conger eel
Clupeidae	herrings
Brevoortia tyrannus	Atlantic menhaden
Etremeus teres	round herring
Sardinella aurita	Spanish sardine
Engrauilidae	anchovies
Anchoa hepsetus	striped anchovy
Engraulis eurystole	silver anchovy
Argentinidae	argentines
unidentified	argentine
Gonostomatidae	lightfishes
Cyclothone sp.	lightfish
Gonostoma elongatum	lightfish
Vinciguerria nimbaria	lightfish
Vinciguerria poweriae	lightfish
Vinciguerria sp.	lightfish
unidentified	lightfish

Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (cont.)

Family Genus and Species	Common name
Stomiidae	dragonfishes
Stomias sp.	dragonfish
unidentified	dragonfish
Aulopidae	aulopus
unidentified	aulopus
Chlorophthalmidae	greeneyes
unidentified	greeneye
Scopelarchidae	pearleyes
unidentified	pearleye
Synodontidae	lizardfishes
Trachinocephalus myops	snakefish
unidentified	lizardfish
Evermannellidae	sabertooth fishes
unidentified	sabertooth fish
Paralepididae	barrucudinas
Lestidiops affinis	barracudina
Stemonosudis intermedia	barracudina
unidentified	barracudina
Myctophidae	lanternfishes
Benthosema glaciace	glacier lanternfish
Benthosema suborbitale	lanternfish
Benthosema sp.	lanternfish
Ceratoscopelus manderensis	lanternfish
Ceratoscopelus warmingii	lanternfish
Diaphus sp.	lanternfish
Diogenichthys atlanticus	Diogenes lanternfish
Electrona risso	lanternfish
Hygophum benoiti	lanternfish
Hygophum hygomii	lanternfish
Hygophum reinhardtii	lanternfish
Hygophum taaningi	lanternfish
Hygophum sp.	lanternfish
Lampadena luminosa	lanternfish
Lampadena sp.	lanternfish
Lampanyctus ater	lanterfish
Lampanyctus cuprarius	lanternfish
Lampanyctus nobilis	lanternfish
Lampanyctus sp.	lanternfish
Lepidophanes sp.	lanternfish
Myctophum affine	metallic lanternfish
Myctophum obtrusiroste	lanternfish
Myctophum selenops	lanternfish
Myctophum sp.	lanternfish
Notolychnus valdiviae	lanternfish
Notoscopelus sp.	lanternfish
unidentified	lanternfish
Moridae	codlings
unidentified	codling
Bregmacerotidae	codlets
Bregmaceros cantori	codlet
Bregmaceros sp.	codlet
unidentified	codlet
Gadidae	cods
Enchelyopus cimbrius	fourbeard rockling
Merluccius bilinearis	silver hake
Urophycis chuss	red hake

Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (cont.)

Family Genus and Species	Common name
Urophycis floridana	southern hake
Urophycis regia	spotted hake
Urophycis sp.	hake
Ophidiidae	cusk-eels
Brotula barbata	bearded brotula
Ophidion beani	longnose cusk-eel
Ophidion selenops	mooneye cusk-eel
Ophidion sp.	cusk-eel
*Ophididium ososti*gmum	polka-dot cusk-eel
unidentified	cusk-eel
Carapidae	pearlfishes
unidentified	pearlfish
Lophiiformes (Order)	anglerfishes
unidentified	anglerfish
Ceratoidei (Suborder)	deepsea anglerfishes
unidentified	deepsea anglerfish
Caulophrynidae	deepsea anglerfishes
Caulophryne jordani	deepsea anglerfish
Lophiidae	goosefishes
Lophius americanus	goosefish
Antennariidae	frogfishes
Antennarius sp.	frogfish
Histrio histrio	sargassumfish
Exocoetidae	flyingfishes
Cypselurus melanurus	Atlantic flyingfish
Hemiramphus brasiliensis	ballyhoo
Hirundichthys affinis	fourwing flyingfish
Hyporhamphus unifasciatus	silverstripe halfbeak
Paraexocoetus brachypterus	sailfin flyingfish
Prognichthys gibbifrons	bluntnose flyingfish
unidentified	flyingfish
Belonidae	needlefishes
Tylosurus acus	agujon
unidentified	needlefish
Scomberesocidae	sauries
Scomberesox saurus	Atlantic saury
Atherinidae	silversides
unidentified	silverside
Trachipteridae	ribbonfishes
unidentified	ribbonfish
Trachichthyidae	roughies
unidentified	roughy
Melamphaidae	scalefishes
Melamphaes simus	scalefish
Holocentridae	squirrelfishes
unidentified	squirrelfish
Caproidae	boarfishes
Antigonia capros	deepbody boarfish
Antigonia sp.	boarfish
Fistulariidae	cornetfishes
unidentified	cornetfish
Centriscidae	snipefishes
Marcoramphosus sp.	snipefish
Syngnathidae	pipefishes
Hippocampus erectus	lined seahorse
Hippocampus reidi	longsnout seahorse

Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (cont.)

