DRAFT

Interim Action to Implement Measures to Reduce Overfishing of the Northeast Fishery Complex Under the Northeast Multispecies Fishery Management Plan

Part II of Settlement Agreement

Environmental Assessment and Regulatory Impact Review

Prepared by the
National Marine Fisheries Service
Northeast Regional Office
One Blackburn Drive
Gloucester, MA 01930-2298

June 2002

Executive Summary

The Secretary of Commerce (Secretary) finds that this action is necessary to comply with the Settlement Agreement Among Certain Parties (Settlement Agreement), which was ordered to be implemented on May 23, 2002, by the U.S. District Court for the District of Columbia (Court) in Conservation Law Foundation, et al., v. Evans (Case No. 00-1134, D.D.C., December 28, 2001). The measures were developed as a result of Court-sponsored mediation. The Settlement Agreement, to which the National Marine Fisheries Service (NMFS) is a party, stipulates that NMFS and the New England Fishery Management Council (Council) must develop Amendment 13 to the Northeast Multispecies Fishery Management Plan (FMP) in order to bring the FMP into compliance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act (SFA). Two interim actions were also ordered to allow the Council time to complete Amendment 13. The rule implementing the first interim action ordered by the Court was published in the Federal Register on April 29, 2002, and amended on May 6, 2002. The action that is the subject of this document is the proposed rule for the second interim action which, by the terms of the Settlement Agreement, is to be implemented by August 1, 2002. In ordering implementation of the Settlement Agreement, the Court recognized that the Settlement Agreement was intended to be implemented as an integrated whole and that to not do so would "cause grave economic and social hardship, as well as injustice to individuals, to families, to fishing communities, and to surrounding cities and states." Consequently, the Preferred Alternative (Section 3.2) described in this document consists of measures specified in the Settlement Agreement that include temporal extension of existing area closures, new area closures, new gear restrictions and restrictions on days-at-sea (DAS) usage and accounting for DAS for the commercial sector of the fishery, as well as additional measures for the recreational sector. The measures are intended to reduce overfishing and provide substantive protection for Gulf of Maine (GOM) cod, as well as several other groundfish stocks in the Northeast (NE) beginning August 1, 2002, and until such time that Amendment 13 to the FMP is implemented. A more extensive observer program to better monitor and collect information on bycatch in the NE multispecies fishery will also be put in place.

Table of Contents

List of Figures

List of Tables

1.0 Introduction

1.1 Background

On December 28, 2001, a decision was rendered by the U.S. District Court for the District of Columbia (Court) on Conservation Law Foundation, et al. v. Evans (Case No. 001134, D.D.C., December 28, 2001), brought by the Conservation Law Foundation, Center for Marine Conservation, National Audubon Society and Natural Resources Defense Council against NMFS. The suit alleged that Framework Adjustment 33 to the FMP violated the overfishing, rebuilding and bycatch provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens) Act, as amended by Sustainable Fisheries Act (SFA), and Amendment 9 to the Fishery Management Plan for the Northeast Multispecies Fishery (FMP); the Court granted plaintiffs' Motion for Summary Judgment on all counts. Specifically, the Court found that Framework 33 failed to meet the FMP's Amendment 9 (i.e., SFA) overfishing and rebuilding targets. Amendment 9 established overfishing and rebuilding objectives to meet SFA requirements. However, it did not implement or analyze any specific measures necessary to meet the new overfishing and rebuilding objectives. Framework 33, which was developed after Amendment 9, was an annual adjustment required by Amendment 7 to meet Amendment 7 targets. In developing Framework 33, the Council chose measures to meet Amendment 7 (pre-SFA) objectives, because Amendment 9 did not specify or analyze the types of measures necessary to meet SFA objectives. The Court found that Framework 33 should have implemented measures to meet Amendment 9/SFA overfishing criteria and rebuilding objectives, rather than those of Amendment 7. Further, the Court found that Amendment 9 and Framework 33 violated the SFA because they did not include a "standardized bycatch reporting methodology" and because they did not adequately justify the lack of new measures to minimize bycatch to the extent practicable.

Although finding that the FMP was not in compliance with the SFA, the Court did not immediately impose a remedy. Instead, the Court asked for a hearing to propose an the appropriate remedy. Shortly thereafter, the States of ME, NH, MA and RI and three industry groups (Intervenors) were allowed to intervene for purposes of recommending to the Court an appropriate remedy. On February 15, 2002, the Court established a briefing schedule to address what remedy the Court should impose on NMFS. On March 1, 2002, NMFS, on behalf of the Secretary of Commerce, submitted to the Court a proposed remedy to bring the FMP into full compliance with the SFA, the Magnuson-Stevens Act and all other applicable law as quickly as possible. The remedy provided for three separate actions: A Secretarial interim action, under authority of section 304(c) of the Magnuson-Stevens Act, to be implemented on May 1, 2002; a Secretarial amendment to the FMP, under

authority of section 304(e) of the Magnuson-Stevens Act, to be implemented before the first interim action expired in October 2002; and Amendment 13 to the FMP, to be completed by both NMFS and the Council on an accelerated schedule, to bring the FMP into full compliance with all provisions of the SFA, the Magnuson-Stevens Act, and other applicable law.

This three-step process was intended to provide protection to the NE multispecies fishery while NMFS, the Council, and the public develop long-term measures to comply with the SFA and other applicable law. The full rationale and justification for this approach were contained in the NMFS brief that was filed with the Court on March 1, 2002. Before the Court could rule on the appropriateness of NMFS' proposed remedy, however, the parties to the lawsuit agreed to participate in Court-sponsored mediation to try to reach a consensus on a remedy. The mediation took place from April 5-April 15, 2002. The majority of parties in the lawsuit agreed to a Settlement Agreement, which was filed with the Court on April 16, 2002. In addition to NMFS, the parties signing the Settlement Agreement include the Conservation Law Foundation, which is one of the plaintiff conservation groups, all four state intervenors, and two of three industry intervenors. The Settlement Agreement specified an interim rule, to be effective May 1, 2002; a second interim rule, to be effective August 1, 2002; and an amendment to the FMP (Amendment 13), to be implemented by August 22, 2003.

In order to have protective measures in place for the beginning of the fishing year on May 1, 2002, NMFS prepared an interim final rule under section 305(c) of the Magnuson-Stevens Act to implement the first phase of the Settlement Agreement; that rule was published in the Federal Register on April 29, 2002. On April 26, 2002, the Court issued a Remedial Order that substantially accepted and ordered the measures contained in the Settlement Agreement, but with several changes. Some of the measures were to be implemented for May 1, 2002, and others by August 1, 2002. To comply with the April 26, 2002, Court Order regarding the May 1, 2002, measures, NMFS filed another interim final rule on May 2, 2002. In the meantime, NMFS and other parties filed motions for reconsideration to the Court's April 26, 2002, order, asking the Court to instead adopt the Settlement Agreement as written. NMFS was making final preparations to publish a second interim final rule to implement the August 1, 2002, measures when the Court issued a second order on May 23, 2002, that granted the motions for reconsideration and ordered NMFS to implement the Settlement Agreement. To address the Court's May 23, 2002, order to make Federal regulations consistent with the Settlement Agreement, NMFS filed an interim final rule on May 31, 2002, which implemented measures specific to Exhibit A of the Settlement Agreement for the remainder of the first quarter of the 2002 fishing year (June 1

through July 31, 2002). The proposed interim rule that is the subject of this action would implement, consistent with the May 23, 2002, Court Order, the second portion of the Settlement Agreement; that is, measures specific to Exhibit B of the Settlement Agreement; for the period from August 1, 2002, until implementation of Amendment 13.

The measures in the Court-ordered Settlement Agreement are necessarily limited in scope because they are intended only to provide sufficient reduction in overfishing on NE multispecies stocks so as not to jeopardize the ability of NMFS and the Council to develop and implement Amendment 13 consistent with the Settlement Agreement. As provided for under sections 304(e)(6) and 305(c) of the Magnuson-Stevens Act, an interim action to reduce overfishing while a more comprehensive amendment is being developed is appropriate and, therefore, consistent with the law. The measures included in this action represent a reasonable compromise among interested parties, including one of the plaintiff conservation groups, on measures that will substantially reduce overfishing in the interim period while minimizing the impact on the fishing industry. As more fully discussed in the Environmental Assessment (EA), these measures result in both quantifiable and non-quantifiable reductions in fishing mortality for virtually all of the NE multispecies stocks managed under the FMP. Based on this information and the improving status of NE multispecies stocks, delaying implementation of Amendment 13 to August 2003 is not expected to jeopardize the ability of the NE multispecies complex to meet the SFA rebuilding objectives. Further, these measures were developed, to the extent possible, given the scope of the action, to comply with the national standards and other required provisions of the Magnuson-Stevens Act.

The interim measures to be implemented on August 1, 2002, as Part 2 of the Settlement Agreement, are analyzed in this EA and are discussed in detail in section 3.2. To come into full compliance with the requirements of the Magnuson-Stevens Act, as amended by the SFA, additional reductions in fishing mortality will be necessary for many of the groundfish stocks managed under the FMP. The full extent of all of these requirements will be met through Amendment 13, which will implement rebuilding plans for several groundfish stocks and address capacity issues in the fishery. Amendment 13 is under development by NMFS and the Council on an accelerated schedule and will be implemented by August 22, 2003.

2.0 Purpose and Need for Action

2.1 Interim Management

Section 304(c) of the Magnuson-Stevens Act states that interim measures, consistent with section 305(c), to reduce overfishing, may be implemented while an amendment is being developed to stop overfishing and rebuild fish stocks. Such measures do not, by themselves, have to stop overfishing. Section 305(c)(1) of the Magnuson-Stevens Act states that, if the Secretary finds that an emergency or overfishing exists, or that interim measures are needed to reduce overfishing for any fishery, the Secretary may promulgate emergency regulations or interim measures necessary to address the emergency or overfishing. For the reasons noted above, the Secretary has determined that several stocks of NE groundfish are being overfished. This action will implement Secretarial interim measures to quickly and significantly reduce overfishing on GOM cod, as well as other groundfish stocks, while NMFS and the Council complete Amendment 13. Given the benefits from significant reductions in fishing mortality on GOM cod and other groundfish stocks that will result from this interim final rule and the improving status of the stocks, delaying implementation of Amendment 13 to August 2003 is not expected to jeopardize the ability of the NE multispecies complex to meet SFA rebuilding objectives.

2.2 Need for Action

To come into full compliance with the requirements of the Magnuson-Stevens Act, as amended by the SFA, severe reductions in fishing mortality rates (F) are necessary for many of the groundfish stocks managed under the FMP. To address these requirements, the Council is currently developing Amendment 13 to the FMP. Amendment 13 is expected to implement rebuilding plans for several groundfish stocks and to address capacity issues in the fishery. However, due to statutory time constraints associated with the amendment process and other applicable law, implementation of Amendment 13 is not expected before August, 2003.

To evaluate the effectiveness of the FMP and to make determinations on the need for adjustments to the FMP, Amendment 7 to the FMP established a procedure for setting annual target levels of total allowable catch (TAC) for specific cod, haddock and yellowtail flounder stocks to achieve rebuilding of these stocks, and an aggregate TAC for the combined stocks of the remaining regulated species. Management measures to achieve these TACs and the overall objectives of the FMP are implemented by way of an annual framework adjustment to the FMP. The Council, in its work on the 2002 annual Framework Adjustment 36 to the FMP, developed several alternatives that would achieve these goals. However, due partly to the extensive management measures that would have been necessary to achieve the needed F reductions and the desire of the Council to deal first with latent capacity in the groundfish fleet, the Council, at its December

19-20, 2001, meeting, voted to dispense with further action on Framework 36 and to focus its resources on completion of Amendment 13.

Given that the Council did not complete its annual adjustment for 2002, there is a strong need to reduce F on key stocks of groundfish, until such time that Amendment 13 is implemented. For the period May 1-July 31, 2002, these needs were met through implementation of the April 29, 2002 interim final rule, which implemented Part 1 of the Settlement Agreement. Among other measures, the April 29, 2002, rule ensured that the Western GOM (WGOM) Area Closure would remain closed, a critical component of the measures needed to control fishing mortality on GOM cod. The subject of this EA, Part 2 of the Settlement Agreement, would ensure that many of the measures under Part 1 would remain in effect, such as the WGOM Area Closure, and would also implement several additional and significant measures to reduce fishing mortality on groundfish.

This document specifically examines and compares two alternatives and incorporates by reference a third alternative that was submitted to the Court at the request of plaintiffs to the lawsuit. The first alternative considers no action--that is, the impacts to the fishery that would occur if the WGOM Area Closure were allowed to reopen and all other management measures remained status quo (i.e., reverted to pre-Settlement Agreement measures). The second alternative is based on the Settlement Agreement reached by the majority of the parties in the litigation (Part 2). The analyses presented in this document examine these alternatives with regard to their environmental consequences and economic impacts. The third alternative is based on a “hard” total allowable catch (TAC) management system (i.e., a fishery is closed when the TAC is reached). The hard TAC alternative is a fundamentally different type of management scheme and was examined in terms of the economic impacts that would result under the two TAC options that were considered. Option 1 would result in a total closure of GB, a significant portion of southern New England, and Long Island Sound to all gear that is capable of catching groundfish in any significant numbers. Option 2 would result in approximately a 35-percent reduction in the total number of DAS used by all vessels in 1999–-a significant reduction in effective effort across the entire commercial fishery. Other alternatives were considered with respect to the Council’s Framework 36 and the lawsuit. Although these alternatives are not explicitly included or incorporated in this document, they were taken into account in developing the alternatives that are included herein. Another alternative rejected because it was not reasonable or feasible in light of the scope and context of this action is the alternative that would bring the FMP into immediate compliance with the SFA.

3.0 Alternatives

In this EA, two alternatives are considered and analyzed, the Preferred Alternative, or Part 2 of the Settlement Agreement, and the No Action Alternative. A more general discussion of a third alternative (hard TACs) is contained paragraphs 10-15 of the Third Declaration of Patricia A. Kurkul, attached hereto as Attachment A, and incorporated herein by reference, which was submitted to the Court in Conservation Law Foundation, et al., v. Evans, et al.

The NMFS Northeast Fisheries Science Center's (NEFSC) 33rd Stock Assessment Workshop (SAW-33) is the most recent GOM cod assessment and included recreational landings and discard estimates for the first time. Because recreational landings are factored into the most recent estimates of F, recreational measures to reduce F are also included in the Preferred Alternative. Therefore, this action would implement restrictions in the recreational fishery. Each alternative discussed below was analyzed (see section 5.0 Environmental Consequences) as a package for both the commercial and recreational sectors. That is, each individual quantifiable measure may have its own specific impact on the stock and the human environment, but total impacts are not necessarily the sum of the individual measures. Thus, one measure's impact cannot necessarily be separated out from others to identify impacts specific to that one measure.

3.1 Alternative 1 (No Action)

All management measures in place for the NE multispecies fishery (as contained in 50 CFR part 648), prior to May 1, 2002, would remain in effect under this alternative. The WGOM Area Closure--implemented by Framework 25 in 1998, and extended in time by Framework 33 in 2000--would reopen as scheduled on August 1, 2002.

Closed areas

Area closure measures discussed throughout this document reference block numbers in Figure 1. Status quo area closures would be as implemented in Amendments 5 and 7 to the FMP, as modified by Frameworks 27, 31, and 33. GOM seasonal area closures are shown in Figure 2. This alternative would continue the provision that, if 50 percent of the 2001 fishing year GOM cod target TAC (1,918 x .5 = 959 mt) is landed by July 31, additional closures result (i.e., "triggered closures"). If the contingency is met and the triggered closures enacted, Cashes Ledge Closed Area would remain closed for 1 additional month (November), and blocks 124 and 125 would close in January (see Figure 2). Without the triggered closures, Cashes Ledge would be closed only from July 1 through October 31. The triggered

closure would effectively close blocks 124 and 125 from January 1 through April 30 and again from October 1 through November 30.

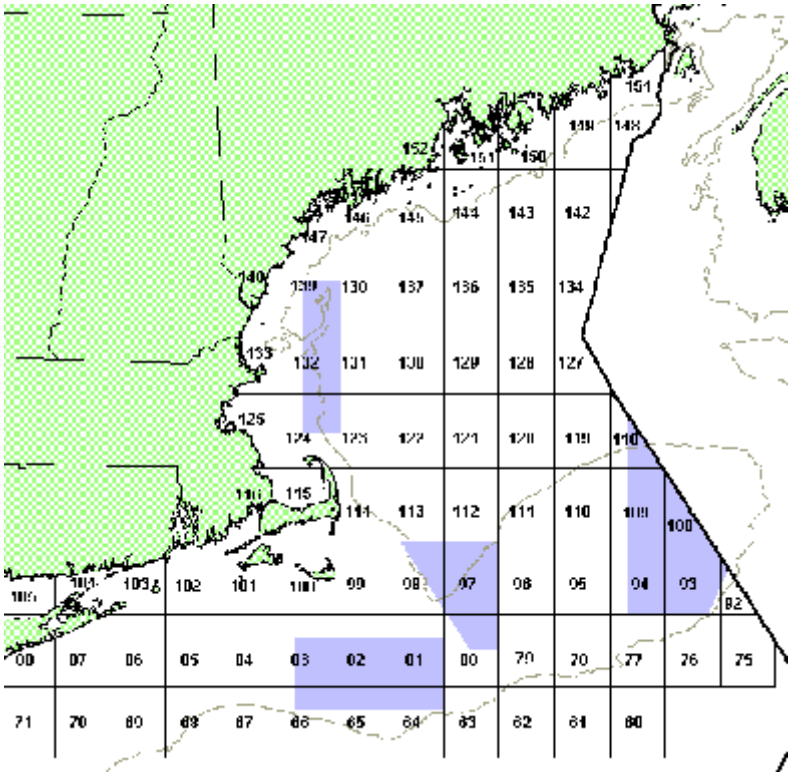


Figure 1. Area closure block reference map

Trip limits

The status quo trip limit for GOM cod of 400 lb/day, with a maximum possession limit equal to 10 times the daily limit (i.e., 4,000 lb) would remain. For each trip longer than 24 hours, the status quo provision allows the vessel to land up to an additional 400 lb for each additional 24-hour block of DAS, or part of an additional 24-hour block of DAS, provided that the vessel does not call out of the DAS program and does not depart from a dock or mooring in port (unless transiting) until the rest of the additional 24-hour block of the DAS has elapsed. Status quo trip limits for haddock and Georges Bank (GB) cod would also remain as in Table 3.1. The only other remaining trip limit is specific to Atlantic halibut. No vessel issued a NE multispecies permit may land or possess on board more than one Atlantic halibut per trip.

Table 3.1. Status quo trip limits for selected groundfish stocks

Species	Time	Fishery	lb per Day	lb per Trip
Haddock*	May 1 through September 30	NE multispecies DAS	3,000	30,000
Haddock*	October 1 through April 30	NE multispecies DAS	5,000	50,000
GOM Cod	Year-round	NE multispecies DAS	400	4,000
GB Cod	Year-round	NE multispecies DAS	2,000	20,000
Halibut	Year-round	N/A	N/A	1 fish

* Unless otherwise adjusted during the fishing year by the Regional Administrator.

Effort control

Days-at-Sea (DAS)

Current DAS allocations would revert back to those implemented prior to the implementation of the Settlement Agreement, as contained in 50 CFR 648.82. Vessels that qualified for a limited access groundfish permit under regulations implementing Amendment 5 (59 FR 9872, March 1, 1994) were allowed to select one of several DAS permit categories, according to the criteria specified, and received an allocation of DAS under the Amendment 5 DAS reduction program. Regulations implementing Amendment 7 (61 FR 34966, July 3, 1996) further accelerated the 50-percent DAS reduction schedule established by Amendment 5. Individual DAS category holders--including those with a Combination category permit--are currently allocated 50 percent of their initial (1994) allocation baseline; Fleet DAS category vessels--including those with a Hook-Gear category permit--are currently allocated 88 DAS. Vessels that are 30 ft or less in length overall and that have selected to fish in the Small vessel category are not restricted to DAS, but are subject to a trip limit of 300 lb of cod, haddock, and yellowtail flounder, combined, and one Atlantic halibut per trip. Separate permit categories for those vessels fishing under a Large Mesh DAS category permit exist where the vessels are allocated a 36-percent DAS increase over their individual DAS allocations, or 120 DAS (as opposed to 88 DAS under the Fleet DAS program). To be eligible to fish under the Large Mesh DAS category, a vessel must fish with gillnet gear with a minimum mesh size of 7-inch diamond or with trawl gear with a minimum mesh size of 8-inch diamond throughout the net, for the entire year. Spawning season restrictions and declaring blocks out of the fishery, as described in 50 CFR 648.82(g) and (k), would remain in effect for all vessels.

Gear restrictions

There would be no revisions to current gear requirements. Vessels fishing under a NE multispecies DAS in the GOM/GB Regulated Mesh Area must use at least 6-inch diamond or 6.5-inch square mesh throughout the net. Vessels fishing under a NE multispecies DAS in the Southern New England (SNE) Regulated Mesh Area are subject to the same mesh size requirement. Vessels fishing in the Mid-Atlantic Regulated Mesh Area must use at least 5.5-inch diamond mesh or 6.0-inch square mesh throughout the net.

For all trawl vessels fishing in the GOM/GB Inshore Restricted Roller Gear Area (50 CFR 648.80(a)(2)(iv)), the diameter of any part of the trawl footrope, including discs, rollers or rockhoppers must not exceed 12 inches. Additionally, trawl vessels fishing under a NE multispecies DAS are prohibited from pair-trawling and all trawl vessels are prohibited from possessing brush-sweep trawl gear while in possession of NE multispecies. Gillnet vessels that declare into the Day gillnet vessel category are restricted to 80 stand-up nets or 160 tie-down nets, which may not be longer than 300 ft. All Day gillnets must be tagged.

Recreational fishing measures

There would be no changes from the current recreational fishing measures. Private recreational vessels are limited to 10 cod and/or haddock, combined, in, or harvested from, the Exclusive Economic Zone (EEZ). There is no possession limit for other groundfish species. The minimum recreational fish sizes for groundfish species are:

SPECIES	MINIMUM FISH SIZE (inches)
Cod	21
Haddock	21
Pollock	19
American plaice (dab)	14
Winter flounder (blackback)	12
Redfish	9
Yellowtail flounder	13
Atlantic halibut	36
Witch flounder (gray sole)	14

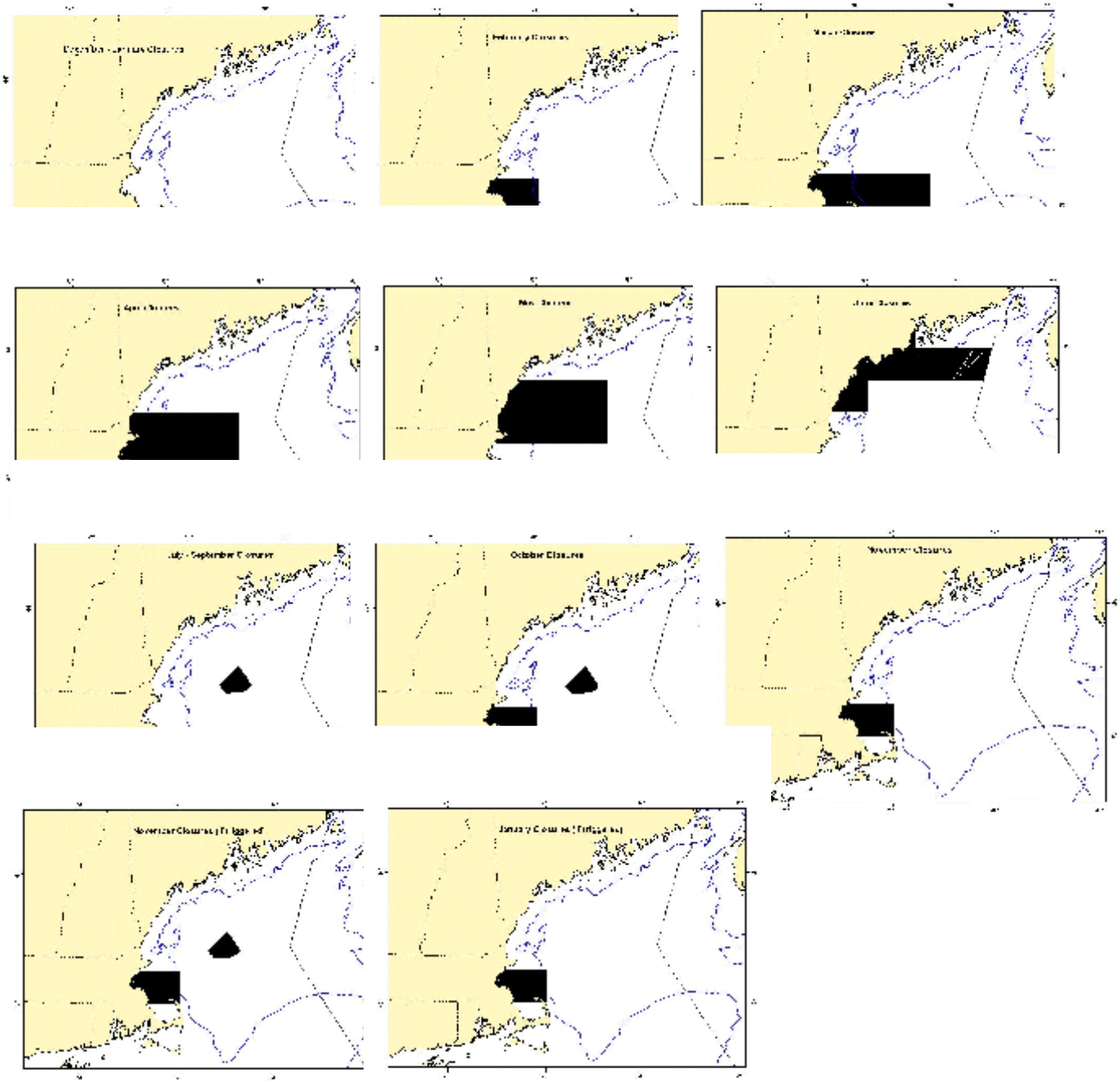


Figure 2. GOM rolling closures under Alternative 1 (i.e., no action)

3.2 Alternative 2 (Preferred)

This alternative would implement measures that include temporal extension of existing area closures, new area closures, new gear restrictions, and restrictions on days-at-sea (DAS) usage and accounting for DAS for the commercial sector of the fishery, as well as additional measures for the recreational sector. These measures were selected as part of a compromise with other parties to the lawsuit described above and included in the Settlement Agreement. Existing measures that are not specifically changed or modified by this interim final rule would remain status quo.