Family Genus and Species	Common name
Hippocampus sp.	seahorse
Syngnathus caribbaeus	Caribbean pipefish
Syngnathus floridae	dusky pipefish
Syngnathus pelagicus	sargassum pipefish
Syngnathus scovelli	gulf pipefish
Syngnathus springeri	bull pipefish
Syngnathus sp.	pipefish
unidentified	pipefish
Dactylopteridae	flying gurnards
Dactylopterus volitans	flying gurnard
Scorpaenidae	scorpionfishes
Helicolenus dactylopterus	blackbelly rosefish
unidentified	scorpionfish
Triglidae	searobins
Prionotus carolinus	northern searobin
Prionotus sp(p).	searobin
unidentified	searobin
Chiasmodontidae	swallowers
unidentified	swallower
Serranidae	sea basses
Anthias sp.	sea bass
Centropristis sp.	sea bass
Diplectrum sp.	sea bass
Hemianthias vivanus	red barbier
Liopropoma sp.	sea bass
Plectranthias garrupellus	apricot bass
Psuedgramma gregoryi	reef bass
Rypticus sp.	soapfish
unidentified	sea bass
Priacanthidae	bigeyes
Priancnthus arenatus	bigeye
unidentified	bigeye
Apogonidae	cardinalfishes
unidentified	cardinalfish
Malacanthidae	tilefishes
Lopholatilus chamaeleonticeps	tilefish
Malacanthus plumieri	sand tilefish
Pomatomidae	bluefish
Pomatomus saltatrix	bluefish
Carangidae	jacks
Caranx bartholomaei	yellow jack
Caranx crysos	blue runner
Caranx ruber	bar jack
Caranx spp.	jack
Decapterus macarellus	maclerel scad
Decapterus punctatus	round scad
Decapterus sp.	scad
Elagates bipinnulata	rainbow runner
Hemicaranx amblyrhynchus	bluntnose jack
Selar crumenophthalmus	bigeye scad
Seriola dumerili	greater amberjack
Seriola fasciata	lesser amberjack
Seriola rivoliana	almaco jack
Serioloa zonata	banded rudderfish
Seriola sp(p).	amberjack
Trachinotus carolinus	florida pompano

Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (cont.)

Family Genus and Species	Common name
Trachinotus falcatus	permit
Trachinotus goodei	palometa
Thachurus lathami	rough scad
unidentified	jack
Coryphaenidae	dolphins
Coryphaena equisetis	pompano dolphin
Coryphaena hippurus	dolphin
Caristiidae	veilfins
Caristius sp.	veilfin
Lutjanidae	snappers
Lutjanus sp(p).	snapper
Rhomboplites aurorubens	vermillion snapper
Lobotidae	tripletails
Lobotes surinamensis	tripletail
Gerreidae	mojarras
Eucinostomus sp.	mojarra
Haemulidae	grunts
unidentified	grunt
Sparidae	porgies
Lagodon rhomboides	pinfish
Pagrus pagrus	red porgy
unidentified	porgy
Sciaenidae	drums
Larimus fasciatus	banded drum
Leiostomus xanthurus	spot
Menticirrhus sp(p).	kingfish
Micropogonias undulatus	croaker
Mullidae	goatfishes
Mullus auratus	red goatfish
unidentified	goatfish
Kyphosidae	sea chubs
Kyphosus sectatrix	Bermuda chub
Chaetodontidae	butterflyfishes
Chaetodon sp(p).	butterflyfish
Pomacentridae	damselfishes
Abudeduf saxatilis	sergeant major
Abudefduf taurus	night sergeant
unidentified	damselfish
Mugilidae	mullets
Mugil cephalus	striped mullet
Mugil curema	white mullet
Mugil sp(p).	mullet
Sphyraenidae	barracudas
Sphyraena barracuda	great barracuda
Sphyraena borialis	northern sennet
Sphyraena sp(p).	barracuda
Labridae	wrasses
Hemipteronotus sp(p).	wrass
unidentified	wrass
Scaridae	parrotfishes
unidentified	parrotfish
Pholidae	gunnels
Pholis sp.	gunnel
Uranoscopidae	stargazers
unidentified	stargazer

Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (cont.)

Family Genus and Species	Common name
Percophidae	flatheads
unidentified	flathead
Blenniidae	combtooth blennies
Parablennius marmorius	seaweed blenny
unidentified	blenny
Ammodytidae	sand lances
Ammodytes spp.	sand lance
Callionymidae	dragonets
unidentified	dragonet
Gobiidae	gobies
Isoglossus calliurus	blue goby
Microgobius sp.	goby
unidentified	goby
Acanthuridae	surgeonfishes
Acanthurus sp(p).	surgeonfish
Trichiuridae	cutlassfishes
unidentified	cutlassfish
Gempylidae	snake mackerels
Diplosinus multistriates	snake mackerel
Gempylus serpens	snake mackerel
unidentified	snake mackerel
Scombridae	mackerels
Auxis sp(p).	frigate mackerel
Euthynnus alletteratus	little tunny
Katsuwonus pelamis	skipjack tuna
Sarda sarda	Atlantic bonito
Scomber japonicus	chub mackerel
Scomber scomber	Atlantic mackerel
Scomberomorus cavalla	king mackerel
Thunnus albacares/alalunga	yellowfin tuna/albacore
Thunnus thynnus	bluefin tuna
Xiphiidae	swordfish
Xiphias gladius	swordfish
Istiophoridae	billfishes
unidentified	billfish
Stromateidae	butterfishes
Ariomma sp.	driftfish
Hyperoglyphe sp.	driftfish
Nomeus gronovii	man-of-war fish
Peprilus triacanthus	butterfish
Psenes cyanophrys	freckled driftfish
Psenes maculatus	silver driftfish
Psenes pellucidus	bluefin driftfish
Psenes sp.	driftfish
unidentified	butterfish
Bothidae	lefteye flounders
Bothus ocellatus	eyed flounder
Bothus sp(p).	flounder
Citharichthys arctifrons	Gulf Stream flounder
Citharichthys cornutus	horned whiff
Citharichthys gymnorhinus	anglefin whiff
Citharichthys sp(p).	whiff
Cyclopsetta fimbriata	spotfin flounder
Engyophrys senta	spiny flounder
Etropus microstomus	smallmouth flounder
Etropus sp(p).	flounder

Taxonomic list of larval and early-juvenile fishes from offshore of Cape Lookout to offshore of Cape Hatteras and includes the region known as "The Point". (cont.)

Family Genus and Species	Common name
Monolene sessilicauda	deepwater flounder
Paralichthys dentatus	summer flounder
Paralichthys lethostigma	southern flounder
Paralichthys oblongus	fourspot flounder
Paralichthys squamilentus	broad flounder
Scophthalamus aquosus	windowpane
Syacium papillosum	dusky flounder
unidentified	flounder
Pleuronectidae	righteye flounders
Glyptocephalus cynoglossus	witch flounder
Pleuronectes ferrugineus	yellowtail flounder
Soleidae	soles
Symphurus sp(p).	tonguefish
Balistidae	leatherjackets
Aluterus heudeloti	dotterel filefish
Aluterus monoceros	unicorn filefish
Aluterus schoepfi	orange filefish
Aluterus scriptus	scrawled filefish
Balistes capriscus	gray triggerfish
Balistes vetula	queen triggerfish
Cantherhines macrocerus	whitespotted filefish
Cantherhines pullus	orangespotted filefish
Cantheridermis maculata	rough triggerfish
Cantherdermis sufflamen	ocean triggerfish
Monacanthus ciliatus	fringed filefish
Monacanthus hispidus	planehead filefish
Monacanthus setifer	pygmy filefish
Monacanthus tuckeri	slender filefish
Xanthichthys ringins	sargassum triggerfish
unidentified	leatherjacker
Ostraciidae	boxfishes
Lactophrys sp(p).	boxfish
Tetraodontidae	puffers
Diodon holcanthus	ballonfish
Sphoeroides spengleri	bandtail puffer
Sphoeroides sp.	puffer
unidentified	puffers
Molidae	molas
unidentified	mola

Appendix B. Habitat laws (Source: EPA, 1994).

The Clean Water Act (CWA) 33 U.S.C. s/s 121 et seq. (1977):

The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. This law gave EPA the authority to set effluent standards on an industry-by-industry basis (technology-based) and continued the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (NPDES) is obtained under the Act. The 1977 amendments focused on toxic pollutants. In 1987, the CWA was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (POTWs) under the Construction Grants Program. The CWA provides for the delegation by EPA of many permitting, administrative, and enforcement aspects of the law to state governments. In states with the authority to implement CWA programs, EPA still retains oversight responsibilities.

The comprehensive environmental response, compensation, and liability act (CERCLA or Superfund) 42 U.S.C. s/s 9601 et seq. (1980)

CERCLA (pronounced SERKla) provides a federal "Superfund" to clean up uncontrolled or abandoned hazardous waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through the Act, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup. EPA cleans up orphan sites when potentially responsible parties (PRPs) cannot be identified or located, or when they fail to act. Through various enforcement tools, EPA obtains private party cleanup through orders, consent decrees, and other small party settlements. EPA also recovers costs from financially viable individuals and companies once a response action has been completed. EPA is authorized to implement the Act in all 50 states and U.S. territories. Superfund site identification, monitoring, and response activities in states are coordinated through the state environmental protection or waste management agencies.

The emergency planning & community right-to-know act (EPCRA) 42 U.S.C. 11011 et seq. (1986):

Also known as Title III of SARA, EPCRA was enacted by Congress as the national legislation on community safety. This law was designed to help local communities protect public health, safety, and the environment from chemical hazards. To implement EPCRA, Congress required each state to appoint a State Emergency Response Commission (SERC). The SERCs were required to divide their states into Emergency Planning Districts and to name a Local Emergency Planning Committee (LEPC) for each district. Broad representation by fire fighters, health officials, government and media representatives, community groups, industrial facilities, and emergency managers ensures that all necessary elements of the planning process are represented.