Regulated Mesh Areas (RMA)

This alternative would divide the GOM/GB RMA into two areas: The GOM RMA, which is the area north of the GOM cod exemption line currently used to define the divide between the GOM cod and GB cod trip limit allowances; and the GB RMA, which is that part of the GOM/GB RMA that lies south of the GOM cod exemption line. This measure would also revise the boundary between the Southern New England (SNE) and Mid-Atlantic (MA) RMAs and between the SNE and GB RMAs. These revisions resulted from the settlement Agreement modification to the SNE RMA.[1] These areas are shown in Figure 3. Specific management measures would also apply, depending on the area fished.

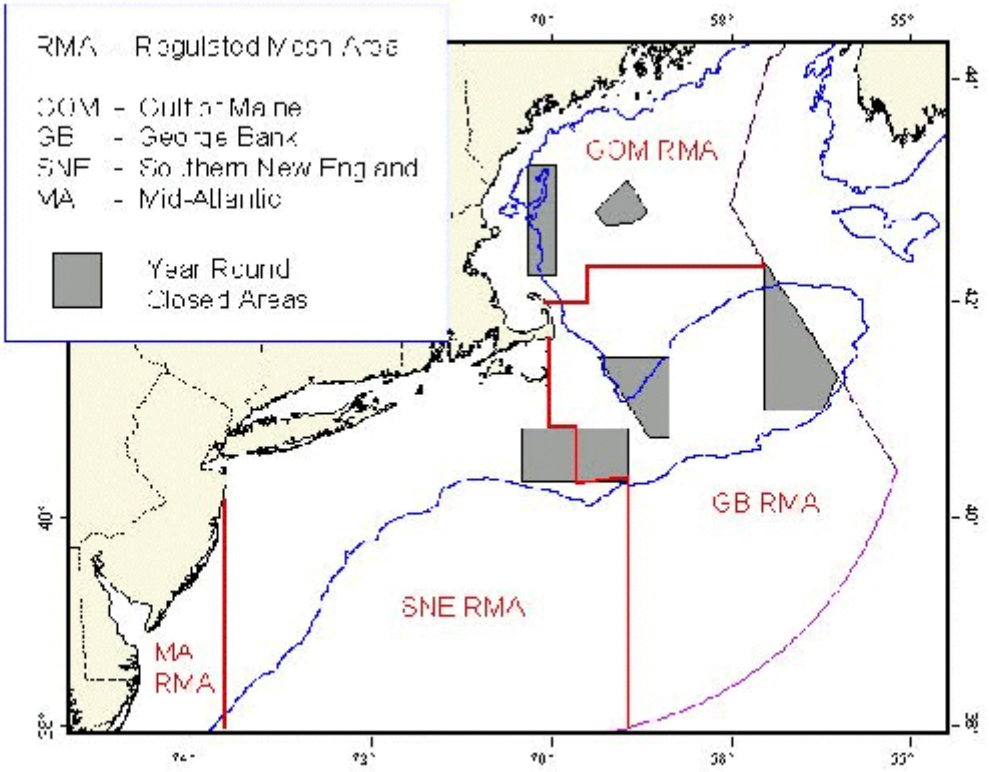
[1]The boundary for the area where specific southern New England measures apply is described as follows:
Bounded on the east by straight lines connecting the following points:

Lat.	Long.
(*)	70˚00'
40˚50'	70˚0'
40˚50'	69˚40'
40˚18.7'	69˚0'
40˚2.7'	69˚00'
(**)	69˚0'

(*) South facing shoreline of Cape Cod
(**) Southward to its intersection with the EEZ
Bounded on the west by: A line beginning at the intersection of 74˚00' longitude and the south facing shoreline of Long Island, NY, and then running southward along the 74˚00' longitude line.

Exempted Fishing Areas

This alternative would maintain the status quo Regulated Mesh Area delineations for the purposes of identifying the status quo Exempted Fishing Areas (see Figure 3).


RMA - Regulated Mesh Area
GOM - Gulf of Maine
GB - George Bank
SNE - Southern New England
MA - Mid-Atlantic
Year Round Closed Areas
GOM RMA
GB RMA
SNE RMA
MA RMA

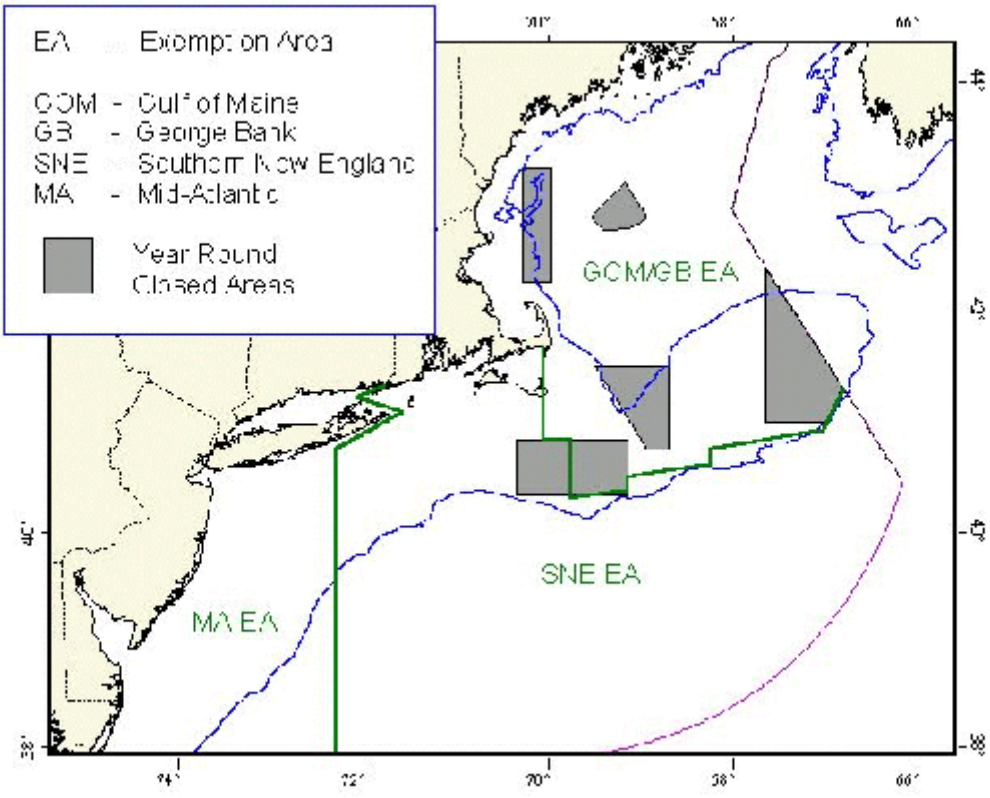

EA - Exemption Area
GOM - Gulf of Maine
GB - George Bank
SNE - Southern New England
MA - Mid-Atlantic
Year Round Closed Areas
GOM/GB EA
SNE EA
MA EA

Figure 3. New Regulated Mesh Areas and Exempted Fishery Areas, including the year-round closure areas, under Alternative 2 (Preferred).

Effort Control

Permits

No additional open access Hand-gear permits would be issued to any vessel that has never been issued such a permit, or has not submitted an application for such a permit, as of the date of implementation of interim measures, or August 1, 2002.

DAS Counting

This alternative would count DAS at status quo rates as counted prior to the interim action. That is, the provision to count DAS greater than 3 hours and less than or equal to 15 hours as a minimum of 15 hours for all vessels fishing under a NE multispecies DAS as part of the first portion of the Settlement Agreement (see EA for interim action, dated April 22, 2002) would be eliminated and DAS counting would return to the original method of actual time. Therefore, starting August 1, 2002, only vessels fishing under the Day gillnet designation and fishing with gillnet gear under a NE multispecies DAS would have their DAS clock count as a minimum of 15 hours for trips that exceed 3 hours and that are less than or equal to 15 hours. Starting August 1, 2002, for all non Dayboat gillnet vessels, DAS counting for fishing year 2002 (May 1, 2002 - April 30, 2003) would be counted based on actual time fished during this period.

Limitation on DAS

DAS would be set using the period of May 1, 1996 - April 30, 2001, at the *maximum* DAS used by a permit in any single fishing year, not to exceed the current allocation. No vessel would receive a baseline of DAS less than 10 days. For limited access vessels not under the call-in system during the period May 1996 through June 1996, a vessel's DAS would be based on vessel trip reports (VTRs) submitted to NMFS before April 9, 2002. Otherwise, DAS would be based on the NMFS call-in system or, for vessels fishing with a Vessel Monitoring System (VMS), DAS would be based on DAS tracking via the VMS unit.

DAS would be reduced by 20 percent from the above baseline, taking into account DAS used in fishing year 2002 prior to implementation of this interim action. That is, for the 2002 fishing year, NE multispecies DAS that were fished by a vessel during the period May 1 through July 31, 2002, would be deducted from that vessel's total allocated DAS. Thus, each vessel's DAS allocation for August 1, 2002, through April 30, 2003, would be equal to that vessel's used

DAS baseline, minus 20 percent of the vessel's used DAS baseline, minus the DAS that vessel fished during May through July, 2002.

Vessels for which the amount of NE multispecies DAS available for use as of August 1, 2002, would be less than or equal to the DAS fished during the May through July 2002, period, the vessel would be left with zero NE multispecies DAS for the remainder of the fishing year, unless the vessel had carry-over DAS from the previous fishing year

Vessels that have a monkfish Category C or D permit (i.e., vessels that possess both a monkfish and a limited access NE multispecies DAS permit) must run both their monkfish DAS clock and the NE multispecies DAS clock concurrently when fishing under a monkfish DAS. Limited access monkfish permit holders are allocated 40 monkfish DAS (under the monkfish FMP). Under the proposed measure, for vessels for which the NE multispecies DAS reduction would result in the vessel having more monkfish DAS allocated than NE multispecies DAS, such vessels could still fish under a monkfish DAS when NE multispecies DAS are no longer available, but would then be required to fish under the provisions of a monkfish Category A or B vessel, i.e., limited access monkfish vessels that do not possess a limited access NE multispecies permit. For example, if a monkfish Category D vessel's NE multispecies DAS allocation were 30, and the vessel fished 30 monkfish DAS, 30 NE multispecies DAS would also be used. However, after all 30 NE multispecies DAS were used, the vessel could utilize its remaining 10 monkfish DAS to fish on monkfish, without a NE multispecies DAS being used, provided the vessel fishes under the regulations pertaining to a Category B vessel and does not retain any regulated multispecies.

Prohibition on Front-loading the DAS Clock

Existing regulations require that, at the end of a vessel's trip, upon its return to port, the vessel owner or owner's representative must call NMFS to notify NMFS that the trip has ended, thus ending a DAS. However, before the interim action currently in place, there was no restriction on when a vessel can start its clock. Consequently, some vessel owners started their DAS clock well in advance of the actual departure of the vessel, a practice known as "front-loading."

This measure would continue the prohibition on front-loading, implemented on May 1, 2002, as part of the Settlement Agreement. A vessel owner or authorized representative would have to notify NMFS no earlier than 1 hour prior to the vessel leaving port to fish under the NE multispecies DAS program. A DAS would begin once the call has been received and a confirmation number is given. This measure would apply in all management areas.

Closed Area Additions/Modifications

This alternative would continue, in its current configuration, the closure of the WGOM Area Closure beyond the scheduled August 1, 2002, reopening date. The area closure known as Cashes Ledge Area Closure, in its current configuration, would be closed for the duration of this action. Additionally, this action would maintain the closure of area blocks 124 and 125 during May and blocks 132 and 133 in June, in both 2002 and 2003. Area blocks 124 and 125, however, would be opened in January, February, and March 2003. Additional area blocks in the GB RMA would be closed during the month of May. Specifically, blocks 80, 81 and blocks 118, 119 and 120, south of 42˚20' N. lat., would be added to the existing GB Seasonal Closure Area, which currently consists of blocks 109-114, 98, and 99, during May 2003 (see Figure 4).

Exemptions to the current rolling closure areas would remain the same for the expanded rolling closures under this alternative; that is, all vessels would be prohibited from fishing in Rolling Closure Areas III and IV, unless the vessel is fishing with or using exempted gear, excluding pelagic gillnet gear capable of catching NE multispecies, and except for vessels fishing with a single pelagic gillnet. In addition, recreational vessels would be exempt, as would the use of scallop dredge gear when a vessel is fishing under a scallop DAS or when it is fishing in the Scallop Dredge Fishery Exemption Area, provided the vessel does not retain any regulated NE multispecies during a trip, or on any part of a trip. Also, vessels would be exempt from the monthly closure areas when fishing in the Raised Footrope Trawl Exempted Whiting Fishery. All of the exemptions listed above apply to the WGOM and Cashes Ledge Area Closures, with the following exceptions: Vessels would be prohibited from fishing with scallop dredge gear or fishing in the Raised Footrope Trawl Exempted Whiting Fishery.

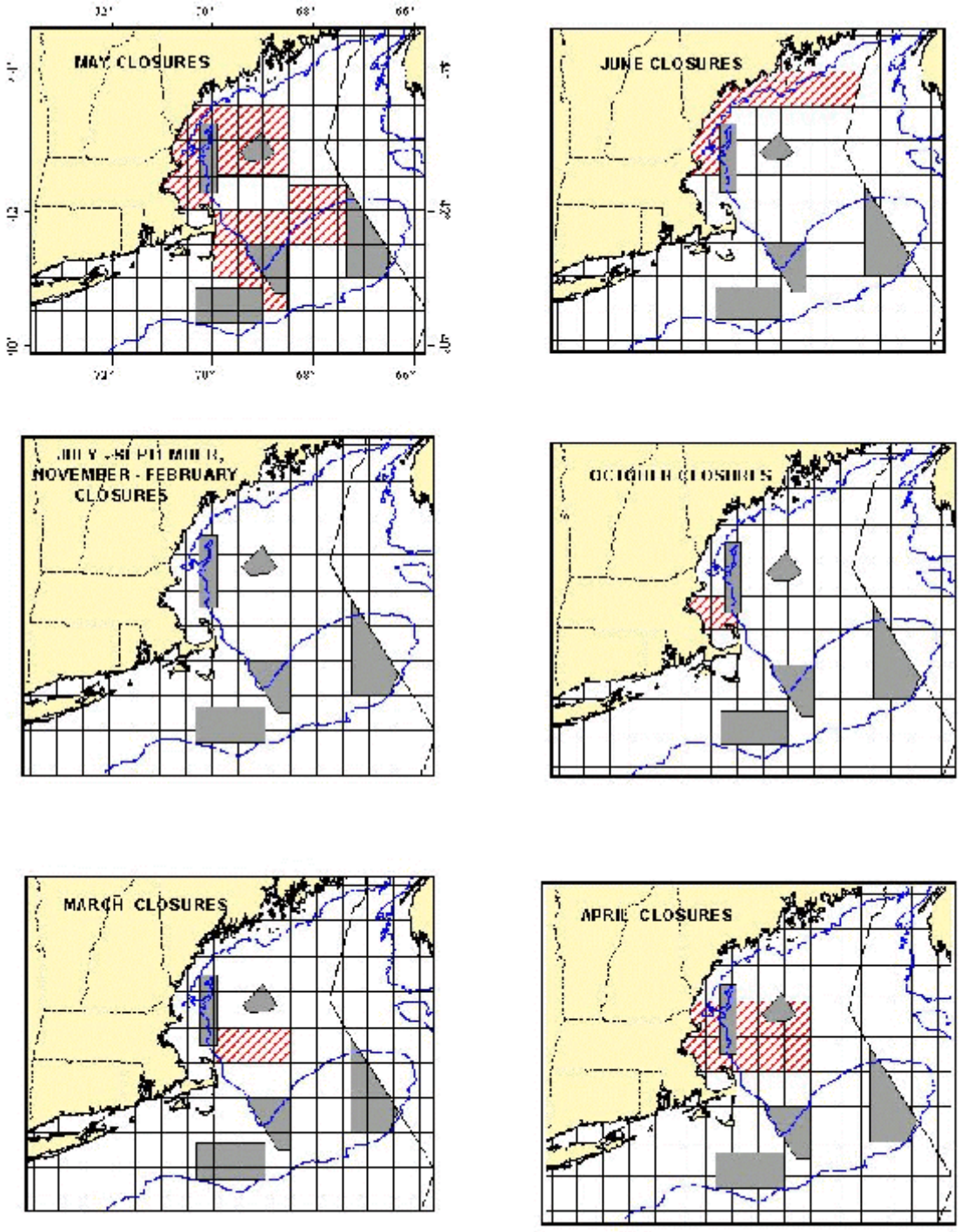


Figure 4. Rolling closures (including year-round closures) under

Gear Restrictions

Under this alternative, gear requirements would be dependent upon the area(s) fished. See Figure 3 for a map of the RMAs.

GOM-specific measures

Vessels using trawls (other than midwater trawls) and fishing any part of a NE multispecies DAS trip in the GOM RMA would be required to fish with a minimum 6.5-inch diamond or square mesh codend. This requirement would apply only to the codend of the net; the minimum mesh-size for the remaining portion of the net would be unchanged, i.e., 6.0-inch diamond mesh or 6.5-inch square mesh, or any combination thereof, throughout the remaining portion of the net. Trawl vessels that currently fish with 6.5-inch square mesh throughout the entire net would not be subject to mesh changes under this alternative. For vessels fishing with a 6.5-inch diamond mesh codend, or for vessels fishing with a 6.5-inch square mesh codend and a combination of square mesh and diamond mesh throughout the remaining portions of the net, codend is defined as follows: The first 25 meshes for diamond mesh, or the first 50 bars in the case of square mesh, from the terminus of the net for vessels 45 ft in length and less, and 50 meshes for diamond mesh, or 100 bars in the case of square mesh, from the terminus of the net for vessels greater than 45 ft in length.

All limited access NE multispecies vessels that have a Large Mesh Individual DAS category or a Large Mesh Fleet Das category permit would be required to fish with nets with mesh that is 2.0 inches larger than the current regulated mesh size when fishing under the NE multispecies DAS program. Thus, vessels fishing in the GOM RMA with trawl nets or sink gillnets would be required to fish with nets with a minimum mesh size of 8.5-inch diamond or square mesh throughout the entire net.

This measure would also require that all limited access NE multispecies vessels, under an annual Trip vessel designation and using gillnet gear, be limited to 150 nets with a mesh size no less than 6.5 inches. Each net would have to have a tag. NE multispecies vessels that obtain an annual designation as a Day gillnet vessel would be required, when fishing any part of a trip under a NE multispecies DAS in the GOM RMA, to fish with a limit of 50 stand-up gillnet (roundfish nets) with a mesh no less than 6.5 inches. Those who use tie-down gillnets would be restricted to a mesh size of no less than 7 inches and a limit of 100 nets. During the months of March through June, only tie-down nets may be used, except for

monkfish gillnets of 10 inches or greater mesh size. Tags for all NE multispecies nets would be limited to 150 tags--two tags per stand-up and one tag per tie-down.

Limited access NE multispecies vessels fishing with hook-gear under a multispecies DAS would be limited to 2,000, 12/0 circle hooks.

GB Bank-specific measures

Vessels using trawls (other than midwater trawls) and fishing any part of a NE multispecies DAS trip in the GB RMA would be required to fish with a minimum 6.5-inch diamond or square mesh codend. This requirement would apply only to the codend of the net (see above under “GOM-specific measures” for a description of the codend).

All limited access NE multispecies vessels that have a Large Mesh Individual DAS category or a Large Mesh Fleet Das category permit would be required to fish with nets with mesh that is 2.0 inches larger than the current regulated mesh size when fishing under the NE multispecies DAS program. Thus, vessels fishing in the GB RMA with trawl nets or sink gillnets would be required to fish with nets with a minimum mesh size of 8.5-inch diamond or square mesh throughout the entire net.

All NE multispecies vessels using gillnet gear, when fishing any part of a trip under a NE multispecies DAS in the GB RMA, would be required to use mesh no less than 6.5 inches and would be limited to 50 nets. Each net would have to have two tags.

Limited access NE multispecies vessels fishing with hook-gear under a NE multispecies DAS would be limited to 3,600, 12/0 circle hooks.

Southern New England (SNE)-specific measures

Limited access NE multispecies vessels using trawl (other than midwater trawls) and fishing any part of a NE multispecies DAS trip in the SNE RMA would be required to fish with a minimum 7.0-inch diamond or 6.5-inch square mesh codend (see description above). All vessels using gillnet mesh would be required to use no less than 6.5-inch mesh and would be restricted to a limit of 75 nets. Each net would be required to have two tags.

All limited access NE multispecies vessels that have a Large Mesh Individual DAS category or a Large Mesh Fleet Das category permit would be required to fish with nets with mesh that is 2.0 inches larger than the current regulated mesh size when fishing under the NE multispecies DAS program. Thus, vessels fishing in the SNE RMA with trawl nets or sink gillnets would be required to fish with nets with

a minimum mesh size of 8.5-inch diamond or square mesh throughout the entire net.

Limited access NE multispecies vessels fishing with hook-gear under a NE multispecies DAS would be limited to 2,000, 12/0 circle hooks.

Mid-Atlantic (MA)-specific measures

Vessels using trawls (other than midwater trawls) and fishing any part of a NE multispecies DAS trip in the MA RMA would be required to fish with a minimum 6.5-inch diamond or square mesh codend. This requirement would apply only to the codend of the net (see above under "GOM-specific measures" for a description of the codend).

All limited access NE multispecies vessels that have a Large Mesh Individual DAS category or a Large Mesh Fleet Das category permit would be required to fish with nets with mesh that is 2.0 inches larger than the current regulated mesh size when fishing under the NE multispecies DAS program. Thus, vessels fishing in the MA RMA with trawl nets or sink gillnets would be required to fish with nets with a minimum mesh size of 7.5-inch (19.0-cm) diamond or 8.0-inch (20.3-cm) square mesh throughout the entire net.

The minimum mesh size restrictions and number of nets required for gillnet vessels when fishing in the MA RMA under a NE multispecies DAS would remain unchanged. That is, vessels would be allowed to continue to fish up to 160 nets. This net restriction is different from the net restriction of 150 nets, as in the Settlement Agreement and Court Order, for vessels fishing under the monkfish DAS program.

Additional measures that would apply in all areas

Vessel would be prohibited from using de-hookers ("crucifiers") with less than 6-inch spacing between the fairlead rollers.

Monkfish vessels that have a monkfish limited access Category C or D permit (i.e., vessels that possess both a monkfish and NE multispecies limited access permit) and that are fishing under a monkfish DAS in any of the RMAs would be restricted from fishing more than 150 nets, provided the vessel fishes with nets with a minimum mesh size of 10 inches. Vessels would be required to affix one tag to each net. Monkfish vessels that have a limited access Category A or B permit would be subject to the status quo number of nets (i.e., 160 nets).

Minimum Fish Size

Under this alternative, the minimum size for cod that may be sold would be 22 inches.

Trip Limits

Hand-gear permitted vessels: The trip limit for open access Hand-gear vessels would be reduced to 200 lb from the current 300-lb level. The trip limit would apply to cod, haddock and yellowtail flounder, except that, when fishing in the SNE and MA RMAs south of 40˚00' N. lat., no possession of yellowtail flounder would be permitted (see below).