The endangered species act 7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973):

The Endangered Species Act provides a pro-gram for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service (FWS) of the Department of Interior maintains the list of 632 endangered species (326 are plants) and 190 threatened species (78 are plants). Species include birds, insects,

fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Anyone can petition FWS to include a species on this list or to prevent some activity, such as logging, mining, or dam building. The law prohibits any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat. Likewise, import, export, interstate, and foreign commerce of listed species are all prohibited. EPA's decision to register a pesticide is based in part on the risk of adverse effects on endangered species as well as environmental fate (how a pesticide will effect habitat). Under FIFRA, EPA can issue emergency suspensions of certain pesticides to cancel or restrict their use if an endangered species will be adversely affected. Under a new program, EPA, FWS, and USDA are distributing hundreds of county bulletins which include habitat maps, pesticide use limitations, and other actions required to protect listed species. In addition, we are enforcing regulations under various treaties, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The U.S. and 70 other nations have established procedures to regulate the import and export of imperiled species and their habitat. The Fish and Wildlife Service works with U.S. Customs agents to stop the illegal trade of species, including the Black Rhino, African elephants, tropical birds and fish, orchids, and various corals.

The federal insecticide, fungicide and rodenticide act (FIFRA) 7 U.S.C. s/s 135 et seq. (1972):

The primary focus of FIFRA was to provide federal control of pesticide distribution, sale, and use. EPA was given authority under FIFRA not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides. Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the U.S. must be registered (licensed) by EPA. Registration assures that pesticides will be properly labeled and that, if used in accordance with specifications, will not cause unreasonable harm to the environment.

The (federal) freedom of information act (FOIA) U.S.C. s/s 552 (1966):

The Freedom of Information Act provides specifically that "any person" can make requests for government information. Citizens who make requests are not required to identify themselves or explain why they want the information they have requested. The position of Congress in passing FOIA was that the workings of government are "for and by the people" and that the benefits of government information should be made available to everyone. All branches of the federal government must adhere to the provisions of FOIA with certain restrictions for work in progress (early drafts), enforcement confidential information, classified documents, and national security information.

The national environmental policy act (NEPA) 42 U.S.C. s/s 4321 et seq. (1969):

The National Environmental Policy Act was one of the first laws ever written that establishes the broad national framework for protecting our environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action which significantly affects the environment. NEPA requirements are invoked when airports, buildings, military complexes, highways, parkland purchases, and other such federal activities are proposed. Environmental Assessments (EAs) and Environmental Impact Statements (EISs), which are assessments of the likelihood of impacts from alternative courses of action, are required from all federal agencies and are the most visible NEPA requirements.

The occupational safety and health act 29 U.S.C. 61 et seq. (1970):

Congress passed the Occupational and Safety Health Act to ensure worker and workplace safety. Their goal was to make sure employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. In order to establish standards for workplace health and safety, the Act also created the National Institute for Occupational Safety and Health (NIOSH) as the research institution for the Occupational Safety and Health Administration (OSHA). OSHA is a division of the U.S. Department of Labor which over-sees the administration of the Act and enforces federal standards in all 50 states.

The pollution prevention act 42 U.S.C. 13101 and 13102, s/s 6602 et seq. (1990):

The Pollution Prevention Act focused industry, government, and public attention on reducing the amount of pollution produced through cost-effective changes in production, operation, and raw materials use. Opportunities for source reduction are often not realized because existing regulations, and the industrial resources required for compliance, focus on treatment and disposal. Source reduction is fundamentally different and more desirable than waste management or pollution control. Pollution prevention also includes other practices that increase efficiency in the use of energy, water, or other natural resources, and protect our resource base through conservation. Practices include recycling, source reduction, and sustainable agriculture.

The resource conservation and recovery act (RCRA) 42 U.S.C. s/s 321 et seq. (1976)

RCRA (pronounced “rick-rah”) gave EPA the authority to control hazardous waste from “cradle-to-grave.” This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites (see CERCLA). HSWA (pronounced “hisswa”) - The federal Hazardous and Solid Waste Amendments. The 1984 amendments to RCRA which required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.

The safe drinking water act (SDWA) 43 U.S.C. s/s 300f et seq. (1974):

The Safe Drinking Water Act was established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designated for drinking use, whether from above ground or underground sources. The Act authorized EPA to establish safe standards of purity and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary standards (nuisance-related).

The superfund amendments and reauthorization act (SARA) 42 U.S.C. 9601 et seq. (1986)

The Superfund Amendments and Reauthorization Act of 1986 reauthorized CERCLA to continue cleanup activities around the country. Several site-specific amendments, definitions, clarifications, and technical requirements were added to the legislation, including additional enforcement authorities. Title III of SARA also authorized the Emergency Planning and Community Right-to-Know Act (EPCRA). the toxic substances control act (TSCA) 15 U.S.C. s/s 2601 et seq. (1976) The Toxic Substances Control Act of 1976 was enacted by Congress to test, regulate, and screen all chemicals produced or imported into the U.S. Many thousands of chemicals and their compounds are developed each year with unknown toxic or dangerous characteristics. To prevent tragic consequences, TSCA requires that any chemical that reaches the consumer market place be tested for possible toxic effects prior to commercial manufacture. Any existing chemical that poses health and environmental hazards is tracked and reported under TSCA. Procedures also are authorized for corrective action under TSCA in cases of cleanup of toxic materials contamination. TSCA supplements other federal statutes, including the Clean Air Act and the Toxic Release Inventory under EPCRA.

Appendix C. Comments on SDEIS for the Sargassum FMP.

Steve

State of North Carolina
Department of Environment
and Natural Resources
Division of Marine Fisheries

Michael F. Easley, Governor
William G. Ross, Jr., Secretary
Preston P. Pate, Jr., Director

RA DRA PA
SRA SDRA
Copy to F/SER2 F/SER1
F/SER3 F/SER2
F/SER4 F/SER3
Budget
Action FYI Comp Ops
Date 1/11/02

NCDENR
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

1/11/02

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MEMORANDUM

TO: US Dept. of Commerce
Joseph E. Powers
Acting Regional Administrator
Southeast Regional Office

FROM: Michael W. Street

DATE: January 8, 2002

SUBJECT: SDEIS – Pelagic Sargassum Habitat of the South Atlantic Region

The North Carolina Division of Marine Fisheries has reviewed the subject document. We have no comments at this time.

MS/sw

P.O. Box 769, Morehead City, North Carolina 28557-0769 Telephone 919-726-7021 FAX 919-726-0254

GEORGIA
Coastal Resources Division

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02 JAN 28 PM 2:26

January 24, 2002

Mr. Joseph E. Powers
SE Regional Office
9721 Executive Center Drive N.
St. Petersburg, Florida 33702

RE: Consistency Determination of SDEIS Pelagic Sargassum Habitat of S. Atlantic Region
December 2001 report

Dear Mr. Powers:

Staff of the Coastal Management Program has reviewed your December 28, 2001 letter and attached SDEIS referenced above. The SDEIS proposes to establish a Fishery Management Plan for Pelagic Sargassum Habitat of the South Atlantic Region.

The Program concurs with the applicant's consistency determination. This determination ensures that the proposed project has been designed to comply to the maximum extent practicable with the applicable enforceable policies of the Georgia Coastal Management Program.

Please feel free to contact Kelie Matrangos or me if we can be of further assistance.

Sincerely,

Stuart A. Stevens

Dr. Stuart A. Stevens
Chief, Ecological Services

SAS/kmm

Cc: DNR/MFS

Mr. Scott Gudes
Room 5805, SP
US Department of Commerce
Washington, DC 20230

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02 FEB -1 PM 12:06

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January 29, 2002

Mr. Joseph E. Powers
Southeast Regional Office
National Marine Fisheries Service
9721 Executive Center Drive N.
St. Petersburg, FL 33702

SDEIS FOR PELAGIC SARGASSUM
REVIEWER COMMENTS

Dear Mr. Powers:

As a member of the SAFMC Environment and Habitat Advisory Panel, I have reviewed the subject document dated December 2001. After careful reading and thoughtful consideration, I recommend the following actions.

1. Allow harvest (TAC) of 50,000 wet pounds annually.
2. Require all participants to report their harvest monthly.
3. Declare the EEZ as the EHF.
4. Restrict harvest to zones far enough off shore to minimize bycatch.
5. Restrict harvest to specified seasons to minimize bycatch.

Thank you for permitting the review and requesting comments.

Sincerely yours.

John W. Duren

Cc:

Scott B. Gudes
Room 5805 SP
U S. Dept. of Commerce
Washington D.C. 20230

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

February 6, 2002

Joseph E. Powers
Acting Regional Administrator
Southeast Regional Office
National Marine Fisheries Service, NOAA
9721 Executive Center Drive N.
St. Petersburg, FL 33702

Dear Dr. Powers:

Thank you very much for the opportunity to review the Supplemental Draft Environmental Impact Statement for pelagic *Sargassum* of the South Atlantic Region, as transmitted in the December 28, 2001 letter from NOAA Deputy Undersecretary Scott Gudes. As this document does not contain an international component, we have no comment. Nonetheless, we continue to appreciate the chance to provide our views.