Yellowtail flounder possession limit restrictions: Limited access NE multispecies vessels fishing any part of a NE multispecies DAS trip would be allowed to retain the following amounts of yellowtail flounder in the areas specified and during the time periods specified, provided the vessel has on board the appropriate authorization to fish from the Regional Administrator:

- When fishing in the SNE and MA RMAs north of 40˚00' N. lat. -

  A vessel fishing any part of a DAS in the SNE and MA RMAs north of 40˚00' N. lat. would be allowed to possess no more than 250 lb of yellowtail flounder per trip during the period March 1-May 31. During the period June 1 to February 28, a vessel could posses no more than 750 lb of yellowtail flounder per DAS, with a maximum trip limit of 3,000 lb per trip, provided the vessel was enrolled in the appropriate seasonal exemption program.

- When fishing in the GOM and GB RMAs -

  A vessel fishing in the GOM and GB RMAs would be exempt from the yellowtail flounder trip limit provisions, provided the vessel was enrolled in the appropriate seasonal exemption program.

Yellowtail flounder prohibition: Vessels would be prohibited from possessing yellowtail flounder in the SNE and MA RMAs south of 40˚00' N. lat., unless transiting this area with gear properly stowed according to the regulations.

Cod trip limit modifications

Vessels fishing in the GOM RMA on a NE multispecies DAS would be subject to a trip limit for GOM cod of 500 lb per DAS, with a maximum trip limit of 4,000 lb per trip.

This action also would modify how the DAS clock would accrue for those vessels fishing in the GB RMA and harvesting GB cod. The GB cod trip limit would be maintained at 2,000 lb per DAS, up to a maximum possession limit of 20,000 lb per trip. A vessel subject to this landing limit restriction could come into port with, and offload, cod in excess of the landing limit, as determined by the number of DAS elapsed since the vessel called into the DAS program, provided that the vessel operator does not call out of the DAS program and does not depart from a dock or mooring in port until the rest of the additional 24-hr block of the DAS has elapsed, regardless of whether all of the cod on board is offloaded. For example, a vessel that has been called into the DAS program for 25 hr at the time of landing may land only up to 4,000 lb of cod, provided the vessel does not call out of the DAS program or leave port until 48 hr have elapsed from the beginning of the trip. This modification would be consistent with the GOM cod trip limit provisions in the NE multispecies regulations. A vessel that would be required to remain in port for the time that it must run its DAS clock could transit to another port during that time, provided the operator notifies the Regional Administrator according to the regulations.

Recreational and Charter/party Vessel Restrictions

Under this alternative, the minimum length for cod that could be retained by federally permitted charter/party vessels, and private recreational vessels not holding a Federal permit and fishing in the EEZ, would continue to be 23 inches, as specified under the Part 1 of the Settlement Agreement, which became effective May 1, 2002. Starting August 1, 2002, the minimum length for haddock that could be retained by both charter/party and private recreational vessels would increase from 21 inches to 23 inches.

This alternative would implement a cod and haddock bag (possession) limit for the charter/party recreational fishing sector when fishing in the GOM RMA. Each person on a charter/party vessel would be allowed to possess no more than 10 cod or haddock, combined, per trip, except that, from December 1 through March 31, only 5 of that total could be cod.

The regulations currently prohibit a vessel fishing under the charter/party regulations from fishing in the GOM area closures unless the vessel has on board a letter of authorization (LOA) issued by the Regional Administrator. Vessels intending to charter/party fish in the GOM closed areas must declare into charter/party fishery for the duration of the closure or for 3 months, whichever is greater. Vessels wanting to obtain an LOA for the entire duration of this interim action would need to obtain a new LOA by calling the NMFS Permit Office. All other existing recreational measures would

remain unchanged, including the no-sale provision for both the party/charter and private recreational sectors.

Observer Coverage

Although not proposed as a regulatory management measure, NMFS will expand significantly its observer coverage in the NE multispecies fishery to monitor and collect information on bycatch, as well as other biological and fishery-related information. For all gear sectors, NMFS would provide 5-percent observer coverage, or higher, if necessary to provide statistically reliable data. Effective May 1, 2003, NMFS will provide 10-percent observer coverage for all gear sectors, unless it can establish by the most reliable and current scientific information available that such increase is not necessary. Observer coverage will be distributed over gear categories, vessel size categories and fishing regions, in order to provide statistically sound estimates of directed catch, nondirected catch and discards (bycatch).

3.3 Alternative 3 (Hard TAC Alternative)

This alternative would establish hard TACs to bring the FMP into compliance with Amendment 9 of the FMP, as originally ordered by the Court in the lawsuit. Two options for measures to implement this alternative are described in paragraphs 10-15 of Attachment A. The Declaration also generally discusses the socio-economic impacts of this alternative.

4.0 Affected Environment

A full description of the affected environment, including a description of the resource species, fishing activities, economic characteristics, and social characteristics of those likely to be affected by the actions under consideration and proposed in this EA was prepared for the Environmental Impact Statement (EIS) that accompanied Amendment 5 to the FMP (NEFMC 1994). This information was updated in the Supplemental EIS (SEIS) that accompanied Amendment 7 to the FMP (NEFMC 1996). Amendment 9 to the FMP added Atlantic halibut to the stocks managed; information for this stock was updated in that action's accompanying EA. A full description of the habitat, including designations of essential fish habitat (EFH) for groundfish species, was described in the EIS accompanying Amendment 7 to the FMP (NEFMC 1996). Those sections are incorporated here by reference.

The description of the affected environment is presented to provide sufficient background information on the various resources and entities likely to be affected by the actions proposed or under consideration. There has been little change in the biological or

physical components of the environment since the implementation of Amendment 7, other than changes in stock status. Readers may reference earlier FMP amendments for descriptions of the stocks and the physical environment, and may access the "Assessment of 19 Northeast Groundfish Stocks through 2000" to review stock status at http://www.nefsc.nmfs.gov/nefsc/publications/crd/crd0120/. NMFS acknowledges, however, that, since 1996, the increasing complexity of the management program may have affected the human environment. For that reason, that section will be thoroughly updated with a complete description of the harvesters, processors, and communities that use the groundfish resource in Amendment 13 to the FMP. Although this section deals with the *affected* environment, it does not present the effects of the proposed management program. This section presents the baseline against which the alternatives are compared.

4.1 Marine Mammals, Endangered Species and Other Protected Resources

A description of potentially affected protected species (marine mammals, sea turtles and fish), including those that are threatened and endangered or proposed to be listed as threatened or endangered, was provided in Amendments 5 and 7 to the FMP. The GOM Distinct Population Segment (DPS) of Atlantic salmon (*Salmo salar*), was listed as endangered under the Endangered Species Act since Amendment 7 to the FMP (November 17, 2000, 65 FR 69459). Further details about protected species inhabiting the action area may be found in stock assessment reports prepared by NMFS pursuant to section 117 of the Marine Mammal Protection Act (MMPA). The fifth and most recent in the series, *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2001* (Waring *et al*. 2001), contains updates to 18 of 60 Atlantic and Gulf of Mexico assessments. The updated stock assessment reviews include 11 strategic and 17 non-strategic stocks. Additionally, information on human interactions (fishery and ship strikes) affecting right, humpback, fin and minke whales stocks was re-reviewed and updated. Species of particular concern or those that merit further comment in this document are discussed separately below. Information on sea turtle status is contained in the 1995 and 1997 status reviews of listed sea turtles prepared jointly by NMFS and the U.S. Fish and Wildlife Service (NMFS and USFWS, 1995). Additional information on protected species, in particular relative to the types of measures proposed in this document (gear modifications, closed areas, DAS restrictions) was previously discussed in FMP Framework Adjustments 20, 24, 25, 26, 27, 30 and 33. The available information, including an updated list of affected species, was most recently considered in the Biological Opinion (BO) for the FMP issued in June 2001.

4.1.1 Threatened and Endangered Species

Northern Right Whales - The western North Atlantic northern right whale (right whale) population, which numbers approximately 300 animals, ranges from wintering and calving grounds off the southeastern United States to summer feeding grounds off New England, in the northern Bay of Fundy, and on the Scotian Shelf. New England waters are a primary feeding ground. Principal prey items include copepods in the genera *Calanus* and *Pseudocalanus*, although they may feed on similar-sized zooplankton and other organisms. Feeding efficiency may depend on the ability of whales to find and exploit dense zooplankton patches. This is considered to be the most endangered whale in the world. Sources of mortality include ship strikes and entanglement in fixed fishing gear.

In the June 14, 2001, BO, NMFS concluded that fisheries conducted pursuant to the FMP are likely to jeopardize the continued existence of the right whale, and outlined a Reasonable and Prudent Alternative (RPA) with multiple management components that, once implemented, is expected to avoid the likelihood of jeopardizing right whales. Components include minimizing the overlap between right whales and NE multispecies gillnet gear, expanding gear modifications to the Mid-Atlantic and Southeast fisheries, continuing gear research and monitoring the implementation and effectiveness of the RPA. On January 9, 2002, NMFS published an interim final rule to amend the regulations that implement the Atlantic Large Whale Take Reduction Plan to provide further protection for large whales, especially North Atlantic right whales, through a Seasonal Area Management (SAM) program (67 FR 1142). The measures for SAM apply to two defined areas called SAM West and SAM East in waters off Cape Cod and out to the EEZ line, in which additional gear restrictions for anchored gillnet gear are required. SAM West and SAM East will occur on an annual basis for the period March 1 through April 30 and May 1 through July 31, respectively. The dividing line between SAM West and SAM East is the 69˚24' W. long. line. Also on January 9, 2002, NMFS published a final rule to clarify the agency's authority to restrict temporarily the use of lobster trap and gillnet fishing gear within defined areas to protect right whales and establish criteria for procedures for implementing a Dynamic Area Management (DAM) program in areas north of 40˚ N. lat. (67 FR 1133). On January 10, 2002 (67 FR 1300), NMFS published a final rule to expand gear modifications required by an earlier rule to the Mid-Atlantic and offshore lobster waters and modified Mid-Atlantic gillnet gear requirements.

Sea Turtles - While there is NE multispecies fishing effort in southern New England and south, the BO notes that the majority of effort occurs in the GOM and on GB. In turn, sea turtle interactions with the fishery are most likely to occur in these areas during the summer and early fall when turtle movements and the presence of gear

overlap. Species that are most likely to be affected include green, leatherback, loggerhead, and Kemp's ridley sea turtles. Information included in the BO indicates there have been no observed takes of sea turtles in the NE multispecies fishery, even though interactions have occurred in otter trawl, sink gillnet and hook gear. No additional information contradicts this statement, although it must be noted that observer effort in this fishery has been extremely low. Therefore, although the potential for interactions between sea turtles and gear types used in the NE multispecies fishery and sea turtles exists, the potential impacts of this action are expected to fall within the scope of the actions already analyzed in the FMP and previous framework adjustments and considered in the BO. The impacts of the fishery and the measures proposed relative to turtles will not be discussed further in this document.

Shortnose Sturgeon - Although shortnose sturgeon have the potential to interact with groundfish gear, the possibility is remote, given that they mainly occupy the deep channel sections of large rivers. The BO concluded that the current FMP is not likely to adversely affect shortnose sturgeon and established no documented takes in NE multispecies gear or fisheries in similar locations and/or gear types. No current information contradicts this statement.

Atlantic Salmon - The recent ESA-listing for Atlantic salmon covers the wild population of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.-Canada border. These include the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Juvenile salmon in New England rivers typically migrate to sea in May after a 2- to 3-year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn.

The potential exists for juvenile and adult Atlantic salmon to be incidentally taken in commercial fisheries targeting other species. Results from a 2001 post-smolt trawl survey in Penobscot Bay and the nearshore waters of the GOM indicate that Atlantic salmon post-smolts are prevalent in the upper water column throughout this area in mid to late May. Commercial fisheries deploying small-mesh active gear (pelagic trawls and purse seines within 10-m of the surface may have the potential to incidentally take smolts). The magnitude and extent of the threat has not been extensively studied and can not currently be adequately assessed. In 2001, a commercial fishing vessel engaged in fishing operations captured an adult salmon subsequently determined to be an escaped aquaculture fish.

Therefore, while there is a concern for the take of salmon in fishing gear, the greatest concern is for gear that operates in the upper 10

m of the water column. For the following reasons, interactions with the NE multispecies fishery are considered unlikely.

- The NE multispecies fishery uses primarily bottom trawl gear and sink gillnet gear
- The eight Atlantic salmon DPS rivers where Atlantic salmon are listed as endangered are near the southern extent of their range (after leaving the rivers they travel north to foraging areas)
- Population abundance of the Maine DPS is low (there were an estimated 75-110 adult returns to all eight rivers in 2000), and
- The NE multispecies interim action will reduce effort in the fishery

4.1.2 Species of Concern

Harbor Porpoise - Harbor porpoise are widely dispersed from New Jersey to Maine, but generally are more abundant in the western GOM and move northward to the Bay of Fundy in the summer. During the periods October-December and April-June they are widely dispersed from New Jersey to Maine. The most common cetacean species caught in commercial fishing gear in the NE, this species is the subject of a Take Reduction Plan (TRP) implemented by NMFS in December 2, 1998. To reduce takes, the TRP targets NE multispecies gillnet, as well as monkfish, dogfish and MA coastal gillnet fisheries. TRP requirements include the use of acoustic deterrents ("pingers") on nets according to specified protocols, time/area closures and gear modifications. Measures implemented through the Harbor Porpoise TRP have significantly reduced takes to numbers below the Potential Biological Removal level allowed for this species.

Barndoor Skate - On March 4, 1999, NMFS received a petition from GreenWorld to list barndoor skate as endangered or threatened and to designate critical habitat. On, April 2, 1999, NMFS received a second petition from the Center for Marine Conservation to list barndoor skate as endangered. This second petition was considered a comment on the first petition submitted by GreenWorld. On June 21, 1999, NMFS, acting on behalf of the Secretary, found that the petition and information available indicated that the requested action may be warranted. NMFS initiated a status review and, as part of that review, conducted a stock assessment (30th Stock Assessment Workshop (SAW-30)) (NEFSC, 1999). SAW-30 indicates that barndoor skates are most common in the GOM, on GB, and in the SNE offshore strata regions, with very few fish caught in inshore or in the MA regions. Also, research surveys and Canada's Department of Fisheries and Oceans sampling in the area between Gulf of St. Lawrence and GB indicate two principal area of barndoor skate concentration: GB/Fundian Channel and the central Scotian Shelf. Dwindling concentrations of barndoor skate occur from southern GB to the Hudson

Canyon. Very few, if any, barndoor skate are recorded south of the Hudson Canyon area (30th SAW).

4.2 Essential Fish Habitat (EFH)

The area affected by the proposed action has been identified as EFH for species managed by the NE Multispecies; Atlantic Sea Scallop; Atlantic Monkfish; Summer Flounder, Scup, and Black Sea Bass; Squid, Atlantic Mackerel, and Butterfish; Atlantic Surf Clam and Ocean Quahog; Atlantic Bluefish; Atlantic Billfish; and Atlantic Tuna, Swordfish and Shark Fishery Management Plans. In general, EFH for these species includes pelagic and demersal waters, saltmarsh creeks, seagrass beds, mudflats, and open bay areas, as well as mud, sand, gravel and shell sediments over the continental shelf, and structured habitat containing sponges and other biogenic organisms.

5.0 Environmental Consequences

Alternatives 1 (No Action) and Alternative 2 (Preferred) are specifically compared and contrasted because they are based on similar management measures. Alternative 3 (Hard TACs) and its impacts are discussed separately and more generally in Attachment A because that management approach is fundamentally different and because the Hhrd TAC alternative was ultimately rejected as it was not based on best scientific information available. Nevertheless, the analysis of Alternatives 1 and 2 apply to Alternative 3 measures, as well, to the extent that they are similar.

5.1 Biological Impacts

The proposed measures include additional area closures and effort control measures. Where possible, quantitative impacts are estimated, but the General Algebraic Modeling System (GAMS)[1], the tool used to conduct this analysis, has limited ability to quantify either the biological or economic impacts of some of the indirect management measures proposed in one or more alternatives evaluated for this action. Specifically, changes in DAS allocations, DAS counting, trip limits, and area closures are amenable to quantitative analysis using math programming methods, whereas measures such as prohibiting front-loading, changes in mesh sizes, limits on numbers of hooks or gillnets, and changes to permit categories cannot be explicitly modeled. The following describes the analytical methods used to estimate the biological impacts of the alternatives and identifies the directionality of impact for measures that could not be explicitly modeled.

[1]GAMS Development Corporation, Washington, D.C.

5.1.1 Area Closure and Effort Control Model

One of the primary tools used to analyze both the biological and economic impacts of the proposed alternatives to achieve fishing mortality objectives is the closed area model. Changes in annual exploitation rates as a result of a combination of DAS controls, area closures, and trip limits were projected through a non-linear programming model using GAMS. The closed area model allocates effort to specific area block/month combinations for each vessel holding a valid fishing year (FY) 2000 NE multispecies permit, and landing groundfish during the time period 1996-2000. Vessels that were removed through the recently completed permit buyout were removed from the data set. A 5-year period was used to smooth out any peaks or valleys in the data and to enable estimation of catch per unit effort (CPUE) in areas that may be closed now or that had been closed at some time in the recent past. Data used included average CPUE by species, gear type, block and month; prices by species and month; and effort by vessel and month. Vessels were assigned a specific gear type based on which gear they used to land the majority of their groundfish catch between 1996 and 2000. Cod discards were included in the CPUE figures for each block and time period because there were several different trip limit regulations for cod during the time period. All prices were deflated to 1996 levels in order to remove the influence of inflation from the analysis. The model objective function maximizes revenue for each vessel by allocating their effort to the highest revenue blocks. However, because the revenue functions embedded in the model are downward sloping, effort stops flowing to a block when marginal revenue hits zero. The model can also be modified to incorporate changes in allowable DAS, trip limits, differential DAS and changes in CPUE by species and stock area.

An initial model run was made based on a baseline management regime. For purposes of analysis, this baseline was constructed based on retaining the fishing year (FY) 2001 measures. This baseline included year-round and seasonal area closures that were in effect, the trip limits for cod and haddock, and capped effort for each vessel at its allocated DAS. One model run was then made based on the No Action Alternative, which would include all FY 2001 measures, but would allow the WGOM closure to sunset. A second model run was conducted by imposing the proposed changes in seasonal and year-round area closures, and changes in DAS under the Preferred Alternative. The estimated catch stream from each option was then compared to the baseline catches, and the percentage change in landings was calculated. These numbers should be interpreted as the percent change in exploitation brought about by the proposed management action using the conditions that existed during the 1996-2000 time period.

An advantage of the model is that, unlike a “no displacement” analysis of closed areas (that is, assuming that effort in a newly closed area does not shift into another location), the closed area model captures redistribution of fishing effort from closed areas into open areas based on rational decisions by fishermen to maximize revenue. A second advantage is that the model output can include predicted impacts on revenues, and this can be broken down by gear sector and vessel size. While the model output results in apparently precise numerical estimates, it is better to use these as broad indicators of relative changes, rather than as precise predictions of fishing mortality or economic impacts. Small percentage changes, for example, should be viewed as less likely relative outcomes than large percentage changes.

5.1.2 Sources of Uncertainty

5.1.2.1 Model

Results from the model should be interpreted cautiously because some conditions may have changed that are not reflected in the base period data. Additionally, variability around the estimates is not fully captured by the model. One weakness is uncertainty about catch rates that may result from opening areas that have been closed for a lengthy period of time. This is most problematic when changing the boundaries of year-round closed areas. Because there is limited trip information from the closed area, the closed area model may under-estimate the catch rates that will result when an area closed to year-round fishing is re-opened. This is less of a problem for seasonal closures, since the model incorporates recent trip information that reflects the catch rates that result immediately after reopening an area.

5.1.2.2 Analysis

Analysis of the impacts of the proposed management Alternatives 1 and 2 is complicated by the following factors:

- The interaction between management measures precludes analysis of the components on both large and small scales.
- The impacts of changes in trawl mesh size on fishing mortality cannot be accurately estimated for reasons explained in the following sections.
- Many of the management measures interact with each other. Whenever possible, the impacts of each alternative are analyzed as a combination of measures, usually by using the closed area model. When estimates of F reductions are obtained from different analytic techniques, they cannot be summed to obtain

an estimate of the overall impacts. This is partly because the measures interact with each other, even if analyzed separately.

- The impacts of some measures in the alternatives cannot be quantified. As a result, overall impacts are expressed in a combination of quantitative and qualitative terms.

5.1.3 Quantitative Analysis

The timing of the proposed action (implementation on August 1, 2002) means that implementation would not correspond with the beginning of the NE multispecies fishing year (which began on May 1, 2002). The impacts of the alternatives were modeled assuming that they would be in place for 12 months. However, even though the action would be implemented in August, 2002, for purposes of analysis, the impacts were modeled as if they would be implemented in May 2002. This approach was taken to permit consistent comparisons to the baseline and across all alternatives and because the mid-year change in DAS allocations affects fishing decisions for the rest of the year. Assuming a May 1 implementation schedule simplifies analysis and allows for more consistent estimation of how the DAS changes may interact with other proposed management measures.

5.1.3.1 Alternative 1 (No Action)

This alternative allows the WGOM Area Closure to reopen on August 1. This No Action Alternative describes what would occur if no management measures other than what had been in effect for FY 2001 were put in place. Biological impacts are expressed in terms of changes in exploitation rate from the baseline. Under this alternative, the exploitation rate may be expected to increase for all GOM stocks--in particular, GOM cod exploitation would increase by 20 percent (Table 5.1). Relative to the baseline, there may be small reductions in exploitation for SNE winter flounder and for several yellowtail flounder stocks.

Table 5.1. GAMS analysis results indicating changes in catch (percent) under Alternative 1 (No Action).

	Stock Area					
	GOM	GB	Southern New England	Cape Cod	Mid-Atlantic	N/A*
Cod	20.0	0.5				
Haddock	8.3	1.2				
Winter Flounder	10.3	0.6	-0.8			
Yellowtail Flounder		0.9	-0.2	-0.1	-0.4	
Windowpane	2.8					

Flounder	
American	3.2
Plaice	
Witch	3.6
Flounder	
Pollock	6.8
Redfish	3.7
White Hake	1.6

* N/A - Not assigned to a particular stock area

5.1.3.2 Alternative 2 (Preferred Alternative)

In addition to a variety of other measures, this alternative would implement a freeze on baseline DAS use, coupled with a 20-percent reduction in that baseline. To evaluate this alternative, the DAS constraint for each vessels was adjusted to reflect the estimated DAS that would be available to each vessel upon implementation of this action. Note that the baseline qualification criterion is based on the maximum DAS used over a 5-year period. This means that, even when reduced by 20 percent, available DAS would not be constraining relative to baseline DAS use for the majority of vessels (see section 5.2.1). With the additional availability of carry-over DAS from FY 2001, DAS use for FY 2002-FY 2003 may be expected to approximate that of FY 2000-FY 2001. Therefore, no reduction was assumed to be attributable to the DAS freeze. The Preferred Alternative also includes an increase in the daily GOM cod trip limit from 400 to 500 lb per day. Consequently, the estimated exploitation rate changes for most stocks were between 5 and 10 percent--not as much as they would be had the DAS reduction been more restrictive (Table 5.2). Exploitation on Cape Cod yellowtail flounder may be expected to increase by 2.8 percent and catches of winter flounder in the GOM may increase by 8.0 percent. However, exploitation of winter flounder on GB was estimated to decline by 8.3 percent, so the net effect on the GOM/GB winter flounder stock is a reduction of 0.3 percent.

Table 5.2. GAMS analysis results indicating changes in catch (percent) under Alternative 2 (Preferred Alternative).

	Stock Area					
	GOM	GB	Southern New England	Cape Cod	Mid-Atlantic	N/A*
Cod	-6.1	-7.5				
Haddock	-5.5	-7.3				
Winter Flounder	8.0	-8.3	-3.1			
Yellowtail Flounder		-5.2	-5.3	2.8	-10.2	
Windowpane	-7.9					

Flounder	
American Plaice	-9.5
Witch Flounder	-8.4
Pollock	-4.3
Redfish	-7.6
White Hake	-4.5

*N/A - not assigned to a particular stock area

5.1.3.3 Alternative 3 Hard TAC Alternative

Under Alternative 3, hard TACs, as determined by the Amendment 9 control rules, would be implemented for all species managed under Amendment 9. Under Amendment 9, 11 of the 19 stocks of groundfish require little or no management action, and some could even accommodate additional fishing pressure. Conversely, the management TACs for six of the stocks would be zero under Amendment 9. This alternative would require that, once a TAC was harvested for a specific species, the fishery would be closed. Although this alternative would have the greatest biological benefits, the economic and social impacts would be extremely severe.

5.1.4 Biological Impacts of Recreational Fishing Measures

Alternatives to the recreational fishing measures include changes in current minimum fish size and bag limits, as well as continuation of an enrollment program for charter/party operators. Specifically, the following recreational measures were considered:

Alternative 1 (No Action)

- A minimum 21" size for Atlantic cod for all modes and all areas
- A 10-fish bag limit for cod/haddock, combined, for private recreational anglers
- No bag limit for party/charter recreational anglers
- Enrollment program for party/charter vessels fishing in closure areas

Alternative 2 (Preferred)

- A minimum 23" size for Atlantic cod for all modes and all areas
- Private boat bag limit of 10 fish (cod and haddock combined) year-round for GB and April 1 - November 30 in the GOM.
- Private boat bag limit of five cod in the GOM, only, from December 1 - March 31
- No bag limit for party/charter mode year-round for GB
- Party/charter bag limit of 10 cod/haddock, combined, in GOM from April 1- November 30
- Party/charter bag limit of five cod in the GOM from December 1 to March 31

- Enrollment program for charter/party vessels in the GOM closure areas for the duration of the closure or 3 months, whichever is longer

For comparative purposes, each of these alternatives was analyzed for a 12-month period. The effects that these measures may have on recreational cod fishing mortality are described below.

5.1.4.1 Data

To evaluate the potential benefit of a minimum fish size change, the Marine Recreational Fishery Statistics Survey (MRFSS) data were used to construct size and catch per angler distributions of cod mortality (Type A plus B1 catch), by stock area, wave and mode. Data from calendar years 1998-2000 were used to calculate a 3-year average for both charter/party and combined private/rental boat and shore modes. These years were selected because they represent a time period during which Federal recreational size limits and bag limits were constant. These data suggest that there are important differences in seasonality (the majority of charter/party catch of cod occurs between November and April, while the majority of the private boat catch comes during the summer months), catch distributions (proportionally more cod are caught at larger sizes in the charter/party sector as compared to the private boat mode) and conformance or compliance rates (for example, approximately 35 percent of private boat fishing mortality in the GOM was associated with trips where cod was landed below the current Federal minimum size of 21 inches or in excess of the Federal 10-fish bag limit, or both, while 10 percent of cod fishing mortality was associated with trips where cod was landed below the Federal minimum fish size of 21 inches in the charter/party mode). These differences need to be considered in evaluating the effectiveness of the proposed management measures and how they may need to be constructed in order to achieve the conservation objectives. The analysis of biological impacts conducted here is limited to Atlantic cod. Haddock was not included because estimated catches were imprecise due to low MRFSS intercept sample sizes.

5.1.4.2 Procedures and Assumptions

The potential effectiveness of the proposed recreational fish size and bag limits for cod were evaluated in the following manner. First, assuming no change in observed compliance or conformance rates, observed landings below the current minimum size and bag limits were assumed to continue to occur. Second, all landings at or above the proposed limits were also assumed to continue. Any landings between the current Federal minimum size and bag limits and the Preferred Alternative's minimum size were assumed to no longer be legally landed, with adjustments made for conformance rates and

discard mortality. The former adjustment was based on the observed non-conformance rates by stock area wave and mode, while the latter was evaluated using a sensitivity analysis ranging from 0 to 50-percent discard mortality.

The effectiveness of an enrollment program is difficult to assess. Based on analysis of relative dependence on passenger income, about 70 percent of charter/party vessels that landed groundfish earned 100 percent of their business income from taking passengers for hire. This means that a majority of charter/party vessels would not be affected by an enrollment program, since they earned no income from commercial fishing in the first place. Further, during fishing year 2000, 107 charter/party vessels reported catching GOM cod through VTR data: 55 of these vessels participated in the enrollment program. While these vessels represent only 51 percent of reporting vessels, they accounted for 78 percent of the total GOM cod catch. In FY 2000, 23 charter/party vessels accounted for 80 percent of the GOM cod catch. Of these 23 vessels, 12 have no limited access NE multispecies permit, all but 6 participated in the 2000 enrollment program, and only 2 reported sales of commercially caught fish in the NMFS Northeast Region dealer data. These data indicate that the proposed enrollment program, in and of itself, will not have a substantial conservation benefit. However, an enrollment program may be an important feature of an overall GOM cod conservation program, as it would prevent opportunistic switching between commercial and recreational activities.

The catch distributions developed to evaluate the bag and size limit changes were further subdivided by 2-month wave, beginning with Mar-Apr and ending with Nov-Dec. The MRFSS survey is not implemented in Jan-Feb in New England and the 2-month waves overlap the proposed changes in bag limits for the Nov-Apr time period. For these reasons, the impacts of the five-fish bag limit from Nov to Mar could not be directly evaluated. However, a lower bound estimate was developed by assuming that the five-fish bag would not apply at all while an upper bound estimate was developed by applying the five-fish bag to the entirety of waves 2 and 6.

5.1.4.3 Estimated Conservation Benefits

Given the assumptions detailed above, three scenarios were constructed incorporating best, worst, and intermediate levels for each assumption.
Alternative 1 (No Action)

The No Action alternative would make no changes to the current Federal regulations for recreational fisheries for Atlantic cod or haddock. However, MRFSS data on size distribution of the recreational catch and the distribution of numbers of fish caught per

angler indicate that non-compliance with existing Federal regulations may be contributing to higher Atlantic cod mortality than would be the case if compliance were higher.

Non-compliance with Federal regulations is likely due to a combination of unintentional non-compliance (lack of knowledge), deliberate non-compliance, and differences between state and Federal landings laws. With respect to the latter, Maine and Massachusetts landings laws for Atlantic cod are consistent with Federal regulations, but landings laws in New Hampshire and Rhode Island are not. Note that changes in state landings laws and improved compliance would not necessarily mean that fewer Atlantic cod would actually be caught, but it may result in a reduction in total mortality, as a larger number of fish would be released. The resulting conservation benefit would depend on release survival. At this time, release survival is not known, so a range estimate for purposes of analysis was developed as being 100 percent, 50 percent, and 75 percent.

Best Case - Maximum conservation benefit would be achieved if all state and Federal regulations were consistent, compliance with all regulations were 100 percent, and discard mortality were zero. Under these assumptions, the annual reduction in mortality for GOM cod would be 11 percent and the annual reduction in mortality for GB cod would be 7 percent.

Worst Case - Assuming that states do not come into conformance with the Federal minimum size and non-compliance rates do not change, there would be no expected change in Atlantic cod fishing mortality.

Intermediate Case - An intermediate scenario was developed with the following assumptions: (1) Discard mortality rate is 25 percent; and (2) through a combination of increased conformance with Federal regulations and improved compliance, the compliance rates for Atlantic cod are improved by 50 percent. Under these assumptions, the reduction in annual exploitation for GOM cod would be 6 percent and the annual exploitation rate for GB cod would be 4 percent.

Alternative 2 (Preferred)

Since previous analysis indicates that the majority of charter/party vessels that account for most of that sector’s fishing effort have a past record of participation in the enrollment program, they were assumed to do so for the duration of this action, as well. For this reason, conservation benefits for this alternative were attributed only to the changes in size and bag limits.

Best Case - Maximum conservation benefit would be achieved if all state and Federal regulations were consistent, compliance with all regulations were 100 percent, and discard mortality were zero. Under these assumptions, the reduction in GB cod harvest would be 25 percent, while the reduction in GOM cod harvest would range from 40 percent to 53 percent, where the upper bound estimate corresponds to the estimated reduction in harvest if the five-fish bag were applied for all of waves 2 and 6, while the lower bound estimate is based on continuation of the 10-fish bag throughout.

Worst Case - Minimum conservation benefit would result if states do not come into conformance with the Federal minimum size, non-compliance rates continue as observed and discard mortality were 50 percent. Under these assumptions, the reduction in exploitation for GB cod was estimated to be 6 percent, while the reduction in GOM cod exploitation ranged from 13 percent to 20 percent.

Intermediate Case - An intermediate scenario was developed with the following assumptions: (1) Discard mortality rate is 25 percent; and (2) through a combination of increased conformance with Federal regulations and improved compliance, the compliance rates for Atlantic cod are improved by 50 percent. Under these assumptions, the reduction in exploitation on GB cod was estimated to be 23 percent while GOM cod exploitation ranged from 17 percent to 35 percent.

5.1.5 Combined Biological Impacts

The estimated biological impacts in terms of relative changes in exploitation for recreational (reported above) and commercial measures reported in Tables 5.1 and 5.2 were based on the relative change in exploitation from the simulated FY 2001 baseline as if the proposed measures were to be implemented for a full fishing year. This section reports the combined biological impacts in terms of estimated reductions in fishing mortality relative to projected calendar year 2001 mortality rates.

The estimated biological impacts (see Table 5.3) are based on combining the recreational and commercial catch reductions for Atlantic cod as they were estimated using the MRFSS data and with the area closure (GAMS) model. These impacts represent the effects of only those measures that were explicitly considered in either model. The contribution to catch reduction associated with several additional measures not incorporated in the models (e.g., prohibition on front-loading the DAS clock, mesh size increases, gillnet reductions and other measures) will provide additional protections beyond those summarized here.

Table 5.3. Summary of combined biological impacts (for both the commercial and recreational sectors) in terms of percent reductions in fishing mortality from FY 2001 levels.

Species/Stock	Projected FY 2001 Fishing Mortality	No Action Alternative Fishing Mortality Rate Change	Preferred Alternative Percent Fishing Mortality Rate Change from FY 2001
GOM Cod	0.77	20.8	-15.6
GB Cod**	0.49	0.0	-10.5
GB Haddock	0.19	0.0	-10.5
GOM Haddock*	0.13	8.3	-5.5
GB Yellowtail	0.19	0.0	-10.5
SNE Yellowtail	0.18	-5.6	-11.1
Cape Cod Yellowtail	2.58	-0.8	0.8
Mid-Atlantic Yellowtail*	2.72	-0.4	-10.2
American Plaice	0.33	3.0	-12.1
Witch Flounder	0.17	0.0	-11.8
SNE Winter Fl.	0.25	-4.0	-4.0
GB Winter Fl.*	0.90	0.0	-1.1
Redfish	0.003	0.0	-17.8
White Hake*	1.28	1.6	-4.5
Pollock*	7.22	6.8	-4.3
N. Windowpane*	0.11	2.8	-7.9

* Denotes indexed stocks.
** GB Cod change in F calculated from weighted average change in exploitation rate based on relative proportions of total harvest from commercial and recreational sectors for 1998-2000 average.

5.1.6 Biological Impacts of Non-Modeled Measures

Certain management measures were amenable to incorporation into the area-closure model, while a number of other measures were not. This section provides a qualitative description of the potential biological impacts associated with these non-modeled measures.

5.1.6.1 Changes to Open Access Hand Gear Trip Limit and Freeze on New Permits

The biological impacts of the freeze on issuance of the open access Hand Gear permits or the change in trip limit cannot be estimated with precision. In general terms, the freeze on issuance of new permits is unlikely to have any measurable biological impact, since

the potential number of permits that could be issued would exceed 3,000 (see section 5.2.4.1). Further, only a fraction of the these permits are actually used in any given year. The effect of the trip limit change is similarly difficult to evaluate, since vessels may be expected to adjust fishing strategies by fishing for and retaining only the most valuable of regulated groundfish. Since prices received vary by species, quality, and season, it is not possible to predict which species might be most sought. Nevertheless, at least an upper bound estimate of biological impact may be provided by estimating the proportion of each of the regulated groundfish accounted for by open access Hand Gear permit holders while using Hand Gear.

Based on VTR reports for FY 2000, the trip limit for open access hand gear would have no biological impact on most species within the groundfish complex (Table 5.4). Of the relative quantity of groundfish landed by open access permit holders, only GOM cod was more than 1 percent of total landings. Of these landings, 40 percent were from trips that landed less than 200 lb of GOM cod. If all trips where GOM cod was greater than 200 lb then, at most, the biological impact would be 60 percent of 1.16 percent, or 0.72 percent. By contrast, if all trips landed only 200 lb, and no GOM cod were discarded over the trip limit, then the reduction in GOM cod landed by open access hand gear permit holders would be 0.23 percent.

Table 5.4. Proportion of regulated groundfish landed by open access permit holders using hook gear

Stock/Species	Percent Landed by Open Access Hand Gear
GOM Cod	1.16
GB Cod	0.46
GOM Winter flounder	0.00
GB Winter flounder	0.00
SNE Winter flounder	0.00
GB Yellowtail	0.00
SNE Yellowtail	0.00
CC Yellowtail	0.00
MA Yellowtail	0.22
American Plaice	0.00
Southern windowpane	0.00
Northern windowpane	0.00
GOM Haddock	0.14
GBHaddock	0.00
White hake	0.00

Pollock	0.08
Redfish	0.03
Witch flounder	0.00

5.1.6.2 Prohibition on Front-loading

Most multispecies vessels currently use the DAS call-in system to report the start and the end of a NE multispecies DAS trip. The total DAS used on a trip dictates the landing limit for GOM cod, GB cod, and haddock. The regulations require that, at the end of a vessel's trip, upon its return to port, the vessel owner or owner's representative must call the Regional Administrator (RA) and notify him/her that the trip has ended, thus stopping the clock and ending a DAS. Modifications to the DAS rules (running clock provision) have been implemented through several actions specifically to limit a vessel owner's ability to catch large volumes of GOM cod in a short time span. However, there is no restriction on when a vessel must start its clock. Consequently, some vessel owners start their DAS clock well in advance of the actual departure of the vessel, a process known as “front-loading."

Front-loading allows a vessel to run the clock for up to 10 days prior to departing on a trip in order to catch 10-days worth of the GOM cod trip limit (the maximum amount allowed) in 1 day of fishing. For example, a vessel could remain in port for about 9 days and then, on the 10th day, fish for 6 hours, and return to port with 4,000 lb of GOM cod. Although the actual time fished in this example was 6 hours, the vessel's DAS clock ran for nearly 10 DAS. Since the practice is not currently prohibited, the trip is technically legal. However, front-loading provides an unintended opportunity to target GOM cod, and in fact may encourage it. The practice is not consistent with the cod rebuilding program and makes the trip limit less effective at reducing fishing mortality on GOM cod.

In addition to the inappropriate targeting of GOM cod by those who front-load the DAS clock, the provision also creates inequities between fishing vessels. Rather than using the DAS call-in system to track NE multispecies fishing effort, multispecies vessels may voluntarily use a VMS and, in some cases, are required to do so. Vessels that possess a NE multispecies Combination permit are required to have a VMS unit in order to satisfy their scallop permit requirements. To activate the VMS DAS clock, the vessel operator must select the proper macro code and cross the demarcation line. Since the vessel must be at sea to cross the demarcation line, it is impossible for these vessels to front-load their multispecies clocks. Vessel owners using VMS have indicated to NMFS that it is unfair that a DAS call-in vessel can front-load and they cannot.

A review of VTR landings data from vessels fishing in the GOM for the 2000 calendar year was conducted to determine the extent of this practice, which NMFS believes is increasing. Data were selected from the VTR database according to the following criteria:

- The landing date was between January 1, 2000, and January 31, 2001;
- At least 1 lb of cod was landed;
- The gear type was either trawl, gillnet, or longline;
- The trip occurred in the GOM (statistical areas 464, 465, 511, 512, 513, 514, or 515); and
- The trip category was commercial, and not charter or party.

The permits database was used to identify any vessels less than 30 ft in length, that were dropped from the selected data set. A vessel less than 30 ft in length may qualify for and fish under the Small Vessel permit category without being subject to DAS restrictions. Trips that landed more than 400 lb of cod per day of fishing were identified. A sample of these trips was examined to confirm they were legal trips--that is, the vessels legally front-loaded the DAS clock in order to land more cod. The data indicated that, over the course of calendar year 2000, 10 percent of the trips were front-loaded in order to land additional cod and 26 percent of the reported VTR landings of cod were on front-loaded trips. The practice varied by month, with May 2000 being the peak month, when 37 percent of the cod landed was from trips that were front-loaded. Other months where front-loading appears to have accounted for more than 30 percent of the GOM cod landings were February, June, and December. Fifteen percent of trips in May and December exceeded the 400 lb daily allowance.

The practice of front-loading the clock may have positive impacts in that it reduces cod discards by allowing vessels to land more than the daily limit of cod and decreases the amount of time gear is fished (thus, mitigating impacts to EFH). However, if the practice changes fishermen’s behavior and encourages them to target cod, then it could reduce the effectiveness of the trip limit. Only if the excess catch is unavoidable is the practice beneficial. Eliminating the practice may result in increased cod discards if fishermen are unable to avoid catching cod and have no way to retain legally the excess cod, such as through use of additional DAS. The data show that few vessels in calendar year 2000 averaged landings of more than 700-800 lb of cod per day absent from port (see Table 5.5). Although this does not include additional cod that may have been discarded, discards are likely to decrease under this alternative, due to additional area closures and restrictions on DAS during times when cod landings are traditionally high.

Front-loading of the clock enables a vessel to catch more cod per trip. If front-loading were prohibited, vessels that used this option in the past may increase the number of their trips in order to catch the same amount of cod. As a result, gear may be in the water for a longer period of time, the same amount of cod may be landed, and cod discards could increase. However, since it is difficult to predict behavior changes, it should also be noted that, if a vessel does not increase time on the water, these issues may not arise.

In effect, front-loading means that vessels are using DAS allocations at a rate that exceeds 2:1. Because DAS allocations would be reduced under the Preferred Alternative, the practice of front-loading will lose much of its economic advantage (see section 5.2.4.2) the practice is likely to be reduced if not eliminated for the majority of NE multispecies vessels. Therefore, the additional conservation benefit of prohibiting front-loading (over and above that of the DAS freeze itself) is likely to be low.

Table 5.5. Trips in the GOM by vessels greater than 30 ft in length using otter trawl, gillnet, or longline gear, on which cod was landed, in calendar year 2000, with the trips grouped in 400-lb categories. Cell shading/italics indicates trips that exceeded 400 lb of GOM cod per day.

LANDING TRIP DURATION(24-Hour Days Absent)

(LBS.)	0-1		>1-2		>2-3		>3-4		>4-5		>5-6		>6-7		>7-8		>8-9		>9-10		>10		TOTAL	
	TRIPS	%	Trips	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%	TRIPS	%
1-200	3,725	43	528	40	308	34	158	29	140	28	47	16	23	14	16	13	8	14	5	9	1	3	4,959	39
>200-300	756	9	98	7	78	8	39	7	36	7	17	6	8	5	6	5	-		1	2	-		1,039	8
>300-400	3,165	37	198	15	48	5	26	5	32	6	20	7	7	4	1	<1	1	2	3	6	3	8	3,504	28
>400-700	***280***	***3***	159	12	134	14	55	10	40	8	23	8	14	9	20	16	4	7	4	8	3	8	736	6
>700-800	***340***	***4***	253	19	168	18	36	7	10	2	6	2	1	<1	2	2	1	2	3	6	1	3	821	6
>800-1,100	***99***	***1***	***35***	***3***	77	8	62	11	45	9	23	8	5	3	15	13	2	4	6	11	2	5	371	3
>1,100-1,200	***91***	***1***	***26***	***2***	84	9	86	15	41	8	14	5	5	3	2	2	3	5	-		2	5	354	3
>1,200-1,500	***43***	***<1***	***14***	***1***	***13***	***1***	29	5	42	8	24	8	13	8	4	3	6	11	3	6	2	5	193	2
>1,500-1,600	***38***	***<1***	***7***	***<1***	***7***	***<1***	40	7	53	10	7	2	1	<1	-		1	2	3	6	1	3	158	1
>1,600-2,000	***42***	***<1***	***11***	***<1***	***13***	***1***	***16***	***3***	51	10	76	26	15	9	6	5	9	16	1	2	1	3	241	2
>2,000-2,400	***30***	***<1***	***-***		***1***	***<1***	***2***	***<1***	***9***	***2***	30	10	29	18	12	10	5	9	3	6	-		121	<1
>2,400-2,800	***20***	***<1***	***2***	***<1***	***-***		***1***	***<1***	***1***	***<1***	***7***	***2***	30	19	15	13	6	11	6	12	2	6	90	<1
>2,800-3,200	***11***	***<1***	***3***	***<1***	***-***		***1***	***<1***	***1***	***<1***	***1***	***<1***	***2***	***1***	15	13	6	11	1	2	1	2	42	<1
>3,200-3,600	***7***	***<1***	***-***		***-***		***-***		***1***	***<1***	***1***	***<1***	***2***	***1***	***3***	***3***	4	7	3	6	1	3	22	<1
>3,600-4,000	***5***	***<1***	***3***	***<1***	***-***		***-***		***1***	***<1***	***-***		***1***	***<1***	***1***	***<1***	***-***		7	14	13	34	31	<1
>4,000	***3***	***<1***	***2***	***<1***	***1***	***<1***	***2***	***<1***	***3***	***<1***	***1***	***<1***	***2***	***1***	***1***	***<1***	***-***		***3***	***6***	4	11	22	<1
TOTAL Trips	8,655	100	1,339	100	932	100	553	100	506	100	297	100	158	100	119	100	56	100	52	100	37	100	12,704	100
Under Limit	7,646	88	1,236	92	897	96	531	96	490	97	287	97	151	96	114	96	56	100	49	94	37	100	11,494	90
Over Limit	1,009	12	103	8	35	4	22	4	16	3	10	3	7	4	5	4	-		3	6	-		1,210	10
TOTAL Landings	2,741,490	100	585,495	100	514,571	100	410,446	100	468,834	100	368,359	100	268,170	100	189,261	100	95,443	100	110,803	100	107,323	100	5,860,195	100
Under Limit	1699464	62	432,544	74	447,664	87	361,045	88	397,467	85	331,670	90	219,440	82	164,457	87	95,443	100	86,695	78	107,323	100	4,343,212	74

Over Limit	104202 38 6	152,9 35 51	66,90 13 7	49,40 12 1	71,36 15 7	36,689 10	48,730 18	24,804 13	-	24108 22	-	151698 26 3

5.1.6.3 Prohibition on Use of De-Hookers

The biological impact of a prohibition on the use of de-hookers is not known. In general, the prohibition may have two effects. First, discard mortality associated with de-hookers is likely to be high. A prohibition on their use may reduce this source of mortality. Second, in effect a de-hooker is a time-saving device that permits hook vessels to tend their gear efficiently. The extent to which their elimination would reduce operational efficiency is not known, but if efficiency is reduced, then hook vessels may not be able to set as much gear and total fishing mortality may be reduced. Given that the majority of bottom longline catch is cod, any reduction in fishing mortality that might result from reduced gear efficiency or discard mortality would benefit GOM cod, and GB cod in particular.

5.1.6.4 Change in Large Mesh Permit Categories

The biological impact of a change in mesh size for Large-Mesh permits will depend upon whether or not vessels switch to a smaller mesh permit category (e.g., Individual or Fleet DAS, or Category A and B, respectively) and the impact of the larger mesh, should vessels choose to continue to elect the Large-Mesh permit category. The latter is not known, since the mesh trials described in section 5.1.6.5.1 do not cover mesh sizes that would be required under the Preferred Alternative for the Large Mesh permit categories. If the majority of vessels elect to fish under the smaller mesh permit categories, then the biological impact of the change in large mesh could be negative, as vessels that had formerly been fishing with large mesh would be switching back to the regulated mesh sizes. The relative magnitude of this effect will depend on whether reduced DAS will more than offset the potential increase in catch rates associated with smaller mesh.

During FY 2000 there were 31 vessels that elected to fish under the Large Mesh permit category (see section 5.2.6.4). Of these vessels, 3 did not call in any DAS, 1 called in DAS but did not record any fishing activity through a VTR record, and 18 called in fewer DAS than they would have received anyway as a Category A or B permit holder. The remaining 13 vessels called in more DAS than they would have otherwise received. Assuming that all vessels were to choose to fish under either a Category A or B allocation, all but these 13 vessels would be able to fish as many DAS as they did in FY 2000 (not taking into account the 20-percent reduction from the baseline freeze). Therefore, if any positive biological impact were to result from the Large Mesh permit change, it would come from the reduced fishing time by any vessel that would be constrained by lower DAS allocations.

The potential biological impact of this effect was approximated by calculating the average catch by species/stock per DAS by the aforementioned affected 13 Large Mesh permit holders. This average CPUE was then multiplied by the total DAS that would be available to these vessels, as if they were fished as a Category A or B permit holder. This estimate is likely to be an upper bound estimate, since the CPUE calculation was based on activity reports using large mesh. CPUE using small mesh is likely to be higher, so that the biological impact of reduced DAS will be offset to some extent by higher catch rates.

Catches of GOM cod and pollock by the 13 affected Large Mesh permit holders were just under 5 percent of total reported landings through the VTRs (Table 5.6). Landings of other species ranged between 1.4 percent and 2.7 percent for GB cod, CC yellowtail, GOM haddock, and white hake. The estimated reduction in total landings exceeded 1 percent for only GOM cod (1.4 percent) and pollock (1.1 percent). As noted above, this reduction in GOM cod landings is likely to be an upper bound estimate and the realized reduction is likely to be lower.