Sincerely,

for

Bill Gibbons-Fly
Acting Director, Office of Marine Conservation

Cc: Deputy Undersecretary Scott Gudes

02/22/02 FRI 12:23 FAX 727 570 5583 FISHERIES MGT SAFMC 002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

FEB 19 2002

OPTIONAL FORM 99 (7-90)
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Dept./Agency | Phone #
Fax # | Fax #
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Joseph E. Powers
Acting Regional Administrator
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive N
St Petersburg FL 33702

RE: EPA Review and Comments on the Supplemental Draft Environmental Impact Statement for Pelagic Sargassum Habitat of the South Atlantic Region CEQ No. 020004

Dear Dr. Powers:

Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has reviewed the subject Draft Supplemental Environmental Impact Statement (DSEIS). The document provides alternatives for establishing a Fishery Management Plan for pelagic *Sargassum* habitat of the South Atlantic Region, proposes to define the geographic extent of the management unit, maximum sustainable yield, optimum yield, overfishing levels, and describes essential fish habitats areas of special concern.

An earlier *Sargassum* Fishery Management Plan (FMP) was originally incorporated in an environmental impact statement addressing Essential Fish Habitat (EFH) in the Fishery Management Plans for the South Atlantic Region. On advice from National Marine Fisheries Service (NMFS), the South Atlantic Fishery Management Council (Council) decided to remove the *Sargassum* FMP from the EFH FMP and create a stand-alone *Sargassum* FMP in October, 1999. EPA commented in November, 1999, expressing concerns for pelagic species inhabiting *Sargassum* mats such as filefish, sea horses, various shrimps and crabs, and the endangered green turtle.

However, in a controversial decision, NMFS then rejected the Council's 1999 *Sargassum* FMP because of objections to the Council's stated position that... "removal of pelagic *Sargassum* represented a net loss of EFH". NMFS held that net loss of habitat was unacceptable and contrary to the goals of the Magnuson-Stevens Act. This position stems from the fact that in the *Sargassum* fishery, the species being targeted for harvest is itself a habitat for other managed or protected species. The conflicting relationship between *Sargassum* as an EFH and as a fishery resource is because the floating *Sargassum* mats provide refuge for federally-managed fin fish

species and federally-protected sea turtles. The present DSEIS provides more comprehensive analysis of the habitat net loss issue, provides estimates of *Sargassum* growth and regeneration rates, and gives the public additional time to submit comments. Unlike hard-bottom or other fixed habitats, *Sargassum* is continually renewing itself by asexual reproduction. These species of *Sargassum* are sterile and reproduce by vegetative fragmentation. Estimates of *Sargassum* production vary depending on the availability of nitrogen and phosphorus; under optimum conditions *Sargassum* is reported to double its biomass every 10-20 days. A doubling of resource biomass every 10-20 days far exceeds the productivity of any other fishery of which EPA is aware.

The fishery today comprises one company, Aqua-10 Laboratories, who harvested *Sargassum* offshore in North Carolina from 1976 to 1997; no harvest has occurred since 1997. Pelagic *Sargassum* is dried, powdered, fermented and extracted to yield powdered concentrated plant growth stimulants and poultry and livestock feed supplements, valued (in 1997) at approximately $36,000. A liquified product is also produced, but the value of the finished liquid product is unknown. A total of 448,000 lbs of *Sargassum* has been harvested in this 21-year time-frame with harvesting occurring during the months of June and September. However, Aqua-10 Laboratories reportedly anticipated an increase in *Sargassum* annual harvest demand of 500,000 beginning in 1999 - exceeding in one year Aqua 10's harvest total for the previous 21 years.

EPA has the following comments, concerns and questions following review of the subject SDEIS.

- EPA believes that designation of *Sargassum* as a habitat, specifically an EFH, should not automatically preclude some level of *Sargassum* harvesting. However, some means of protecting federally-managed fin fish species and federally-protected sea turtles needs to be discussed. Current harvesting methods using trawls would entrain and drown sea turtles, especially the young; the final SEIS should explore strategies for reducing post-hatchling turtle mortality. Prohibiting *Sargassum* harvesting from July to October, when the turtle hatching season is over, is an obvious strategy that might be explored. We do not know, however, for how long the post-hatchlings are likely to remain within the floating algal mats and subject to capture and damage in the harvest process.

- EPA supports establishing a Management Unit for *Sargassum* throughout the South Atlantic Exclusive Economic Zone, and recommends that State waters be included as part of the Management Unit. While the majority of *Sargassum* habitat occurs beyond 12 miles, and thus outside of State jurisdictional waters, EPA believes that management plans affecting State and federal waters should be consistent to provide maximum protection of the resource. The presence of sea turtles in floating *Sargassum* mats is independent of political jurisdictions. Because post-hatchling sea turtles migrate from on-shore beach nesting areas through State jurisdictional waters on their way to a pelagic existence, the *Sargassum* mats first encountered by the baby turtles are likely to be

situated in State waters. *Sargassum* habitats found in State waters should be protected to the same degree as those found in federal waters.

- EPA supports the Council's establishing a Management Unit as large as is feasible so that the geographical boundaries of the fishery will not have to be redefined at some future date in the event an increased interest in *Sargassum*-based products expands the fishery. Up to now, the *Sargassum* harvesting has been modest, averaging slightly more than 20,000 lbs/year in the period 1976 to 1997, but Aqua 10's dramatic increase in proposed annual harvest suggests a potential increased interest in seaweed-base products that may have long-term impacts on the resource. Establishing a comprehensive Management Unit at this time would provide the Council the authority to monitor and adjust stock harvest levels without having to provide additional NEPA documentation on redefining stock geographic boundaries.