Table 5.6. Proportion of regulated groundfish landed by affected Large Mesh permit holders

Stock/Species	Percent Landed by Affected 13 Large Mesh Vessels	Change in Catch (percent)
GOM Cod	4.9	-1.2
GB Cod	1.4	-0.3
GOM Winter flounder	1.6	-0.4
GB Winter flounder	0.0	0.0
SNE Winter flounder	0.0	0.0
GB Yellowtail	0.0	0.0
SNE Yellowtail	0.0	0.0
CC Yellowtail	1.7	-0.4
MA Yellowtail	0.0	0.0
American Plaice	0.1	-0.02
Southern windowpane	0.0	0.0
Northern windowpane	0.0	0.0
GOM Haddock	1.6	-0.4
GB Haddock	0.2	-0.04
White hake	2.7	-0.6
Pollock	4.6	-1.1
Redfish	0.0	0.0
Witch flounder	0.1	-0.02

5.1.6.5 Gear Changes

5.1.6.5.1 Gear Restrictions - Mesh Size Changes

The Preferred Alternative includes measures that would change mesh regulations for trawl and gillnet vessels. Mesh selectivity is only one of a number of factors that influence the overall selection pattern in a fishery. Fishermen can influence the size of fish they catch by fishing at different times of the year, in different locations, or by using different gear or techniques. Most mesh selectivity studies have examined smaller mesh sizes and have focused on trawls. Indeed, in one experiment that examined the performance of 6.5-inch square mesh in selecting winter flounder in southern New England (DeAlteris, et al.,1999), the results suggested that scaling up earlier mesh experiments over-estimated the retention of winter flounder--that is, the mesh allowed more escapement than predicted by the earlier experiments at smaller mesh sizes. Even with adequate experiments that evaluate the selection pattern of a particular size of fish, mesh selectivity in commercial fishing operations may not match experimental results. There is evidence that selectivity can vary considerably based on different characteristics at the vessel level (Tschernej and Holst, 1999). There are several mathematical models for fitting results of mesh experiments to a selectivity curve. Using a different model can result in different estimates for the selection of fish at a certain size. Studies done in different locations, or using different experimental techniques, may give different results. The exploitation pattern is only one element of fishing mortality. If effort increases, even as the exploitation pattern is shifted to older fish, it is not clear what the final impact on fishing mortality will be. For all of these reasons, it is not possible to accurately predict how an increase in mesh size will affect fishing mortality.

In addition to the difficulty in predicting the impacts of a change in mesh size, a review of past attempts to manage exploitation patterns in North Atlantic groundfish stocks indicate only partial success. Pinhorn and Halliday (2001) examined changes in partial recruitment patterns for 26 cod, haddock, and pollock stocks between the immediate period after the extension of jurisdiction (1979-1988) and the last decade of international regulation (1967-1976). While the data reviewed showed widespread, modest improvements in partial recruitment patterns, the authors were not able to correlate the improvements with the expected changes based on regulations. Problems with compliance and poor data on size of removals are two of the factors they note may obscure the impacts of mesh changes. A preliminary review of GOM cod exploitation patterns since 1981 shows that, in spite of several increases in mesh size, the partial

recruitment pattern for age 4-6 fish is essentially unchanged, while fishing mortality on age 4-5 fish has declined.

This does not mean that increases in mesh size do not have positive impacts, or that the impacts may be inconsequential. The following positive impacts should result from an increase in mesh size.

- A likely increase in spawning stock biomass per recruit.
- Discards may be reduced, as larger mesh would capture smaller numbers of fish below the minimum size limits. The impacts of this benefit also depend on the type of mesh, as square and diamond mesh have different selection patterns for flat and round fish.
- "Harvesting at a delayed PR…" [partial recruitment, i.e. harvesting at older ages] "… enables the stock to maintain a high spawning biomass with an expanded age structure, while supporting a sustainable fishery" (O'Brien, 1999). To the extent that a mesh change contributes to a delayed PR, it contributes to an expanded age structure and potentially a higher spawning biomass at a given level of removals from the fishery.
- A likely increase in the number of times each fish spawns prior to capture. If the mesh size results in an increase in older spawners in the stock, there may be improvements in recruitment, since there is evidence that the eggs and larvae of older fish have higher survival rates (Trippel and Morgan, 1994; Knutsen and Tielseth, 1985; Kjesbu et al., 1996). Vallin and Nissling (2000) showed that, for Baltic cod, older, repeat spawners produce more, and larger, eggs than first time spawners, and showed that the number of age 2 cod recruits was positively related to the fraction of eggs produced by older females. There are some genetic data that suggest that male fertilization success increases with male body size (Hutchings et al., 1999), though other studies question this conclusion. All of these factors suggest that an increase in mesh size, to the extent it increases the age distribution and size of fish in the population, may lead to improved spawning success and recruitment.

Predicted Changes in Exploitation Pattern

As noted in the previous section, there are a number of difficulties with estimating the impacts of a change in mesh size. In order to provide a qualitative picture of the changes in exploitation that may result, selection patterns for trawl gear were calculated using the average mesh selectivity results from mesh studies as summarized in DeAlteris and Grogan (1997a). The selectivity characteristics of the mesh were plotted using a simple logistic selection curve for both

diamond and square mesh. In order to show the range of possible estimates, this table also includes estimates based on specific studies used in DeAlteris and Grogan (1997a). The alternatives were chosen to illustrate the range of results from the studies using the mesh closest to the mesh under consideration, without considering location or type of experiment. Their use is not meant to imply they are the "right" values, but to illustrate the variability between results from various experiments. Age at length was converted using the Von Bertanlanffy growth parameters from various sources, as summarized in NEFMC (1994). Length was calculated at the mid-year point to consider growth over the course of the year. This section focuses on the impacts of changes in mesh size on cod.

Regardless of the specific selection factors used, the proposed mesh change has the most impact on fish in the range of 3 to 4 years. For GOM cod, this is the age when the proportion of mature fish increases from about 88 percent females/76 percent males, to about 99 percent females/94 percent males (O'Brien, et al. 1993). All of the examples from the aforementioned scientific studies show that changing the minimum mesh size from the current 6-inch diamond mesh to 6.5-inch or 7-inch square mesh should reduce the probability of selection for age 3 fish. Generally, the examples show that changing the minimum mesh size from 6-inch diamond to 6.5-inch square mesh moves a given probability of selection at a certain size about 1 year into the future. An increase in trawl codend mesh from 6-inch diamond to 6.5-inch diamond, or from 6.5-inch square to 7-inch square, moves the probability of selection at a certain size less than a year into the future. That is, a fish is likely to live longer, and grow larger, before it would be retained by the larger mesh. Changing from 6-inch diamond mesh to 7-inch square mesh moves a given probability of selection at a certain size about 18 months into the future. Changing the minimum mesh size from the current 6-inch diamond mesh to 6.5-inch or 7.0-inch square mesh should reduce the probability of selection for age 3 fish.

Using the same mesh studies, the impacts on GB cod can also be illustrated. While the selectivity of the mesh does not change, the age at selection is different because of the different growth rates for GOM and GB cod. Changing mesh from 6-inch diamond to 6.5-inch square shifts the pattern about 1 year.

Effect on Yield per Recruit (YPR)

YPR calculations can be used both to show the change that results from the change in exploitation, and to estimate the impact of the change on the reduction in fishing mortality for GOM cod. An increase in mesh size will not affect the full force of fishing mortality, as the increase tends to affect only a narrow range of

size classes and therefore would not impact significantly fully recruited F. For GOM cod, the first age at full recruitment has been, and remains age 4, despite recent increases in codend mesh size, and the 2000 fully recruited F is 0.73. Although the stock is presently dominated by predominantly young fish, the age structure in a rebuilt stock under a low-F regime will be considerably broader. Therefore, it is important to consider the effect of the full force of fishing mortality on all fully recruited ages. An increase in mesh size will not have any impact on the fully recruited F. If a mesh increase were to shift the first age at full recruitment from age 4 to age 5, the definition of fully recruited F would simply shift from ages 4 and older fish to ages 5 and older fish, so the actual fully recruited F would remain unchanged.

Given this, it is more illustrative to examine the effect of a mesh increase (and therefore change in partial recruitment over the incompletely recruited ages) on the F reference points that can be derived from a simple YPR analysis. In this way, the impact of the mesh change can be examined from the perspective of reducing the distance between the current F and the management target F, advantageous because both Fs are in the same fully recruited units.

SAW-33 examined changes in F_{MAX} and $F_{0.1}$ reference points for GOM cod, given varying assumptions in changes in partial recruitment patterns associated with mesh change (see Table 5.7). The partial recruitment pattern in this analysis was calculated from the average 1999-2000 virtual population analysis (VPA) Fs at age. These years were chosen so that the calculated PR could reflect the most recent increase in mesh size.

The effects of the proposed mesh change were based on an examination of the possible impacts on selectivity at age of a ½-inch mesh size increase. It appeared that the overall effect of a ½-inch increase in mesh was a 1-year shift in the selectivity at age. However, given the incremental changes in partial recruitment that has been observed based on the VPA Fs over the past decade, it is likely that a less than full 1-year shift in partial recruitment will occur, even if the selection at age information is accurate.

Changes in mesh selectivity do not translate directly into equivalent changes in the partial recruitment pattern for several reasons:

1. Targeting behavior;
2. Illegal adjustments to the mesh;
3. Incomplete application of the regulated mesh to all gear sectors; and
4. Incomplete translation of selectivity experiments to actual field applications.

Given this, two additional YPR analyses were done. In each of these, the base partial recruitment pattern was adjusted to reflect the possible effects of the mesh change. The YPR runs were as follows:

Run 1. Base run with 2001 assessment partial recruitment pattern.
Run 2. Partial recruitment pattern from base run adjusted by ½ year.
Run 3. Partial recruitment pattern from base run adjusted by 1 year.

The 1-year shift in partial recruitment was accomplished by shifting the original PR up one full age. The ½-year shift in partial recruitment was accomplished by averaging the PR values for adjacent ages and applying the average to the higher of the two ages. All other input data to the analyses remained the same. The results are summarized below.

Estimates of F_{MAX}	Base Run	½ Year Shift	1 Year Shift
	0.27	0.30	0.34
Estimates of $F_{0.1}$	Base Run	½ Year Shift	1 Year Shift
	0.15	0.17	0.18

These reference point F's were then compared to the calendar year 2000 F (0.73) for GOM cod. Differences between the reduction multiplier based on the current reference point with existing partial recruitment pattern and the re-estimated reference points corresponding to the adjusted partial recruitment patterns were used as the basis for percentage contributions attributed to the proposed mesh increase.

Overall, the results suggest that a ½-inch increase in mesh size may contribute, at best, 9.6 percent to the required reduction from the current F for GOM cod to F_{MAX} (63 percent) and 4.1 percent to the required reduction from the current F for GOM cod to $F_{0.1}$ (79 percent). If the mesh increase serves to shift the partial recruitment pattern by only ½ year, the contributions are about halved, to 4.1 percent and 2.7 percent for F_{MAX} and $F_{0.1}$, respectively. The estimates were based on an assumed ½-inch mesh increase for all nest fished throughout the GOM. While the Preferred Alternative would increase the required mesh on diamond mesh, the square mesh provision would not change. This means that the biological impact of the mesh change estimated above would be diminished by some unknown amount.

Table 5.7. Changes in F reference points (for GOM Cod), given varying assumptions in changes in partial recruitment patterns associated with mesh change.

	No change	½-year shift in PR	1-year shift in PR

$F_{0.1}$	0.15	0.16	0.18
F_{MAX}	0.27	0.30	0.34
$F_{20\%}$	0.36	0.42	0.53

5.1.6.6 Impacts on Other Regulated Groundfish

There is a limited amount of selectivity information available for plaice, yellowtail flounder, pollock, and winter flounder for trawl mesh, and even less for gillnet mesh. This information is subject to the same caveats as were described in previous sections. Using the average selection factors from DeAlteris and Grogan (1997), and with the same cautions regarding the use of these data, selectivity curves comparing diamond and square mesh of different sizes for plaice (see Table 5.8), pollock, and GOM haddock (see Table 5.8) are shown below. Selection of plaice with square mesh is roughly the same as with diamond mesh that is ½ inch smaller.

Table 5.8. Theoretical exploitation at age for plaice. Trawl mesh selectivity from DeAlteris and Grogan (1997) using average mesh characteristics.

	Theoretical Plaice Probability of Mesh Selection at Age			
Age/Length				
	6" diamond	6.5" diamond	6.5" square	7" square
1.5/5.2 in.	0	0	0	0
2.5/8.4 in.	0	0	0	0
3.5/11.0 in.	.08	.02	.03	.02
4.5/13.3 in.	.40	.20	.30	.10
5.5/15.1 in.	.79	.56	.78	.51
6.5/16.7 in.	.94	.85	.96	.87
7.5/18.0 in.	.98	.95	1.0	.97
8.5/35.4 in.	1.0	1.0	1.0	1.0

The selectivity results for pollock are not definitive. DeAlteris and Grogan (1997) list only one square-mesh experiment for pollock. Comparing these results to the average diamond-mesh characteristics from the same paper suggests that 6.5-inch square mesh selects a higher percentage of pollock at a given age than does 6-inch diamond mesh. This difference, however, is not consistent with other roundfish (e.g., cod, haddock) selection patterns and later experiments. Halliday et al. (1999) conducted experiments with 5.5-inch (140-mm) square and diamond mesh, and 6.1-inch (155-mm) diamond mesh. In these experiments, the length at 50-percent selection was larger for 140-mm square mesh than for either size diamond mesh. A data review of other studies by the same authors found another study, using much smaller mesh, that showed square mesh selects larger pollock than diamond mesh. Based on this paper, it is likely that square mesh will select larger pollock than diamond mesh. Halliday et al. (1999) developed the following formulas relating size at 50-percent selection (L50) to the size of mesh for pollock:

$$\text{Square: } L50 = 0.529m - 12.243$$
$$\text{Diamond: } L50 = 0.256m + 15.036$$

Based on this relationship, the pollock L50 for 7-inch square mesh is about 32 inches, and for 6.5-inch square mesh is about 29.5 inches.

For 6-inch diamond mesh, the L50 is 21.2 inches. Generally, any increase in size of square mesh will provide positive biological benefits to pollock.

Based on this limited information, the mesh size changes under consideration in this action should not have negative biological impacts on other groundfish species, and in some instances will have positive benefits. Several groundfish stocks have high Fs that will need to be further reduced in future management actions. These stocks include white hake, plaice, and GOM haddock. The mesh size change proposed under this alternative should benefit these stocks (see Table 5.9).

Table 5.9. Theoretical probability of selection at age for GOM haddock using trawl gear. Average mesh characteristics.

Theoretical GOM Haddock Probability of Trawl Mesh Selection At Age*				
	6-inch diamond	6.5-inch diamond	6.5-inch square	7-inch square
1.5	0	0	0	0
2.5	0	0	0	0
3.5	0.12	0.05	0	0
4.5	0.48	0.21	0.1	0.02
5.5	0.75	0.47	0.41	0.12
6.5	0.87	0.69	0.67	0.3
7.5	0.93	0.81	0.83	0.5
8.5				

Source: DeAlteris and Grogan, 1997a. * Note: GOM haddock growth slows significantly after age 7.5, little change in selection expected after that age.

Gillnet selectivity curves are usually assumed to be roughly bell-shaped, or "Gausssian." These curves have a fish length that is the "optimal" length of selection (L_{opt}) – that is, a length that has the highest probability of selection of all lengths, usually equal to 1 – and then the probability of selection tapers off as fish size increases or decreases from this optimal length. The precise shape of these curves is subject to considerable debate, and reflects choices on the mathematical model and techniques used to describe the fish caught in the net, as well as different opinions on whether both gilled and non-gilled fish should be considered when determining selectivity. At this point, it is not clear that any one model is better than another, and the choice of model rests primarily with the data obtained and the preference of the individual researcher (Pol and Hovermale, 2000). One of the differences between the various models is how they treat fish that are at the extremes of L_{opt}. Some models assume that there is a minimum and maximum size that have a

very low probability of retention in the mesh. Other models recognize that some fish at these extremes may get tangled in the mesh and still be caught, and thus these models conclude that the fish at the extremes have higher probability of retention than does the first model. These latter models explicitly recognize that "gilling" is only one way that fish are caught in gillnets.

DeAlteris and Grogan (1997) summarized available gillnet selectivity information in addition to that for trawl mesh. They used a simple, rescaled normal probability curve to estimate selection patterns. Using this model, change in probability of selection at age can be estimated using a process similar to that used for trawl gear. Unlike trawl gear, however, the theoretical exploitation pattern for gillnets shows a peak probability at some interim age, and then declining probability at both younger and older ages. The primary source used for gillnet selectivity summarized in this study is a 1992 study by DeAlteris and Lazar. One advantage of these gillnet data, compared to the available trawl data, is that the earlier study examined mesh from 6 inches to 9 inches, covering the range of mesh considered in this action. Using the average mesh characteristics from DeAlteris and Grogan (1997), the theoretical probability of selection at age for GOM cod is shown in Table 5.10. This table shows that the theoretical L_{opt} for gillnet mesh is roughly the same as the theoretical length at full exploitation for diamond mesh of the same size. A ½-inch increase in mesh size shifts this age/size less than 1 year into the future. For Alternative 2, then, a ½-inch increase in gillnet mesh will shift the gillnet exploitation pattern less than 1 year into the future for GOM cod.

Table 5.10. Theoretical probability of gillnet selection at age for GOM cod. Based on average gillnet selection factors.

Theoretical GOM Cod Probability of Gillnet Mesh Selection at Age*			
	6-inch	6.5-inch	7-inch
Age/Length			
1.5/7.5 in.	0	0	0
2.5/13. in.	0	0	0
3.5/18 in.	0	0	0
4.5/22.3 in.	0.3	0.06	0.01
5.5/26 in.	1	0.7	0.25
6.5/29.6 in.	0.4	0.85	0.96
7.5/32.7 in.	0.03	0.21	0.65
8.5/35.4 in.	0	0	0.1
$L_{optimum}$ (cm./in.)	66.2/26 in.	71.9/28.3 in.	77.1/30.4 in.

Source: DeAlteris and Grogan, 1997. * Lengths at age based on Von Bertanlanffy growth parameters; annual variation likely to result in different lengths at age during any given year.

5.1.6.6.1 Impacts of Changes in Gear Limits

The No Action alternative would implement no changes to either mesh size, numbers of gillnets or hooks fished. By contrast, the Preferred Alternative would implement several gear changes that differ by area. These changes are detailed in section 3. The level of complexity involved with potential changes in gear and the myriad adaptive strategies that may result made it impossible to incorporate the biological impact of gear changes into the math programming model. To assess the potential impact of these changes, VTR data for trips landing regulated groundfish during fishing year 2000 were queried to ascertain area fished, catch, gear type, gear quantity, and mesh size. Each of these trips (approximately 22,500) was classified as being either a trawl, trip gillnet, day gillnet, or bottom longline trip. Each record was then examined to determine if the trip in question was already using conforming gear in terms of amount and size of gear; was using the conforming amount of gear but non-conforming size; was using conforming size but not conforming amount; or was not in conformance with either size or quantity of gear. Since hook size is not recorded on the VTR records, no analysis was possible on the minimum hook size. However, note that there is little available information on the selectivity of different size hooks. In fact, what information is available suggests that selection for larger fish is correlated with the size of the bait, rather than hook size.

Logbook records do not provide sufficient information about the size of catch. Therefore, no attempt was made to estimate the forgone yield associated with the proposed mesh size changes. However, the proportion of trips using conforming gear was estimated to provide a relative measure of what proportion of groundfish activity might be affected by the mesh size changes.

For gillnet and hook vessels, the change in numbers of nets or hook size may be more significant and provide greater biological impact than the change in mesh. In the absence of an explicit behavioral model to predict how vessels may adapt to these changes in amount of gear an estimate of the impact was developed by assuming that average landings rates (discards were not included) by species/stock per unit of gear fished (by net panel, or per hook) would be constant for all gear fished on the trip. In this manner, the biological impacts on trips where the observed quantity of gear fished would be greater than under the Preferred Alternative may be estimated by multiplying the average landings by the gear limit. The resulting product

provides a rough estimate of the biological impact of the changes in gear limits, exclusive of mesh.

Of the VTR-reported trips in the Northeast region, the largest proportion were taken by otter trawl vessels in the GOM (38.4 percent) (Table 5.11). Among other species, trawl trips landed 56.9 percent of GOM cod, 81.8 percent of GOM winter flounder, and 82.6 percent of GOM haddock. Compared to Trip gillnet vessels (4.7 percent of all trips), Day gillnet vessels accounted for proportionally more effort in terms of trips (16.1 percent), but Trip vessels landed almost as much GOM cod (18.4 percent as compared to 22.3 percent) as Day boats.

According to reported activity, 37 percent of all trips taken in the Northeast region would not be affected by either mesh or gear quantity, because both mesh size and quantity of gear used would be consistent with the Preferred Alternative (Table 5.12). An additional 55.2 percent of trips would only be affected by the mesh change. These values include otter trawl vessels that would not be affected by any changes in quantity of gear fished. For the subset of vessels (hook and gillnet) that may be affected by changes in both mesh and quantity of gear, 55 percent of the 7,800 trips taken by these vessels were already in conformance with the proposed gear changes. An additional 22 percent of fixed gear trips would have to change mesh size, but would not be affected by the nominal reductions in gear. This leaves 23 percent of all fixed gear trips that would be affected by reductions in gear. In terms of landings, the fixed gear sector accounted for 18.3 percent of total groundfish landings, of which 12.9 percent of total landings would not be affected by a change in quantity of gear used, leaving a maximum biological benefit of approximately 5.4 percent for all regulated groundfish combined. This maximum benefit would only occur if all trips that used more than the proposed gear changes would allow were to be abandoned. Should vessels choose to fish with the reduced gear allowance, the biological impacts would be lower.

Based on the assumption that vessels do not abandon any trips, applying the average landing per unit of gear set results in an estimated aggregate reduction in regulated groundfish landings of 1.7 percent (Table 5.13). Across the species in the groundfish complex, estimated reductions exceeded 1 percent only for GOM cod (2.61 percent), GB cod (5.06 percent), pollock (3.99 percent), and redfish (1.99). Although the relative reduction for some species in some trip categories appears relatively large, the total reduction is low because the given category only accounts for small quantities of total landings. For example, the reduction in GB cod from Trip gillnet vessels was estimated to be almost 36 percent. However, cod landings from these trips only accounted for 1.1 percent of total GB

cod landings in FY 2000. This means that the effective reduction in total GB cod landings is only 1.1 percent of 36 percent, or 0.4 percent.

Table 5.11. Summary of relative distribution of effort and landings by trip type and fishing area (percent).