- EPA's earlier concerns for the commercial harvesting of *Sargassum* weed remain largely unresolved because harvesting destroys most of the bycatch inhabitants due to their small size and camouflage. The DSEIS should explore means to reduce mortality of managed fin-fish species entrapped in the *Sargassum* during harvesting operations.

- The DSEIS notes that natural beach stranding of *Sargassum* on North Carolina shores alone is estimated to be 500 metric tons which far exceeds amounts being contemplated for commercial harvest. Harvesting beach stranded instead of offshore *Sargassum* eliminates most if not all of the EFH and related protected species concerns. The final SEIS should explain why beach stranded *Sargassum* cannot be used by Aqua-10 in their production processes.

Based on this review EPA rated the subject DSEIS "EC-2", that is, environmental concerns about the proposed management plans have been identified and more information is needed to fully assess environmental impacts to fully protect aquatic resources. Mortality of managed fin fish and protected sea turtles remains problematic.

EPA appreciates the opportunity to provide these comments and looks forward to reviewing the final SEIS. If you have any questions or need additional information on these comments, please contact John Hamilton at (404) 562-9617.

Sincerely,

Heinz Mueller, Chief
Office of Environmental Assessment

Tue, Feb 26, 2002 11:05 AM

From: Steve Branstetter <Steve.Branstetter@noaa.gov>
Organization: NOAA
To: <Roger.Pugliese@safmc.net>
Date: Wednesday, February 20, 2002 1:04 PM
Subject: sargassum comment via email

Subject: Sargassum Fishery Comment
Date: Thu, 14 Feb 2002 16:34:23 -0500
From: "Todd R. Barber" <reefball@reefball.com>
To: <joseph.powers@noaa.gov>
CC: "ACT \(Advanced Coastal Technology\)" <ACT@dnet.net>, <Reefballer@aol.com>, "kathy kirbo" <kkirbo@hotmail.com>, "Don Brawley" <dbrawley@eternalreefs.com>, "Lena Jankowsky" <lena88C@hotmail.com>, "Kenneth Minnick" <minnick@dotstar.net>

The Reef Ball Development Group, Ltd, Reef Ball Foundation, Reef Innovations, Inc., Coastal Reef Builders, Inc., Eternal Reefs, Inc., Reef Ball Coalition, Inc., Advanced Coastal Technologies, Inc, and all of our combined memberships and affiliated companies OPPOSE any harvest of CRITICAL Atlantic (or any other seas) Sargassum Habitat. That ONE man would be allowed to destroy such VITAL habitat for the sole purpose of feeding livestock is not only abusive of the habitat and public resource...it's just plain insane. We strongly oppose any plan that allows ANY harvest of Congressionally Mandated Essential Fish Habitat.

Thanks,

Todd R. Barber
Chairman, Reef Ball Foundation
CEO, Reef Ball Development Group, Ltd.
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Page 1 o

The National Environmental Policy Act (NEPA) and its implementing regulations encourage

Advocates for Wild, Healthy Oceans

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Suite 600
Washington, DC 20036

Formerly the Center for Marine Conservation

February 25, 2002

Dr. Joseph Powers, Acting Regional Director
NMFS SERO
9721 Executive Center Dr. N.
St Petersburg, FL 33702

The Ocean Conservancy

RE: Supplemental Draft Environmental Impact Statement for Pelagic Sargassum Habitat of the South Atlantic Region

Dear Dr. Powers:

On behalf of the Ocean Conservancy (formerly The Center for Marine Conservation) and our more than 120,000 members nationwide committed to advocacy for wild healthy oceans, we are writing to express concern over the National Marine Fisheries Service's (NMFS) process for publicly noticing the availability and comment deadline for the Supplemental Draft Environmental Impact Statement for Pelagic Sargassum Habitat in the South Atlantic Region (SDEIS).

While searching for materials relative to other matters on the South Atlantic Fishery Management Council (SAFMC) website, we came across a notice indicating that the SDEIS was available and that comments were due to NMFS by February 25, 2002. We immediately requested a copy of this document from NMFS and received it several days later. The troubling part of this is that there was not the usual posting in the Federal Register from NMFS or NOAA that this document was available for review and comment.

On February 19, 2002 (67 FR 7344) there was a Federal Register posting for a public hearing regarding Sargassum, taking place in Savannah, GA on March 6, 2002, concurrent with the SAFMC meeting schedule. This notice mentions the SDEIS and indicates written comments can be sent to the SAFMC until the same March 6, 2002 date. The document that we received from NMFS indicated that it was completed and filed with the United States Environmental Protection Agency on January 4, 2002. Given that NMFS did not independently notice this document for public review and comment, at all, but rather relied on the EPA weekly notice of receipt of environmental impact statements that included the DSEIS (67 FR 1461), it seems an unreasonably short deadline to now close public comment on February 25, 2002 for NMFS and on March 6, 2002 for the SAFMC.