	GOM				GB				SNE			
	Trawl	Trip Gillnet	Day Gillnet	Long line	Trawl	Trip Gillnet	Day Gillnet	Long line	Trawl	Trip Gillnet	Day Gillnet	Longline
Trips	38.4	4.7	16.1	0.9	9.5	0.4	6.4	4.2	17.5	0.4	1.0	0.4
Gom Cod	56.9	18.4	22.3	2.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GB Cod	0.0	0.0	0.0	0.0	62.8	1.1	21.8	10.4	2.1	0.5	0.8	0.5
GOM Winter	81.8	3.2	13.7	0.0	0.1	0.0	0.0	0.0	1.0	0.0	0.0	0.0
GB Winter	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SNE Winter	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	99.5	0.3	0.1	0.0
GB Yellowtail	0.0	0.0	0.0	0.0	99.6	0.0	0.0	0.0	0.4	0.0	0.0	0.0
SNE Yellowtail	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	99.7	0.0	0.0	0.0
CC Yellowtail	57.9	2.4	9.4	0.0	29.9	0.1	0.3	0.0	0.0	0.0	0.0	0.0
MA Yellowtail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Plaice	59.8	0.2	0.6	0.0	38.7	0.0	0.0	0.0	0.6	0.0	0.0	0.0
S. Windowpane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
N. Windowpane	62.4	0.1	0.9	0.0	35.4	0.0	0.0	0.0	1.1	0.0	0.0	0.0
GOM Haddock	82.6	12.5	2.3	2.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GB Haddock	0.0	0.0	0.0	0.0	95.3	0.3	3.2	0.6	0.4	0.2	0.0	0.0
White Hake	22.2	13.6	1.6	0.1	18.8	1.5	0.4	0.0	41.5	0.2	0.0	0.0
Pollock	20.7	37.3	7.5	0.0	25.3	2.7	4.5	0.1	0.2	1.7	0.0	0.0
Redfish	30.2	14.8	0.5	0.0	48.1	2.0	0.8	0.2	1.1	2.3	0.0	0.0
Witch Flounder	47.9	0.2	1.0	0.0	48.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0

Table 5.12. Relative proportion of trips by conformance with proposed gear quantity and size regulations for FY 2000 (percent)

Trip Category	Conforming Gear	Conforming Quantity/Non-Conforming Size	Non-Conforming Quantity/Conforming Size	Non-Conforming Quantity/Non-Conforming Size	Prohibited
GOM Trawl	7.9	30.5	0.0	0.0	0.0
GOM Trip Gillnet	2.3	2.0	0.4	0.0	0.0
GOM Day Gillnet	10.8	4.8	0.2	0.0	0.3
GOM Longline	0.6	0.0	0.3	0.0	0.0
GB Trawl	1.9	7.5	0.0	0.0	0.0
GB Trip Gillnet	0.1	0.0	0.2	0.1	0.0
GB Day Gillnet	2.5	0.8	2.7	0.4	0.0
GB Longline	1.3	0.0	2.8	0.0	0.0
SNE Trawl	8.0	9.6	0.0	0.0	0.0
SNE Trip Gillnet	0.2	0.0	0.1	0.1	0.0
SNE Day Gillnet	0.9	0.0	0.1	0.0	0.0
SNE Longline	0.4	0.0	0.0	0.0	0.0
Total	37.0	55.2	6.9	0.7	0.3

Table 5.13. Biological impact of gear quantity changes by trip type and species/stock

		GOM				GB				SNEngland			
Species/Stock	Totals	Trawl	Trip Gillnet	Day Gillnet	Longline	Trawl	Trip Gillnet	Day Gillnet	Longline	Trawl	Trip Gillnet	Day Gillnet	Longline
Gom Cod	-2.61	0.00	-3.27	-7.42	-15.11	0.00	-58.33	0.00	0.00	0.00	0.00	0.00	0.00
GB Cod	-5.06	0.00	-1.52	0.00	0.00	0.00	-35.78	-12.58	-16.38	0.00	-22.21	-10.32	-2.41
GOM Winter	-0.80	0.00	-6.38	-4.11	-50.76	0.00	-58.33	0.00	0.00	0.00	0.00	0.00	0.00
GB Winter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-10.00	0.00	0.00	0.00	0.00
SNE Winter	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-12.99	-0.14	0.00
GB Yellowtail	0.00	0.00	0.00	0.00	0.00	0.00	-2.63	-37.50	0.00	0.00	0.00	0.00	0.00
SNE Yellowtail	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-11.82	-10.31	0.00
CC Yellowtail	-0.58	0.00	-6.62	-2.67	0.00	0.00	-26.05	-42.08	0.00	0.00	0.00	0.00	0.00
MA Yellowtail	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plaice	-0.07	0.00	-2.44	-8.42	0.00	0.00	-33.70	-28.86	-4.10	0.00	-25.00	0.00	0.00
S Windowpane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-25.00	0.00	0.00
N. Windowpane	0.00	0.00	0.00	-0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GOM Haddock	-0.68	0.00	-1.41	-14.50	-8.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GB Haddock	-0.72	0.00	0.00	0.00	0.00	0.00	-39.03	-14.51	-12.51	0.00	-24.94	0.00	0.00
White Hake	-0.90	0.00	-0.74	-8.97	-5.06	0.00	-34.25	-23.07	-10.63	0.00	-23.57	0.00	-12.35
Pollock	-3.99	0.00	-1.94	-11.35	-22.28	0.00	-42.54	-18.37	-14.54	0.00	-24.76	-0.14	-18.18
Redfish	-1.99	0.00	-1.50	-7.90	-18.30	0.00	-45.37	-29.15	-3.53	0.00	-25.08	0.00	0.00
Witch Flounder	-0.05	0.00	-0.77	-2.65	0.00	0.00	-42.63	-47.29	0.00	0.00	-6.59	0.00	0.00
Total	-1.74	0.00	-2.21	-7.26	-13.63	0.00	-38.76	-13.43	-16.24	0.00	-23.56	-9.95	-2.44

5.1.7 Cumulative Impacts

Although the measures in the EA are for the time period August 1, 2002, until the implementation of Amendment 13 (anticipated by August 22, 2003), the interim action could have potential cumulative impacts. The scope and magnitude of any cumulative impacts from measures established in previous years is largely dependent on how effective those measures were in meeting their intended objectives. Mitigating measures may have lessened the cumulative impacts of restrictions.

Prior actions taken to reduce fishing mortality in the NE multispecies fishery have contributed to stock size increases, enhancements to stock structure, and production of large year classes for some stocks. The Preferred Alternative (versus the No Action alternative), by continuation of current measures and implementation of new measures, would protect important year classes (such as the 1998 year class of GOM cod) and increase the likelihood of timely stock rebuilding. An important aspect of the Preferred Alternative that enhances the protection of the stocks is the control of latent DAS. The DAS freeze would significantly limit the extent to which latent DAS could be activated and, therefore, limit the extent to which the increases in fishing mortality from the use of such DAS could undermine efforts to control fishing mortality. In contrast, the No Action alternative or hard TAC alternative, because they would not limit the use of latent effort, would be less effective in ensuring that fishing mortality did not increase and undermine the cumulative rebuilding gains achieved.

Under the FMP, the Multispecies Monitoring Committee (MMC) meets annually to develop target TACs for the upcoming fishing year, and to develop options for Council consideration on any adjustments or additions to management measures that may be necessary to achieve the FMP goals and objectives. The annual nature of the management measures is intended to provide the opportunity for the Council and NMFS to regularly assess the status of the stocks and to make adjustments. Rebuilding of some stocks under the FMP began in 1996, with Amendment 7 to the FMP. Subsequent frameworks implemented measures based on recommendations from the MMC that were developed to attain the appropriate level of fishing mortality, based upon the available information. Because each year’s measures build upon the previous year’s measures, the cumulative effects of the management program on the health of the stocks and the fishery are assessed from year to year.

Although this action would not reduce fishing mortality to the full extent necessary under the Magnuson-Stevens Act, the level of fishing mortality anticipated will not compromise the rebuilding of

overfished stocks. Despite the fact that some NE multispecies stocks have experienced overfishing (excessive fishing mortality) over a number of years, there does not appear to be a cumulative effect that would prevent the rebuilding of stocks.

5.1.8 Bycatch

This interim action would put in place restrictive measures to reduce fishing effort and fishing mortality on groundfish stocks in the NE, which will reduce overall bycatch in the groundfish fishery. In most areas where the groundfish fishery operates, several stocks of groundfish occur together, along with other non-groundfish species, such as skates, spiny dogfish, and monkfish. Under the Preferred Alternative, area closures, effort restrictions, modifications to the DAS clock, and gear restrictions such as mesh increases, gillnet net reductions, and hook gear restrictions would help reduce bycatch in both the groundfish fishery and on these other stocks by reducing levels of fishing effort and efficiency.

The primary means of an indirect effect on bycatch would be through the following management measures: Control of latent DAS through establishment of a used DAS baseline, reduction in fishing effort through a 20=percent cut in DAS, additional GB closures in May, the closure of additional areas of the inshore GOM during the months of May and June, new limitations on the number of gillnets fished, limitations on the number of hooks fished, and a moratorium on the issuance of new open access hand-gear permits. The increase in the GOM cod daily possession limit to 500 lb per DAS will likely decrease regulatory discards of cod. In the context of an increasing stock size, increases in trip limits for the target species will result in decreases in regulatory discards of the target species.

Increases in the required minimum mesh size will have a direct effect on bycatch and result in a decreased bycatch of most species (both target and non-target species), within a certain body size range. The concurrent increase in cod minimum size for commercial vessels (to 22") however may increase regulatory discarding of cod below the 22" size limit. It is instructive to note, however, that maintenance of the minimum cod size at 19" (the current regulation), in conjunction with an increase in minimum mesh size. may serve as an incentive for otter trawl fishers to use net liners in order to retain a greater portion of fish that enter the net. It is very difficult to quantify or predict the affect of mesh size increases due to the large number of variables that affect the size of catch, and the limited number of applicable scientific studies.

For some proposed measures, such as front-loading and the decrease in trip limit for the open access Hand Gear category, the net affect on

bycatch depends on the behavior of the individual vessel operator. For example, the prohibition on front-loading may serve as incentive to increase the amount of time spent fishing. Under a scenario where front-loading is prohibited, if a vessel operator who was in the practice of front-loading in the past chose to remain fishing in order to catch the same amount of fish he/she would have caught in the past (while front-loading), he/she would spent more time actually fishing for the same amount of fish. Such a behavior pattern would cause an increase in bycatch. Similarly, the reduction in trip limit for the open access Hand Gear permit category could serve as an incentive to continue fishing for species in the NE multispecies FMP that do not have a trip limit, which could increase regulatory discards of cod, haddock, and yellowtail flounder. It is possible that the imposition of the yellowtail possession limit could cause some regulatory discarding in the SNE RMA, because there is currently no yellowtail flounder possession limit in place.

Given the limited scope and context of this interim action and numerous measures already in place that reduce bycatch, it is not practicable to implement measures solely to minimize bycatch.

Although not proposed as a regulatory management measure, NMFS will expand significantly its observer coverage in the NE multispecies fishery to monitor and collect information on bycatch, as well as other biological and fishery-related information. For all gear sectors, NMFS will provide 5-percent observer coverage, or higher, if necessary to provide statistically reliable data. Effective May 1, 2003, NMFS would provide 10-percent observer coverage for all gear sectors, unless it can establish by the most reliable and current scientific information available that such increase is not necessary. Observer coverage would be distributed over gear categories, vessel size categories and fishing regions, in order to provide statistically sound estimates of directed catch, nondirected catch and discards (bycatch).

5.2 Economic Impacts

The following discussion provides an analysis of anticipated economic impacts associated with this interim action. Quantitative analysis of the impacts of DAS reductions, potential fishing income losses, and vessel break-even analyses are discussed.

5.2.1 Impacts of DAS Reduction

A DAS baseline freeze would be established based on the maximum DAS called-in to the NE multispecies DAS program any fishing year from 1996 through 2000. For purposes of analysis, the NERO call-in data

base was queried by permit number to determine the maximum DAS used over the qualifying period for valid current limited access NE multispecies permit holders. The results of this query did not include DAS associated with vessels in the Confirmation of Permit History program and excluded DAS associated with limited access permits that were removed through the latent permit buyout.

There were 1,442 valid limited access permits issued for FY 2001, which had an associated DAS allocation (see Tables 5.14, 5.15, and 5.16 for summaries of DAS allocations by state, permit category, and vessel length class respectively). Of these permits, 242 had no recorded call-in record, while the remainder called in on at least one occasion over the 5-year qualification period. Based on these call-in records, a total of 73,351 DAS would qualify for the freeze baseline. A 20-percent reduction from this baseline would result in an initial allocation of 58,680 DAS for FY 2002. Current NE multispecies regulations permit vessels to carry over up to 10 unused DAS from the prior to the subsequent fishing year. Comparing FY 2001 DAS allocations to FY 2001 call-in data results in an estimated 11,306 DAS. Adding these carry-over DAS to the estimated FY 2002 DAS results in a total of 69,986 DAS allocations that will be available for use in FY 2002. Compared to observed DAS use in FY 2001, this FY 2002 DAS allocation would not necessarily constrain total fishing effort, even though it would be constraining for about half of all vessels that called in DAS in FY 2001.

The actual impact of DAS reductions will differ by vessel depending on level of sustained participation in groundfish over time and will depend on the relative importance of groundfish to total fishing income. With respect to the former, vessels that have had a sustained record of groundfish fishing are likely to be relatively more affected in FY 2002 because they are likely to have fewer carry-over DAS from FY2001 (for vessels that have them, carry-over days would mitigate some of the impacts of the DAS reduction), and because the 20-percent DAS reduction is likely to represent a “real” reduction in effort. By contrast, vessels with varying participation in the groundfish fishery are likely to have more carry-over days and are likely to qualify for higher DAS allocations than may be consistent with participation levels over time.

To assess the relative distribution of impacts, final FY 2002 DAS allocations were compared to observed FY 2001 call-in data, by vessel. A total of 1,044 vessels called in on at least one occasion during FY 2001 (see Tables 5.17, 5.18, and 5.19 for summaries of relative DAS call-in changes by state, permit category, and vessel length). Of these, an estimated 582 (56 percent) would not be able to call in as many DAS in FY 2002 as they did in FY 2001. On average, these vessels would lose 22 DAS, compared to FY 2001 call-in

history. Relative DAS losses would be above this average in Massachusetts and Maine (Table 5.17). Across permit categories, 122 of the 130 individual allocation vessels would lose an average of 29 DAS relative to their FY 2001 participation levels (Table 5.18).

In terms of total available fishing effort, losses in DAS (relative to FY 2001 call-in) may be more than offset by available DAS allocations in excess of observed use. There were a total of 462 vessels that did call in DAS for FY 2001 that whose potential FY 2002 call-in could exceed that of FY 2001. There are an additional 398 vessels that would receive some FY 2002 allocation that did not call in any DAS in FY 2002. The sum of available "latent" DAS for the combined 857 vessels was estimated to be 18,422 DAS; an average of 21 DAS per vessel. Thus, the potential exists for the effort reductions by vessels that will be constrained by the proposed freeze baseline and DAS reduction to be more than offset by expansion in effort by other vessels.

Table 5.14. Summary of DAS allocations and DAS use under the Preferred Alternative by home port state

Home Port State	Number of Permits (Permit Year 2001)	Permits with no Call-in Records	Freeze Baseline DAS	FY 2002 Initial Allocation	FY 2001 Initial DAS Allocations	DAS Called-In FY 2001	Carry-Over from FY 2001	Final FY 2002 DAS Allocations
CT	17	4	897	718	1,455	646	151	869
MA	779	113	42,535	34,028	72,142	39,057	5,753	39,781
ME	179	46	9,486	7,589	16,847	9,331	1,245	8,834
NH	75	6	4,729	3,783	7,101	4,570	511	4,294
NJ	77	21	2,318	1,854	6,904	1,282	764	2,618
NY	143	17	4,995	3,996	12,491	3,210	1,340	5,336
RI	114	17	6,340	5,072	10,195	4,686	1,037	6,109
Other	58	18	2,051	1,641	4,832	1,622	505	2,146
Totals	1,442	242	73,351	58,680	131,967	64,403	11,306	69,986

Table 5.15. Summary of DAS allocations and DAS use under the Preferred Alternative by permit category

Permit Category	Number of Permits (Permit Year 2001)	Permits with no Call-in Records	Freeze Baseline DAS	FY 2002 Initial Allocation	FY 2001 Initial DAS Allocations	DAS Called-In FY 2001	Carry-Over from FY 2001	Final FY 2002 DAS Allocations
Individual	138	7	16,109	12,887	17,151	16,142	346	13,233
Fleet	1,065	195	47,773	38,218	93,720	40,153	8944	47,162
Hook Only	130	29	3,239	2,591	11,440	2,154	1231	3,822
Combination	46	5	1,543	1,234	1,994	1,102	307	1,541
Large Mesh	63	6	4,687	3,749	7,662	4,851	478	4,227
Totals	1,442	242	73,351	58,680	131,967	64,403	11306	69,986

Table 5.16. Summary of DAS allocations and DAS use under the Preferred Alternative by length class

Length Class	Number of Permits (Permit Year 2001)	Permits with no Call-In Records	Freeze Baseline DAS	FY 2002 Initial Allocation	FY 2001 Initial DAS Allocations	DAS Called-In FY 2001	Carry-Over from FY 2001	Final FY 2002 DAS Allocations
Large	255	34	18,661	14,929	24,212	15,926	1574	16,503
Medium	694	88	39,192	31,353	63,630	34,750	5238	36,591
Small	493	120	15,498	12,398	44,125	13,727	4494	16,892
Totals	1,442	242	73,351	58,680	131,967	64,403	11306	69,986

Table 5.17. Summary of estimated FY 2002 call-in DAS relative to FY 2001 participation by home port state

Home Port State	Number of Permits Called-in FY 2001	Number of Permits with Reduced FY 2002 Call-in DAS	Number of FY 2002 Call-in DAS Used	Number of Lost FY 2002 Call-in DAS	Average Lost FY 2002 Call-in DAS	Number of Latent FY 2002 Call-in DAS
CT	12	4	597	49	12	271
MA	598	363	30,825	8,232	23	8,956
ME	124	91	7,049	2,282	25	1,785
NH	60	42	3,651	919	22	643
NJ	46	9	1,192	90	10	1,427
NY	91	25	2,753	457	18	2,582
RI	83	34	4,214	471	14	1,894
Other	30	14	1,284	339	24	864
Totals	1,044	582	51,565	12,839	22	18,422

Table 5.18. Summary of estimated FY 2002 call-in DAS relative to FY 2001 participation by permit category

Permit Category	Number of Permits Called-in FY 2001	Number of Permits with Reduced FY 2002 DAS	Number of FY 2002 DAS Used	Number of Lost FY 2002 DAS	Average Lost FY 2002 Call-in DAS	Number of Latent FY 2002 DAS
Individual	130	122	12,620	3,521	29	613
Fleet	757	386	32,744	7,411	19	14,419
Hook Only	76	22	1,733	421	19	2,090
Combination	23	13	911	192	15	630
Large Mesh	58	39	3,557	1,294	33	670
Totals	1,044	582	51,565	12,839	22	18,422

Table 5.19. Summary of estimated FY 2002 call-in DAS relative to FY 2001 participation by length class

Length Class	Number of Permits Called-in FY 2001	Number of Permits with Reduced FY 2002 DAS	Number of FY 2002 DAS Used	Number of Lost FY 2002 DAS	Average Lost FY 2002 Call-in DAS	Number of Latent FY 2002 DAS
Large	190	118	12,977	2,948	25	3,527
Medium	540	316	28,037	6,715	21	8,554
Small	314	148	10,551	3,176	21	6,341
Totals	1,044	582	51,565	12,839	22	18,422

5.2.2 Economic Impacts of Fishing Income Changes

Quantitative analysis of the biological effectiveness of the proposed alternatives was accomplished primarily by using an area closure model as described in section 5.1. This model provided a relative measure of the change in exploitation of each of the primary groundfish stocks that would be impacted, as well as a relative measure of gross revenue changes. The data embedded in this model include gear type, landings, value, effort, and monthly average CPUE's of the 10 regulated groundfish species, by area block, for the NE region. These effort data were compiled by averaging a combination of VTR activity records and dealer price data for calendar years 1996-2000 for trips that had a valid latitude-longitude coordinate. This means that the area closure model excludes two types of information for vessels that land some quantity of regulated groundfish: Landings and value of groundfish with no valid lat-lon coordinate and landings and value of all other species. While the former is implicitly included in the gross revenue changes predicted by the area-closure model by assuming that the revenue impacts for groundfish landings that do not have valid location information will be proportional to the revenue impacts for data that is included in the model, exclusion of the latter will tend to result in an upward bias in the magnitude of impact on a vessel's total annual income. Note that the magnitude of this bias will be greater/lesser for vessels the lesser/greater their dependence on regulated groundfish for fishing income. The procedures used to correct for this estimation bias are described below.

5.2.2.1 Data

Data for this analysis included landings data from the VTR, price data from dealer records, and NMFS NERO permit data. The permit data for FY 2000 were queried to obtain home port state and vessel length for all vessels that were included in the area closure model[2]. VTR data for calendar years 1998-2000 were used to estimate total landings of all species by trip and by year for each vessel. The VTR data were used to maintain consistency with the data used in the area closure model and because it was the only way to maintain individual vessel information for vessels that may have landed in Connecticut or Delaware. Total trip value was estimated by applying monthly average price, by species, to each trip record.

[2]Even though the area closure model may not have included 100 percent of any given vessels activity, all vessels that did record landing of one or more pounds of regulated groundfish were included. Therefore, the area closure model should be a reasonable census of vessels that have landed regulated groundfish during calendar year 1996-2000 and that currently hold a valid multispecies permit.

Although there have been a number of regulatory changes affecting species other than groundfish, the changes affecting dogfish are perhaps the most significant. With the change in the dogfish trip limits, any given vessel may have a greater dependence on groundfish today than it would have had in prior years, which may be particularly true for gillnet vessels. Including annual dogfish revenue from prior years could have the effect of introducing a downward bias in the estimated impacts of the interim action. This bias would be greater the more dependent any given vessel was on dogfish during calendar years 1998 and 1999.

The dogfish revenues for 1998 and 1999 were adjusted in the following manner. First, the proportion of dogfish revenue to total combined species other than regulated groundfish was calculated for calendar year 2000. This proportion provides an estimate of relative dependence on dogfish for a period of time when all vessels would have been operating under current regulations and so may be assumed to best approximate status quo conditions. Second, dogfish dependence in 1998 and 1999 were set to be less than or equal to that of calendar year 2000. If the proportion of dogfish to total other species revenues was less than the 2000 estimate, then no adjustment to dogfish revenues was made. Otherwise, dogfish revenues were adjusted downward by multiplying total combined revenues from species other than regulated groundfish by the calendar year 2000 proportion of dogfish revenue. Last, total non-groundfish revenues were recalculated by summing adjusted dogfish revenue and combined revenues from all other non-groundfish species, assuming that dogfish revenue represented 10 percent of total non-groundfish revenues in 2000 (for example, dogifish revenue represented 10 percent of total non-groundfish revenues in 2000). If, in 1999, dogfish revenue was 5 percent of non-groundfish revenues, then no adjustment was made. But if in 1998 dogfish revenue were 20 percent of non-groundfish revenue, and total non-groundfish revenues were $50,000, then dogfish revenues were adjusted downward from $10,000 to $5,000. The total non-groundfish revenues were similarly adjusted to $45,000 to account for the $5,000 adjustment to dogfish revenues.

Data for groundfish revenues and all other species revenues, adjusted as necessary, were then summed by vessel and aggregated into total annual income from combined large-mesh groundfish and total income from all other species. Total income by vessel for calendar years 1998-2000 were then averaged to construct a final data set that included the vessel permit number, gear sector (consistent with that included in the area-closure model), home port state, vessel length, 3-year average annual income from regulated groundfish, and 3-year average income from all other combined species.

5.2.2.2 Procedures

The area closure model was designed to provide a relative measure of change in the exploitation of species included in the model. As such, a baseline is constructed by imposing a set of constraints on where and when vessels may fish, to observed fishing location data, where the constraints represent the various management measures currently in place. By changing these constraints, an estimate of how effort may be redistributed and the resulting revenue and landings is produced. The percent change in exploitation and regulated groundfish revenue is then estimated relative to the baseline.

Given that the area closure model produces a relative measure of change, and that the baseline is dependent on the specified constraints, there is no direct mapping between the modeled baseline and landings data tabulated from either dealer or VTR records. However, in concept, the area closure baseline is designed to approximate the suite of management measures that are currently in place. These measures include DAS, trip limits, and combinations of year-round and rolling closures. Therefore, an approximate mapping of the model baseline and VTR landings may be accomplished by selecting a time period that best reflects current regulatory conditions, which, for purposes of analysis, was assumed to be the 1998-2000 calendar year averages.

The economic effects of the proposed alternatives were then estimated in the following manner. First, for a given option, the area closure model was used to estimate the expected change in large-mesh groundfish revenues. This change was then applied to baseline (i.e., the 1998-2000 average) groundfish revenues to estimate expected groundfish revenue under that option. The proportion of combined revenue from all other species landed on trips where groundfish were also landed was then calculated. This proportion was used to adjust total trip income to account for forgone income from non-groundfish species associated with changes in groundfish activity. Last, the estimated total income was divided by baseline total income to calculate proportional changes in total fishing incomes.

There are likely to be several potential sources of bias associated with the method described above. The mismatch between the 1998-2000 average and the area closure proxy for the baseline has already been mentioned. Another source of bias is associated with the treatment of revenue from species other than regulated groundfish. To the extent that revenues from other species is earned on groundfish trips that may be affected by one or more of the management options, the assumption that changes in these revenues would be proportional to income lost on groundfish trips may introduce a downward bias in the estimated impacts. On the other hand, to the extent that vessels adapt to any one or more of the proposed measures by increased

targeting of species other than regulated groundfish, assuming proportionality in other species' revenues will result in an upward bias in the estimated economic impacts. At this time, it is difficult to predict which of these biases would be more prevalent.

In addition to the aforementioned, there is a potential bias associated with the inability to account for possible improvements in catch rates with changing stock sizes. This bias will be more severe for stocks that respond quickly to management changes than for stocks that respond relatively slowly. In the former case, the estimated impacts will tend to be biased upward, while in the latter the economic impact estimates would not be affected. The extent of the bias will be greater, the longer the time period associated with the projected impacts.

The introduction of bias in the estimated impacts would be a more significant problem if the primary purpose were to calculate the absolute magnitude of economic impacts. This is not the case. The primary purpose of the analysis is to provide a comparative assessment of economic impacts across alternatives, as well as an assessment of the distributive effects by gear sector, state, and vessel size class. Thus, even though some bias is likely, as long as each alternative is assessed in a consistent manner, the ordinal ranking of alternatives and the relative impacts across gears, sizes, and states should be preserved.

5.2.2.3 Results

5.2.2.3.1 Economic Impacts of Commercial Measures

Taking no action would leave all current management measures in place, and would result in fishing inside the WGOM Area Closure. This change would increase commercial fishing opportunities for vessels that have ready access to the area. The No Action alternative would result in an estimated increase of 2.1 percent in total fishing income and a 2.9-percent increase in groundfish income. This option would not affect the majority of the 1,024 vessels included in the economic analysis, but would provide an increase in annual fishing income of 6.5 percent at the 90th percentile (see Table 5.20). The relative increase annual fishing revenues would be more than 6.5 percent for all vessels above the 90th percentile.

By contrast, implementing Alternative 2 would result in an aggregate loss of less than 1 percent in total fishing income, but would result in an aggregate reduction in total groundfish income of 4.2 percent. For individual vessels, the estimated loss in annual fishing revenues was 15.7 percent or greater for all vessels at or below the 10th percentile. Gross revenue for the median vessel would also be

unchanged, while 25 percent of vessels would increase their gross income. Note that this increase is due to changes in rolling closures (opening blocks 124 and 125 January to March) and the increase in GOM cod trip limit.

Table 5.20. Relative reduction in commercial fishing vessel gross revenue.

	No Action	Preferred Alternative
10th Percentile	0	-15.7
25th Percentile	0	-5.3
50th Percentile	0	0.0
75th Percentile	0.1	0.1
90th Percentile	6.5	5.1

5.2.2.3.2 Effects by Vessel Size

Under Alternative 1 (No Action), all expected revenue changes would be positive. However, opening of the WGOM Area Closure to fishing would have the greatest positive impacts on small vessels (21.5 percent at the 90th percentile) than medium vessels (5 percent at the 90th percentile), and medium vessels would benefit relatively more than large vessels (see Table 5.21). These results indicate that the WGOM Area Closure is more important as a source of fishing revenues for vessels less than 40 ft than it is for larger vessels.

Under Alternative 2, median annual revenue would be unchanged for medium and small trawlers, but would be reduced by 1.1 percent for large trawlers (see Table 5.21). The impacts across vessel size classes are similar, as income losses below the median are not significantly different for large medium and small vessels.

Table 5.21. Proportional change in annual gross revenues by vessel size (Large = +70'; Medium = 40 to 70', Small = under 40')

	No Action	Preferred Alternative
Large (n=205)		
10th Percentile	-0.1	-15.3
25th Percentile	0.0	-7.2
50th	0.0	-1.1

Percentile		
75th Percentile	0.0	0.0
90th Percentile	1.3	0.2
Medium (n=549)		
10th Percentile	0.0	-18.1
25th Percentile	0.0	-4.9
50th Percentile	0.0	0.0
75th Percentile	0.4	0.3
90th Percentile	6.9	5.0
Small (n=210)		
10th Percentile	0.0	-15.2
25th Percentile	0.0	-2.4
50th Percentile	0.0	0.0
75th Percentile	0.9	0.5
90th Percentile	21.5	11.0

5.2.2.3.3 Effects by Gear Groups

Among the gear groups, gillnet and hook gear would benefit most from Alternative 1 (No Action), as revenues would increase 2.3 percent at the 75th percentile and 13.8 percent at the 90th percentile for gillnet gear, and 0.5 percent and 31.4 percent, respectively, for hook gear (see Table 5.22). These results indicate that the WGOM Area Closure is more important for fishing revenue for fixed gear, as compared to mobile gear.

Revenue losses would be greatest for trawl vessels under the Preferred Alternative, with 50 percent of all trawlers losing at least 1 percent of annual gross income, and with 10 percent of these vessels losing more than 18 percent of annual gross revenue. By contrast, gross revenue losses for gillnet or hook vessels are much lower, and 25 percent of vessels in these two gear sectors would experience some increase in gross revenue. For gillnet and hook vessels operating in the GOM, these positive impacts are likely

attributable to the increase in GOM cod trip limit, because cod represents are much larger proportion of total trip income as compared to trawl vessels. Thus, even modest increases in the cod trip limit will have proportionately greater benefit to hook and gillnet gear as compared to other gear.

Table 5.22. Proportional change in annual gross revenues by gear group.

	No Action	Preferred Alternative
Gillnet Gear (n= 211)		
10th Percentile	0.0	-8.4
25th Percentile	0.0	0.0
50th Percentile	0.0	0.0
75th Percentile	2.3	4.7
90th Percentile	13.8	14.4
Hook Gear (n=98)		
10th Percentile	0.0	-6.0
25th Percentile`	0.0	0.0
50th Percentile	0.0	0.0
75th Percentile	0.5	0.9
90th Percentile	31.4	14.9
Trawl Gear (n=655)		
10th Percentile	0.0	-18.1
25th Percentile	0.0	-7.2
50th Percentile	0.0	-1.1
75th Percentile	0.0	0.0
90th Percentile	3.2	0.6

5.2.2.3.4 Effects by Gear/Vessel Size Groups

Alternative 1 (No Action) would have the greatest positive impact on small gillnet and small hook vessels. Opening the WGOM Area Closure would result in an estimated 40.7-percent and 38.9-percent increase in annual gross revenues at the 90th percentile for small gillnet and small hook vessels, respectively (see Table 5.23). Consistent with the gear group impacts detailed in the previous section, the beneficial impacts of opening the WGOM closure area are much smaller than any of the hook or gillnet size groupings, regardless of trawl vessel size class.

Under the Preferred Alternative, as a group, small trawl vessels would experience the greatest adverse impact, with 25 percent of all vessels losing nearly at least 11.9 percent of gross fishing revenue (see Table 5.23). Further, 10 percent of all small trawl vessels would lose at least 27 percent annual fishing income. Among the remaining sectors, the relative distribution of revenue losses were similar for large and medium trawl vessels. Hook and gillnet vessel impacts were mixed, as revenue losses for components of these two fleets would experience revenue losses (revenue losses were 44.7 percent at the 10th percentile for large hook vessel) other components of the fleet would experience increased in fishing income.

Table 5.23. Proportional change in annual gross revenues by gear/size group.

	No Action	Preferred Alterative
Large Gillnet (n=134)		
10th Percentile	0.0	-6.7
25th Percentile	0.0	0.0
50th Percentile	0.0	0.1
75th Percentile	4.3	4.0
90th Percentile	19.1	10.8
Small Gillnet (n=77)		
10th Percentile	0.0	-12.2
25th Percentile	0.0	-1.5
50th Percentile	0.0	0.0
75th Percentile	2.0	5.3
90th Percentile	40.7	17.4
Large Hook (n=30)		
10th Percentile	0.0	-44.7
25th Percentile	0.0	0.0
50th Percentile	0.0	0.0
75th Percentile	0.0	0.9
90th Percentile	5.6	17.6
Small Hook (n=65)		
10th Percentile	0.0	-2.9
25th Percentile	0.0	0.0
50th Percentile	0.0	0.0
75th Percentile	2.5	0.5

90th Percentile	38.9	11.3
Large Trawl (n=202)		
10th Percentile	0.0	-15.3
25th Percentile	0.0	-7.2
50th Percentile	0.0	-1.1
75th Percentile	0.0	0.0
90th Percentile	1.1	0.1
Medium Trawl (n=237)		
10th Percentile	0.0	-15.3
25th Percentile	0.0	-5.3
50th Percentile	0.0	-1.0
75th Percentile	0.0	0.0
90th Percentile	4.4	1.7
Small Trawl (n=216)		
10th Percentile	0.0	-27.0
25th Percentile	0.0	-11.9
50th Percentile	0.0	-1.3
75th Percentile	0.2	0.0
90th Percentile	3.8	0.6

5.2.2.3.5 Effects by Home Port State

The No Action alternative would only affect vessels that list home ports in Maine, New Hampshire, or Massachusetts on their NE multispecies permit applications. Among these GOM border states, New Hampshire vessels would benefit most (20.7 percent at the 90th percentile), followed by Massachusetts (15 percent) and Maine (6.2 percent) (see Table 5.24).

The Preferred Alternative would have broader impacts across the NE region, although the economic impacts would be greater on vessels in Maine, New Hampshire, and Massachusetts. Among these three states, New Hampshire vessels would be most affected, with vessels losing 15.1 percent of gross income at the 25th percentile and 32.8 percent at the 10th percentile. Even though individual vessel impacts would be greater for New Hampshire vessels, the total impact on the State of New Hampshire is likely to be less than that on Maine or Massachusetts, since there are a larger number of adversely impacted vessels in the latter two states. Adverse impacts on vessels in Southern New England and Mid-Atlantic states are most likely due to changes in possession limits for yellowtail flounder.

Table 5.24. Proportional change in annual gross revenues by home port state.

	No Action	Preferred Alternative
Massachusetts (n=447)		
10th Percentile	0.0	-18.4
25th Percentile	0.0	-7.1
50th Percentile	0.0	0.0
75th Percentile	1.5	2.3
90th Percentile	15.0	11.8
Maine (n=159)		
10th Percentile	0.0	-11.2
25th Percentile	0.0	-1.1
50th Percentile	0.0	0.0
75th Percentile	1.2	0.4
90th Percentile	6.2	3.1
New Hampshire (n=66)		
10th Percentile	0.0	-32.8
25th Percentile	0.0	-15.1
50th Percentile	0.0	-.03
75th Percentile	4.3	3.0
90th Percentile	20.7	6.2
New Jersey (n=56)		
10th Percentile	0.0	-7.3
25th Percentile	0.0	-3.3
50th Percentile	0.0	0.0
75th Percentile	0.0	0.0
90th Percentile	0.0	0.0
New York/Connecticut (101)		
10th Percentile	0.0	-15.1
25th Percentile	0.0	-6.5
50th Percentile	0.0	-1.3
75th Percentile	0.0	0.0
90th Percentile	0.0	0.0
Rhode Island (105)		
10th Percentile	0.0	-5.9
25th Percentile	0.0	-2.4
50th Percentile	0.0	-0.8
75th Percentile	0.0	0.0
90th Percentile	0.0	0.0

All Other (n=30)		
10th Percentile	0.0	-36.2
25th Percentile	0.0	-8.8
50th Percentile	0.0	-0.7
75th Percentile	0.0	0.0
90th Percentile	0.0	0.0

5.2.2.3.6 Effects by Port Group

The preceding analysis was further subdivided into specific port groups that were identified by NEFMC staff as part of supporting analyses for development of Amendment 13 to the FMP. Since the number of vessels in any given port group may be small, reporting of economic impact results is only possible for the 25th, 50th (median), and 75th percentiles.

As indicated previously, the No Action alternative would have positive impacts on vessels that fish in the GOM and that may fish in the WGOM Area Closure specifically. Vessels that may be positively affected by the No Action alternative are in the Gloucester, New Hampshire Seacoast, Portsmouth, Portland, and South Shore Massachusetts port groups (see Table 5.25).

Under the Preferred Alternative, vessels in the NH seacoast and New Bedford port groups would be most adversely affected, with 50 percent of all vessels in both port groups experiencing income losses of at least 3 percent. Impacts were similar on vessels in the Boston and Portsmouth port groups and, although likely to be impacted by different measures, vessels impacts on Eastern Long Island vessels were similar to that of the Gloucester port group.

Table 25. Proportional change in gross annual revenues by port group.

	No Action	Preferred Alternative		No Action
Boston (n=19)			Portland (n=51)	
25th Percentile	0.0	-8.4	25th Percentile	0.0
50th Percentile	0.0	0.0	50th Percentile	0.0
75th Percentile	2.7	1.7	75th Percentile	3.7
Chatham/Harwich (n=53)			Portsmouth (n=31)	
25th Percentile	0.0	0.0	25th Percentile	0.0
50th Percentile	0.0	0.0	50th Percentile	0.8
75th Percentile	0.0	0.0	75th Percentile	6.9
E. Long Island (n=43)			Provincetown (n=21)	
25th Percentile	0.0	-5.4	25th Percentile	0.0
50th Percentile	0.0	-1.6	50th Percentile	0.0
75th Percentile	0.0	0.0	75th Percentile	0.4
Gloucester (n=115)			S. Shore Massachusetts (n=48)	
25th Percentile	0.0	-5.9	25th Percentile	0.0
50th Percentile	0.9	0.0	50th Percentile	0.2
75th Percentile	10.7	5.1	75th Percentile	7.3
New Bedford (n=102)			Upper Mid-Coast Maine (n=19)	
25th Percentile	0.0	-12.0	25th Percentile	0.0
50th Percentile	0.0	-3.0	50th Percentile	0.0
75th Percentile	0.0	0.0	75th Percentile	0.0
NH Seacoast (n=32)			Other (n=378)	
25th Percentile	0.0	-19.7	25th Percentile	0.0
50th Percentile	0.0	-6.6	50th Percentile	0.0
75th Percentile	2.6	0.0	75th Percentile	0.0
Point Judith (n=52)				
25th Percentile	0.0	-2.8		
50th Percentile	0.0	-1.2		
75th Percentile	0.0	0.0		

5.2.2.3.7 Effects by Proportion of Groundfish Income

Differential impacts of groundfish management measures derive from two sources--different fishing patterns in terms of season, gear, and area fished, and differing levels of dependence on groundfish for fishing income. Vessels that share common groundfish fishing patterns may be affected very differently, depending upon how groundfish activity fits into the overall fishing business. Relative dependence on groundfish was calculated as the proportion of groundfish revenue to total fishing revenue for the 1998-2000

baseline average. Dependence on groundfish was than classified into quartiles.

The No Action Alternative would have positive impacts, but these impacts are greater for vessels (approximately 60 percent of total vessels included in the analysis) that rely on groundfish for at least half of fishing income (Table 26). Vessels that earn at least 50 percent of income from species other than groundfish would receive relatively little benefit from opening the WGOM Area Closure.

Just as the No Action had a greater positive impact of vessels with higher groundfish dependence, the Preferred Alternative has a greater adverse impact on these vessels. At the 10th percentile, adverse income effects would be nearly twice that of vessels that rely on groundfish for less than half of their annual fishing income.

Table 5.26. Proportional change in annual gross revenues by dependence on groundfish

	No Action	Preferred Alternative
Less than 25% (n= 235)		
10th Percentile	0.0	-4.9
25th Percentile	0.0	-1.1
50th Percentile	0.0	0.0
75th Percentile	0.0	0.0
90th Percentile	0.1	0.7
25% to Less than 50% (n=158)		
10th Percentile	0.0	-9.0
25th Percentile`	0.0	-4.9
50th Percentile	0.0	-0.5
75th Percentile	0.0	0.0
90th Percentile	0.3	0.2
50% to Less than 75% (n=176)		
10th Percentile	0.0	-28.4
25th Percentile	0.0	-8.8
50th Percentile	0.0	-0.9
75th Percentile	1.2	0.6
90th Percentile	13.0	8.1
75% or Greater (n=395)		
10th Percentile	0.0	-20.4
25th Percentile	0.0	-9.7

50th Percentile	0.0	0.0
75th Percentile	1.7	0.7
90th Percentile	11.4	8.5

5.2.3 Vessel Break-even

The preferred approach to analyze the economic impact of DAS reductions would be to estimate impacts on vessel profitability. While information on vessel costs and revenue are available, the coverage on costs is not extensive enough to provide reliable estimates of fishing vessel profitability. Instead, this analysis estimates the number of DAS needed by vessels of different gear and size classes to cover operating and annual costs before returns are divided among crew and owner. Comparing break-even DAS with current allocated DAS, and knowing the average return per day by vessel class, provides an indication of how close vessels are to being unable to realize adequate returns to labor and capital to sustain business operations under new restrictions. The analysis developed below refers to the minimum number of DAS needed to cover all fixed costs and the operating costs (less labor expense) on these trips for groundfish activity alone. This analysis is most appropriate for vessels that earn most of their fishing income on groundfish trips and is not as reliable a measure of economic impact or potential business failure for vessels that rely on other fisheries for much of their fishing business income.

5.2.3.1 Data used to Estimate Break-even DAS

Cost data were collected through university surveys of fleet sectors involved in catching groundfish. The University of Rhode Island surveyed the small trawl vessel fleet[3] in 1996 and the large trawl vessel fleet[4] in 1997. The University of Massachusetts Dartmouth surveyed the hook fleet[5] in 1996, which covered both longline and

[3]Lallemand, Philippe, J.M. Gates, J. Dirlam, and J. Cho. March 1998. The Costs of Small Trawlers in the Northeast. Department of Environmental and Natural Resource Economics, The University of Rhode Island.

[4]Lallemand, Philippe, J.M. Gates, J. Dirlam, and J. Cho. April 1999. The Costs of Large Trawlers in the Northeast. Department of Environmental and Natural Resource Economics, The University of Rhode Island.

[5]Georgianna, Daniel, and A. Cass. September 1998. The Cost of Hook Fishing for Groundfish in the Northeastern United States. University of Massachusetts Dartmouth.

handline vessels. Both university surveys were funded through NMFS' Cooperative Marine Education and Research (CMER) Program and the data were provided to NMFS. Cost data for the gillnet fleet comes from economic questions asked by observers on sea sampling trips in 2000. Cost data from 1996-97 were adjusted for inflation, with the GDP implicit price deflator, and is in 2000 dollars.

The university surveys collected data on all fishing business costs--both variable and fixed. Variable costs include fuel, oil/lubrication, ice, food/water, bait (where applicable), offloading, consignment, supplies, and other trip costs. Fixed costs include association fees, permits, haul out, insurance, mooring, office expenses, professional fees, business taxes, vehicle, interest, repair/maintenance, and other fixed expenses. The variable cost questions asked by observers were limited to fuel, oil/lubrication, ice, food/water, and bait (which is not applicable to gillnet vessels). The only fixed cost question asked by observers was the cost of insurance. For this analysis, fixed costs for gillnet vessels are assumed to be the same as longline vessels.

Based on the number of observations and the range of vessel sizes in the cost data, the vessels were separated into length classes. There are two length classes for each gear group except trawl vessels, which have three length classes. This grouping of vessels by gear and size is unique to the break-even analysis. Further subdivisions by port or other criteria were not possible due to limited numbers of observations.

FY 2000 (May 2000 through April 2001) revenue data were generated by applying average fish prices from the NEFSC dealer data to logbook trips with groundfish landings. Observations were limited to those vessels with a limited access NE multispecies permit. Therefore, DAS would have been used on these trips. Revenue from all species was summed for the trip, then divided by DAS used to get revenue per DAS. Trips were then categorized by gear type and vessel length class.

5.2.3.2 Methods for Estimating Break-even

Break-even DAS are calculated by first calculating a contribution margin per day, which is variable costs per day subtracted from revenue per day. The term contribution margin is used to illustrate that the daily revenue above daily variable costs contributes to paying fixed costs, labor, and then returns to the owner. Dividing yearly fixed costs by the daily contribution margin yields the minimum number of DAS needed to cover fixed expenses. Contribution margins from additional DAS used would then go to labor payments and owner's return.

Labor payments on fishing vessels are made on a trip basis, with the crew sharing the risk of variable levels of catch. Generally, a crew share formula is used, which deducts trip expenses from the revenue received on a trip and then divides the remainder among the crew and the vessel owner (or, the revenue is divided first then certain expenses deducted from the crew's share). The reason for not including a daily labor cost in the calculation of break-even DAS is that crew share formulas are often adjusted, or crew size is reduced, when overall revenue declines in the fishery.

Since a groundfish trip was defined as a trip where at least 1 lb of groundfish (the mean was 68,000 lb) was landed by a vessel with a limited access permit and since revenue from all species was summed for that trip, the number of DAS reported here are what is needed to break even if only allocated NE multispecies DAS are used. As is the case with many vessels, additional revenue may be earned by targeting other species during the year. That activity is not counted here.

Rather than using the arithmetic means of cost and revenue data to calculate a point estimate of break-even DAS, this analysis uses the distribution of these data to estimate an expected value and likelihood of breaking even. Using the distributions helps to capture the variability of the cost and revenue data.

The software package BestFit was used to fit distributions to the cost and revenue data[6]. Another software package, called @RISK, was used to run a simulation where cost and revenue values are randomly chosen, according to their probability distribution, to get a distribution on break-even DAS. The *@RISK* software allows the user to correlate the selection of values in the simulation. For example, a high cost value is chosen in an iteration if a high revenue value is chosen, and vice versa. The simulation was allowed to continue until it converged (at 10,000 iterations). Break-even values were constrained to between 0 and 365 DAS.

5.2.3.3 Results

Estimated mean break-even DAS ranges from a low of 19, for medium-sized trawl vessels, to a high of 61 DAS for larger handline vessels (Table 27). Differences in break-even DAS across vessel size-gear groupings are related to differences in fishing costs and the ability to generate daily fishing revenues. For example, break-even DAS for larger trawl vessels are lower than that for small trawlers primarily because of the relative difference daily revenue potential is much greater than the relative difference in costs.

[6] *BestFit* and *@RISK* software were developed by the Palisade Corporation in Newfield, NY

The comparatively high number of break-even DAS for large handline vessels is a result of a combination of relatively high fixed costs and a relatively low contribution margin from commercial fishing revenues. This is notable because a large percentage of these vessels also take passengers for hire, which means that break-even based on commercial activity alone may be a misleading indicator of financial viability for these vessels.

Table 27. Estimated average break-even DAS and 80% confidence interval

Vessel Size-Gear Group	Lower 80% Confidence Interval Break-Even DAS	Average Break-Even DAS	Upper 80% Confidence Interval Break-Even DAS
Long-line vessels < 40'	16	34	52
Long-Line vessels >= 40'	7	36	84
Hand-line vessels < 40'	7	24	44
Hand-line vessels >= 40'	15	61	139
Trawl vessels < 50'	14	37	68
Trawl vessels 50 to 70'	6	19	35
Trawl vessels >= 70'	9	20	30
Gillnet vessels < 40'	9	25	44
Gillnet vessels >= 40'	15	35	60

Since break-even DAS were estimated using FY 2000 activity data, FY 2000 call-in records were used for purposes of estimating how many vessels may fall below break-even by comparing FY 2002 DAS allocations under the Preferred Alternative FY 2002 call-in records. A total of 974 vessels were used in this analysis. On average, all size-gear groups except for handline gear would receive enough DAS under the Preferred Alternative to at least cover their fixed costs on groundfish alone (Table 28). However, 213 vessels (22 percent) would not receive sufficient DAS allocations to break-even on groundfish DAS alone. This does not necessarily mean that all 213 vessels would cease to operate, for several reasons. First, the analysis does not take into account whether these vessels may already be fishing fewer DAS than they need to break even. Second, the cost estimates used for this analysis were based on relatively small sample sizes and the extent to which these data are representative of the population of groundfish vessels by size or gear is not known. While revenue data are more reliable, errors in estimating costs could result in substantial biases in estimated break-even DAS. As long as the sample data were within the range of the population, the use of the simulation approach should reduce this potential source of bias. Last, the analysis does not take into account the ability to adjust to changing financial conditions by taking such actions as

rescheduling debt payments or means of controlling costs or by shifting effort into alternative fisheries.

Table 5.28. DAS over Break-Even for the Preferred Alternative

Vessel Size-Gear Group	Average DAS Over Break-even DAS (min, max)	Number of Vessels Below Break-Even
Long-line vessels < 40'	12 (-26, 36)	9
Long-Line vessels >= 40'	8 (-26, 37)	6
Hand-line vessels < 40'	-2 (-16, 44)	21
Hand-line vessels >= 40'	-34 (-53,9)	70
Trawl vessels < 50'	13 (-29, 81)	54
Trawl vessels 50 to 70'	39 (-11, 107)	6
Trawl vessels >= 70'	55 (-14, 111)	11
Gillnet vessels < 40'	19 (-17, 71)	16
Gillnet vessels >= 40'	27 (-23, 90)	20

5.2.4 Economic Effects of Non-Modeled Measures

5.2.4.1 Changes to Open Access Hand Gear Trip Limit and Freeze on New Permits

The open-access Hand-gear permit was first issued with implementation of Amendment 7. Since that time (FY1996) at least one open access Hand gear permit has been issued to a total of 3,316 unique vessels. Therefore, for the duration of the freeze on issuance of new permits the potential number of open access Hand gear permits would be limited to these qualifying vessels. The economic impact of this freeze is likely to be limited since as reported activity over the most recent three complete fishing years indicates that even though a relatively large number of permits are issued, only about 10 percent of these vessels actually report any fishing through dealer records.

The number of open access Hand gear permits increased by an average 160 permits each year from fishing year 1998 to 2001 (Table 5.29). As of June 3, 2002, a total of 1,518 open access Hand gear permits had been issued. Of those vessels that have been issued such a permit only about ten percent actually report having landed any one of the ten large mesh regulated groundfish species through the Northeast dealer reports.