The National Environmental Policy Act (NEPA) and its implementing regulations encourage agencies like NMFS to obtain public input regarding agency decisions, such as those contemplated in the DSEIS. See 42 U.S.C. § 4321 et seq. As such, NMFS should meaningfully comply with purpose of NEPA in providing for sufficient public notice and comment.

We understand the need to address this matter at the upcoming SAFMC meeting the week of March 4th, 2002, however this seems to give the public an insufficient amount of time to review and discuss an important topic that involves the take of essential fish habitat and impacts to endangered and threatened species like sea turtle hatchlings. This lack of sufficient time is even more concerning given that NMFS did not give proper notice of the SDEIS as it usually does, instead relying on a bare-bones, 4 line notice tucked in an EPA posting to the Federal Register.

The Ocean Conservancy, in the short time period it has had actual notice of this SDEIS, has reviewed the SDEIS and has several substantial concerns regarding the adequacy of the DSEIS. We intend to provide further detail on these concerns in a letter to the SAFMC by its March 6th deadline.

We do urge you to extend the comment deadline to a reasonable date to allow for adequate public participation in the comment process directly to NMFS. If additional time is provided for the public to comment to NMFS, the SAFMC can then review comments and make recommendations to NMFS at its June 2002 meeting.

Sincerely,

Marianne Cufone, Esq.
Regional Fish Program Manager

Coby Dolan
Program Counsel

Advocates for Wild, Healthy Oceans

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Formerly the Center for
Marine Conservation

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MAR 1 3 2002
South Atlantic
Fishery Mgmt Council

The Ocean Conservancy

March 6, 2002

Robert Mahood, Executive Director
South Atlantic Fishery Management Council
One Southpark Circle, Suite 306
Charleston, SC 29407-4699
VIA FACSIMILE AND U.S. MAIL

RE: Supplemental Draft Environmental Impact Statement for Pelagic Sargassum Habitat of the South Atlantic Region

Dear Mr. Mahood:

On behalf of The Ocean Conservancy (formerly The Center for Marine Conservation) and our more than 120,000 members nationwide committed to advocacy for wild, healthy oceans, I am writing to provide substantive comments on and concerns about the contents of the Supplemental Draft Environmental Impact Statement for Pelagic Sargassum Habitat in the South Atlantic Region (SDEIS). I am also writing to express our concern over the public notice process, or lack thereof, for this document.

At the outset, The Ocean Conservancy expresses its dismay that the National Marine Fisheries Service (NMFS) continues to devote significant resources to attempt maintaining a Sargassum fishery, particularly in the face of overwhelming public opposition, consensus by the South Atlantic Fishery Management Council (SAFMC) that a ban on Sargassum collection is appropriate and knowledge that ecological impacts from Sargassum collection are significant.

I. Sargassum is mainly concentrated in known sites and is, throughout its range, essential habitat

Most pelagic Sargassum circulates between 20 and 40 degrees North latitude and 30 degrees West longitude and the Western edge of the Florida Current /Gulf Stream. This includes state waters off of Florida, Georgia, South and North Carolina, the U.S. EEZ, and extraterritorial waters of the Western North Atlantic. The greatest concentrations are found within the North Atlantic Central Gyre in the Sargasso Sea. Large quantities of Sargassum frequently occur on the Continental Shelf off the Southeastern United States.

Sargassum supports a diverse assemblage of ocean wildlife, including fungi, micro- and macro-epiphytes, at least 145 species of invertebrates, over 100 species of fish, and five species of endangered or threatened sea turtles.

The floating mats of algae are of crucial importance to the life cycle of several species of threatened and endangered sea turtles: Loggerhead, Green, Leatherback, Hawksbill and Kemp's Ridley. Presence of post-hatchling sea turtles in Sargassum weed has been documented repeatedly. Research indicates that a minimum of 5 post-hatchling turtles can be found in just a one-mile strip of Sargassum. In June 1999, NMFS completed a formal Endangered Species Act (ESA) Section 7 consultation on the proposed rule to implement a Fishery Management Plan for pelagic Sargassum habitat, resulting in a biological opinion that concluded that **collection of Sargassum would likely adversely affect sea turtles,** particularly loggerhead post-hatchlings. NMFS anticipated that incidental, lethal take of up to 30 post-hatchling loggerheads and one other young sea turtle per 50,000 pounds wet weight collected would have occurred during the phase-out of Sargassum collection under the proposed rule.

Sargassum is also important to more than 100 species of fish, including important recreationally and commercially caught species like many snappers and billfish that are severely overfished. Like young turtles, the fish use Sargassum mats for protective cover and food. For this and other reasons, the SAFMC and NMFS determined Sargassum to be essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Act).

The Ocean Conservancy strives to be the world's foremost advocate for the oceans. Through science-based advocacy, research, and public education, we inform, inspire and empower people to speak and act for the oceans.