For the most recent complete fishing year (FY2000), the 172 vessels holding an open access Hand gear permit and that landed groundfish had combined revenues of $12.1 million of which $3.24 million (26 percent) was regulated groundfish. For these vessels changing the combined cod, haddock and yellowtail flounder groundfish catch to a total of 200 pounds per trip, was estimated by identifying all trips

where regulated groundfish were landed and deducting the revenue from cod, haddock, and yellowtail flounder over a combined total of 200 pounds where an average price by trip from these species was applied to the 200 pound trip limit. This simplifying assumption may tend to overstate the economic impact of the trip limit change as vessels are likely to fill their trip limit with only the most highly valued species. Trip income from all other species where cod, haddock, or yellowtail flounder were caught, as well as income on trips where no groundfish were landed was assumed to remain unchanged.

Table 5.29. Summary of Number Open Access Hand Gear Permits Issued and Use of Permits

	1998	1999	2000	2001	2002
Number of Permits Issued	1,330	1,471	1,637	1,812	1,518*
Number of Vessels Landing Groundfish	128	118	172	218*	

* Preliminary year to date.

Groundfish income was estimated to decline to $3.06 million; a reduction of 5.8 percent in groundfish revenue but less than a 2.0 percent reduction in total fishing income. These revenue losses reflect average losses across all participating vessels. At an individual vessel level, 94 vessels (55 percent) would experience no reduction in revenues at all (i.e., combined cod, haddock, and yelowtail landings never exceeded 200 pounds in FY2000) while a smaller number of vessels would experience significant losses in fishing income. A total of 20 vessels (12 percent) would lose 5 percent or less of fishing income while an additional 7 vessels would lose from 5 to 10 percent of fishing income and 29 vessels would lose in excess of 25 percent of fishing revenues. The remaining 22 vessels would lose between 10 and 25 percent of total fishing income.

5.2.4.2 Prohibition on Front Loading

The practice of front loading enables an individual vessel to increase the amount of any given species managed by a daily trip limit that may be legally retained. From an economic perspective, front loading allows vessels to make more efficient use of DAS allocations as trip income may be increased while keeping operating costs down. Effectively, on front loaded trips, DAS allocations are being used at more than a 2:1 rate because for each trip limit “unit” a total of 24 hours on the DAS clock must be used. For example, any vessel that wanted to retain up to 800 pounds of GOM cod would have to use at least 48 hours of their DAS allocation to do so. If the trip duration were actually 18 hours then DAS allocation would have

been used at a rate of 2.7 hours for every hour fished. The practice of front loading is only advantageous as long as DAS allocations exceed actual time spent in the groundfish fishery since the opportunity cost of using DAS at a rate that exceeds 1:1 is likely to be greater than the marginal gain in the GOM cod trip limit alone. Given that the Preferred Alternative would change available DAS allocations the economic advantage of front loading is likely to be diminished as most vessels are not likely to have sufficient excess DAS allocation to cover normal fishing activity and allow for front-loaded trips. For this reason, the practice of front loading the clock is likely to be greatly reduced, so much so, that the prohibition on front-loading may not add any increased adverse economic impact over and above that of the changes in DAS allocations themselves. Nevertheless, in the absence of the prohibition, some vessels may still find it advantageous to front-load the clock.

For vessels that choose to do so, the prohibition on front-loading would force vessels to alter trip decision making. Some vessels may choose to increase a trip duration to assure that at least no fishing time were lost or may take an alternative trip where cod catch rates may be expected to be consistent with the trip limit and planned trip duration. In either case it may be presumed that the front-loaded trip would have been economically preferred and that an alternative trip may yield lower net return.

To evaluate the impact of a prohibition on front-loading VTR records for FY2000 were compared to call-in records to identify trips that landed more than 400 pounds of GOM cod and where the difference between DAS in the call-in records exceeded that of the days absent as calculated by the start and landed date from the VTR records by more than 24 hours. Qualifying records were matched by landed data in both VTR and call-in records. The total number of qualifying records that met all matched criteria was 331. Due to a variety of circumstances, these trips are likely to represent only a subset of all trips that may have been front-loaded . This means that analysis of the total economic impact of the front-loading prohibition is not possible. Instead, the data were treated as a sample of trips where front-loading was evident and the economic impacts were estimated at a trip level rather than at a vessel or industry level.

If vessels are not able to front-load the DAS clock they would be limited to the trip limit according to actual fishing time. Average trip income on front-loaded trips ranged from $1,689 to $2,546 for bottom long-line and gillnet gear respectively (Table 5.30). Limiting these trips to a trip limit consistent with their recorded VTR time would more than halve average trip income for all gears except for gillnet vessels. These data suggest that prohibition of front loading would have a significant impact of trip income for vessels that may still want to target GOM cod. These vessels would

have to increase their observed trip duration in order to retain larger quantities of GOM cod or would have to find alternative fisheries to make up for the lost cod income. Note that the impacts reported below would at least be partially offset by the increase in the GOM cod trip limit to 500 pounds.

Table 5.30. Average Change in Trip Income for Front Loading Prohibition

Gear Type	Mean VTR Days Absent	Mean Call-in DAS	No Action	Preferred Alternative	Change in Trip Revenue
Bottom Long-Line	0.8	4.1	$1,689	$545	$-1,144
Hand Gear	0.6	4.9	$1,798	$348	$-1,450
Otter Trawl	0.8	4.6	$2,401	$1,241	$-1,160
Gillnet	0.8	4.5	$2,546	$1,635	$-911

5.2.4.3 Prohibition on Use of De-Hookers

The economic impact of a prohibition on the use of de-hookers will be related to the extent to which their elimination affects efficiency. Presumably, a de-hooker is used to improve time efficiency and may be a labor-saving device. With a prohibition on their use vessel owners may need to hire more crew to remove fish from long-lines. While this may increase crew opportunities, the added cost is not likely to be accompanied by any increased production particularly in the face of increased restrictions on the number of hooks that may be set. Given the likelihood that labor costs would increase with no offsetting change in output it is probable that profitability of hook vessels would decline.

5.2.4.4 Change in Large Mesh Permit Categories

The large mesh permit categories were developed with implementation of Amendment 7 to provide an incentive for vessels to use larger mesh. In return, participating vessels would receive increased DAS allocations that were intended to be calibrated to be equivalent in terms of relative fishing mortality with that of vessels that chose to use smaller mesh. Since making a large mesh permit available the numbers of permit holders had been relatively low (ranging between 10 in 1996 to 31 in 2000) but doubled to over 60 permit holders in FY2001. With the proposed changes in mesh sizes there would be little difference between the current minimum mesh size for large mesh permit holders. Increasing the large mesh permit mesh size is consistent with the original rationale for assigning differential DAS allocations based on mesh size.

The economic impact of increasing the mesh size for large mesh permit holders will depend on the extent to which current permit holders are actually fishing, and whether by opting to give up the permit category, their DAS allocations would be reduced below that of their observed use rate. Of the 31 large mesh permit holders in permit year 2000 three did not call-in any DAS and 18 did not call-in as many DAS as they would have received as either a category A (individual) or Category B (fleet) permit. The remaining 13 vessels called-in more DAS (an average of 28 more DAS) than they would have been allocated as a Category A or B permit holder (note that only 12 of these 13 actually reported any activity through the VTR's). For FY2001 five permit holders used no DAS, 32 used no more DAS and 28 vessels called-in more DAS than they would have received otherwise. Thus, in both FY2000 and FY2001 about half of the large mesh permit holders were able to take advantage of higher DAS allocations than they would have received as either a Category A or B permit holder.

Assuming that the change in large mesh permit category is most likely to affect only those permit holders that used more DAS than they would have received otherwise an estimate of economic impact was derived by calculating revenue per day fished/called-in on trips where regulated groundfish (including monkfish) were landed. This average was used to estimate fishing income with no change to the minimum mesh to that of fishing income under DAS allocations that each vessel would receive as a Category A or B permit holder. This estimate is likely to overstate the economic impact on these vessels since higher catch rates may be expected to at least partially offset the reduction in DAS if they elect to switch back to a Category A or B permit.

Estimated average revenue per day fished for the 12 large affected large mesh permit vessels was $2.3 thousand. Applying this value to the lower DAS allocations each vessel would have received as a Category A or B permit holder yields an average loss of $78 thousand per vessel. As noted previously, this estimate may be overstated since the average revenue per day is likely to increase for any given vessel that switches back to a smaller mesh permit category.

5.2.4.5 Economic Effects of Mesh Changes

The Preferred Alternative would require replacement of the codend for all vessels fishing with multispecies trawl gear and gillnet throughout the Northeast region. The regulations may also require replacement of hook gear to comply with the hook gear specifications. The economic cost of this measure would be quite different between trawl and gillnet vessels. Gillnet vessels may be required to spend anywhere from $10-20,000 on replacement costs depending on the number and configuration of nets fished. By contrast, trawl vessels would be required to replace only the codend of the net; an expense that

may range between $800 and $1,500. These increased gear costs would be in addition to forgone fishing revenues, although they would likely be a one-time only cost, as subsequent gear maintenance and replacement costs would not likely be appreciably greater than they would be under the status quo.

The total cost of the mesh change cannot be known with certainty, since available data do not distinguish between diamond or square mesh. Nevertheless at least an estimate of amount of gear that may need to be replaced can be developed by comparing VTR data on mesh size used and quantity of gear. Specifically, the VTR records for FY2000 were examined to identify trips that were fished in each of the general management areas (GOM, GB, and SNE) that used a mesh size that was less than the largest of the smallest size allowable or a gear quantity that exceeded the limits that will be allowed under the Preferred Alternative. For example, the maximum of the minimum mesh size that may be fished by otter trawl vessels would be 7-inch diamond mesh. Since VTR records do not distinguish between diamond and square meshes it was assumed that any net fished in the SNE area that was less than 7-inches would have to be replaced. Tie-down nets fished by day boat gilllnets in the GOM must be 7-inches. Assuming that trips that landed more than 50 percent of combined flatfish by weight were conducted using tie-down nets, all nets used on any such trip that used less than 7-inch mesh would have to be replaced.

The total number of gillet strings that would have to be replaced was estimated by first identifying every trip and quantity of gear used on that trip that used a mesh size below that of the proposed minimum size. These records were then sorted in ascending order by vessel and management area. In this manner, the last record for each vessel is equal to the maximum amount of gear fished on all trips taken by that vessel in that management area. Note that where appropriate the total number of nets that would have to be replaced was constrained by the limit on number of nets that may be fished. Summing across vessels provides an estimate of the total number of gillnet strings (based on an average of 10 nets per string) that would have to be replaced and an estimate of the number of vessels that would have to replace their gear. Since this procedure was repeated for each management area the estimated gear replacement is likely to result in some double-counting of gear since vessels may fish gear in more than one area so the resulting economic impacts may be biased upwards. On the other hand, the VTR records do not necessarily provide an accurate record of affected gear as gear quantity and/or mesh size is not always reported or may not be reported accurately.

Based on these assumptions a total of 751 vessels would be required to replace a total of 6,367 nets the majority (5,722) of which would be gillnets (Table 5.31). Assuming replacement costs of $1,250 for trawl vessel cod-ends and a cost of $2,000 per gillnet string (10 net

panels per string) the total replacement cost would be nearly $2 million. On an per vessel basis, gillnet vessels would have to spend substantially more on replacement gear with trip gillnet vessels fishing in the GOM having to spend twice as much as any other component of the gillnet fleet.

Table 5.31. Estimated Cost to Replace Gillnet and Trawl Gear

	Totals	GOM Day Boat Tie-Down Gillnet	GOM Day Boat Stand-Up Gillnet	GOM Trip Gillnet	GB Gillnet	SNE Gillnet	GOM/GB Trawl Cod-End	SNE Trawl Cod-End
Number of Nets	6,367	837	1,208	2,294	1,075	308	424	221
Number of Vessels	751	18	31	25	25	7	424	221
Nets per Vessel		46.5	39.0	91.8	43	44	1	1
Cost per Vessel ($)		9,300	7,794	18,352	8,600	8,800	1,250	1,250
Total Cost ($)	1,950,650	167,400	241,600	458,800	215,000	61,600	530,000	276,250

5.2.4.6 Economic Effects of Changes in Gillnet and Hook Gear Quantities

In addition to increasing mesh sizes vessels that fish with either gillnet or bottom longline gear will be subject to different limits on quantity of gear depending on where they fish. During FY2000 a total of 22.5 thousand trips were taken where one or pounds of groundfish were landed. (see Section 5.1.6.5.2). Of these trips, 7.8 thousand groundfish trips were taken using fixed gear that may be subject to the proposed gear limits, but less than 25 percent of fixed gear trips in FY2000 exceeded the maximum allowable quantity of gear that would be allowed for the duration of this action. Average estimated FY2000 trip income on groundfish trips that used more than the Preferred Alternative amounts for the No Action alternative ranged from a high of $14,794 for trip gillnet vessels in the GOM to a low of $776 for bottom longline trips in the SNE area (Table 32). With the Preferred Alternative limits on amount of gear fished average trip income would be reduced between 50 and 16.7 percent for trip gillnet trips on Georges Bank and day gillnet trips in SNE respectively.

The gear limits would affect an estimated 30 longline, 72 day gillnet, and 24 trip gillnet vessels. The economic impact on total fishing income from all sources were highest for trip gillnet vessels for the most affected vessels. Ten percent of all trip gillnet vessels were estimated to lose 36.6 percent of total fishing income while the most affected day gillnet and longline vessels would lose

an estimated 26.2 and 19.3 percent of fishing income respectively (Table 5.33). At all other percentiles the relative impact across fixed gear vessels were similar. Based on these results, the economic impact of the limits on number of nets may be at least as large as that, and perhaps more so, than the changes in DAS or the changes in mesh size. This impact may be particularly acute for trip gillnet vessels as they had not been subject to net limits while fishing for groundfish.. Even though the amount of trip gillnet activity in the GB and SNE areas was low in FY2000 the change from current regulations in these areas (three times lower than that of the GOM on GB and twice as low in the SNE area) is comparatively greater than for the same gear group in the GOM. Thus,

Table 5.32. Estimated Average Trip Income for Fixed Gear for No Action and Preferred Alternative

Trip Type	Number of Trips	No Action Average Trip Income	Preferred Alternative Average Trip Income	Percent Change
GOM Trip Gillnet	83	14,794	11,540	-22.0
GOM Day Gillnet	621	3,228	1,967	-39.1
GOM Longline	68	1,779	1,095	-38.5
GB Trip Gillnet	59	8,311	4,087	-50.8
GB Day Gillnet	713	3,797	2,439	-35.8
GB Longline	642	2,039	1,600	-21.5
SNE Trip Gillnet	55	6,147	4,695	-23.6
SNE Day Gillnet	34	2,585	2,152	-16.7
SNE Longline	5	776	387	-50.2

Table 5.33. Reduction in Fishing Income For Fixed Gear Vessels

	Longline (n=30)	Day Gillnet (n=72)	Trip Gillnet (n=24)
10th Percentile	-19.3	-26.2	-36.6
25th Percentile	-13.9	-14.8	-14.0
50th Percentile	-6.4	-7.2	-8.6
75th Percentile	-2.3	-1.6	-2.7
90th Percentile	-0.4	-0.7	-0.2

5.2.5 Economic Impacts of Recreational Measures

Changes in recreational measures will affect anglers across all modes and will affect charter/party operators directly, through regulatory action, or indirectly, through reduced passenger loads, if any one measure causes anglers to choose to reduce their fishing activity. Of the proposed recreational measures, the change in the minimum fish size for Atlantic cod would affect all recreational anglers while the seasonal change and imposition of the party/charter GOM cod trip limit would affect only those anglers in the Gulf of Maine. The year-round exemption letter would have a direct affect on charter/party operators.

5.2.5.1 Angler Impacts

Economic effects on anglers are manifested in a reduction in the value or satisfaction that they derive from taking a recreational fishing trip. If the primary motivation for fishing is based on catching fish, then changes in measures affecting keep rates without affecting catch may have a relatively small impact on recreational fishing value. Conversely, to the extent that anglers are motivated primarily by keeping fish, measures that affect keep rates would result in comparatively greater loss in economic value. Research indicates that recreational anglers are motivated by a variety of different factors, but it may be assumed that groundfish anglers are more motivated by keeping fish rather than for sport.

Data to determine the welfare loss associated with the proposed measures are not available. However, the combined effects of any given alternative having varying degrees of bag limit changes and an increased size limit may be expected to substantially reduce keep opportunities for anglers that target cod and would, therefore, result in a corresponding reduction in recreational fishing value. This reduced value may be partially offset by substitution of alternative target species, but this would still result in some

welfare loss, assuming that cod would have been the preferred species choice.

In addition to some loss in economic welfare, an area closure may result in fewer recreational trips being taken if no suitable alternative target species are available. Note the proposed possession and minimum fish size limits may also discourage trip-taking decisions, if anglers believe that these limits would not justify taking a trip. To the extent that anglers do take fewer trips other secondary economic impacts may accrue in the form of reduced angler expenditures. A loss in angler expenditures would result in lower sales by businesses that service the recreational fishing sector (bait and tackle, charter/party operators, restaurants, etc.). Note that these losses would be to specific businesses that sell recreational fishing inputs, but would not necessarily represent losses in total sales at either a local or a regional level since anglers may substitute freshwater for saltwater fishing or may substitute fishing with some other recreational activity. To the extent that anglers continue to engage in some other recreational activity, the regional or local impact may be one of a redistribution of expenditures among different businesses.

5.2.5.2 Charter/Party Impacts

Charter/party operators would be directly affected by the enrollment requirement, and indirectly affected, should any one of the recreational measures result in a reduction in passenger demand. The enrollment program would remove the possibility of a charter/party vessels switching back-and-forth between commercial fishing and carrying passengers for hire for those vessels that still want to be able to take recreational passengers into any one of the rolling closure areas. Vessels that forego the exemption program would still be able to switch between commercial and recreational activities, but may sacrifice some charter/party business to competitors if catch rates are actually higher, or even perceived to be higher, inside the closed areas.

Given the increase in the minimum size limit, charter/party vessels may experience a reduction in passenger demand. However, the minimum fish size increase will have a relatively small effect on charter/party keep opportunities. Experience following implementation of the minimum fish size increase in 1996 and 1997 indicates that passengers and trips have been increasing over the past 2-3 years. Further, among alternative management measures, size limits are generally supported by the recreational fishing public. Therefore, the change in minimum size does not seem likely to result in a substantial reduction in passenger demand for charter/party trips in the GOM or GB.

The Preferred Alternative would introduce a bag limit on charter/party anglers fishing for Atlantic cod in the GOM. Industry representatives have indicated in the past that passenger demand is, in part, driven by angler expectations, and that one important component of angler expectations is the opportunity to have a "big trip." As the argument goes, even though these expectations are realized on only a small fraction of trips, imposition of a bag limit would cause individuals to lose interest in taking a charter/party trip. The extent to which anglers would respond in the manner described is not known, nor have there been any studies that document angler response to changes in charter/party bag limits.

Based on VTR reports, the number of charter/party operators reporting trips where GOM cod were landed ranged between 103 and 114 from 1997 to 2000. Of these vessels, approximately 20 percent in any given year took 60 percent of total trips that landed GOM cod, carried 70 percent of total passengers on those trips, and landed 80 percent of the total GOM cod. Thus, it is likely that the majority of economic impacts will be borne by the 20-25 operators whose primary business is in offering groundfish trips to their recreational fishing customers.

5.2.6 Economic Impacts on Other Sectors

The impacts that have been estimated in the above section are for the harvesting sector. However, there will also be impacts on the marketing chain, and the infrastructure that supports the fishing industry.

Generally, fish are purchased at the dock by dealers who then sell to processors, and by processors themselves. Fresh fish processing and frozen fish processing are two separate industries in New England, each with its own customers, firms, and industrial organizations (Georgianna and Dirlam, 2000). Fresh fish processors buy whole fresh supplies from fishermen locally and at other New England ports, and they bring in fresh supplies from other parts of the U.S., from Canada and from other countries. They process the product (for example, cutting fish into fillets) and sell these products to wholesalers, retailers, restaurants, and other final users. Frozen groundfish processors buy frozen inputs, which are imported into the U.S. from Canada, Iceland, Norway, and from around the world. These frozen inputs, mostly frozen blocks of fillets, are processed into frozen portions, sticks, and other products for sale to supermarkets, restaurants, and institutions. Frozen products keep for a long time and are not subject to the same time constraints as fresh products. Prices for frozen products are less volatile, markets more impersonal, and business relations more competitive. Frozen groundfish plants are also much larger than fresh groundfish plants, and they operate longer through the day and through the year. Few

fresh groundfish processors produce frozen product, and those that do, sell special orders to institutions, usually government agencies, who are sometimes required to purchase U.S. product (Georgianna and Dirlam, 2000). Wholesale firms do not process fish, but buy from processors and sell to retail outlets, institutions and other buyers.

Overall, the number of processing firms in New England has fallen since 1995, while wholesaling firms have increased. Employment trends saw an increase in processing sector employment until 1997, followed by a decline to a 1999 level that was below 1995 levels. Wholesale sector employment had the opposite trend with a decline until 1997, followed by an increase to its highest level in 1999. It is estimated that more than one-third of the fresh processing firms in business in 1992 are no longer operating, although the number of plants has been stable since 1995. Surviving firms are now paying more attention to the bottom line (Georgianna and Dirlam, 2000). Most groundfish landed in New England goes into the fresh fish market, and landings since 1995 have been less than the total volume of processed products in live-weight terms. This has led fresh fish processors to import additional supplies from Canada and the West Coast. Recently, processors have increased imports from Iceland when Canadian supply declined, using air cargo routes into Logan Airport. Firms have also compensated for the decline in groundfish landings by expanding their product line to substitute species such as farmed salmon, shark, tilapia, mahi mahi, orange roughy and catfish (Georgianna and Dirlam, 2000). The majority of these processing facilities are in Massachusetts. Plants located in Massachusetts have a distinct competitive advantage because of their proximity to Boston's Logan Airport (Georgianna and Dirlam, 2000)

Frozen groundfish processing has also declined in the region, and has been similarly impacted by a shortage of groundfish supply. However, most of this has been caused by a decline in Canadian landings after the closure of the Grand Banks to cod fishing in 1991. Rarely, if ever, are New England groundfish landings processed into frozen blocks. As imports of cod blocks declined, imports of pollock blocks increased and processors substituted pollock for cod in the production of breaded cooked fillets, portions and nuggets (Georgianna and Dirlam, 2000). Georgianna and Dirlam (2000) report that consumer demand for fish sticks and portions has been declining since mid-1980.

As the processing sector has declined, the wholesale sector has increased as processors abandoned processing and merely concentrated on wholesaling. Employment in the wholesale sector has increased since 1997, as employment in the processing sector has fallen off. Imports of new products has offered profit potential to existing wholesalers and the potential to expand their product line. It is

difficult to predict whether the wholesale sector will remain strong if inroads are made by firms that specialize in internet marketing.

5.3 Habitat Impacts

5.3.1 Overview of Habitat Impacts

A comprehensive description of the physical environment in which groundfish species occur and an assessment of the impacts on habitat resulting from a variety of fishing practices are presented in the Council's omnibus Essential Fish Habitat (EFH) Amendment (NEFMC, 1998) and Framework 33 to the FMP. The EFH Amendment identifies and describes the EFH for 14 species of regulated groundfish and 4 other Council-managed fishery resource species. That document includes a description of the designs, functions, and actions of all types of fishing gear used in New England fisheries, including the principal groundfish gears: Otter trawls, gillnets, and hooks and lines. The EFH for offshore hake is identified and described in Amendment 12 to the FMP. Additionally, a workshop was convened in October 2001 to further evaluate on the effects of fishing gear on marine benthic habitats (Northeast Region Essential Fish Habitat Steering Committee [NEFHSC] 2002) as well as the development of a draft gear effects review document detailing the most recent scientific studies in this subject area (NMFS 2001).

Different habitat types serve different ecological functions and are considered to have different functional values. Bottom types of higher complexity are generally believed to have higher functional value to the ecosystem than those of low complexity (Auster and Langton, 1999; NEFMC 1998). More complex habitats generally exhibit some form of structure, either in the form of the bottom type itself (e.g., rock or boulder piles) or due to some associated biogenic structure (e.g., sponges, bryozoans, tunicates, mussel beds, clay pipes, etc.) (Auster and Langton, 1999). The principal function provided by the structure associated with these complex habitats is often predator avoidance, which increases the survival rate of demersal species (juveniles especially) and contributes to higher recruitment (Kaiser *et al.*, 1999). Prey abundance may also be increased and energetics may be optimized in areas of higher complexity and functional value (Gerstner, 1998; Gerstner and Webb, 1998; Kaiser *et al.*, 1999).

Of the three principal fishing gears used to harvest groundfish (otter trawls, gillnets, and hooks and lines), otter trawls are most often associated with impacts to benthic habitats. Gillnets are a static gear and the majority of studies that have investigated the impacts of fixed gillnets have concluded that they have a minimal effect on benthic habitats (Barnette, 2001). West *et al.* (1994) stated that there was no evidence from their study that sink gillnets

contributed importantly to bottom habitat disturbance. There is some evidence (Gomez *et al.*, 1987; Ohman *et al.*, 1993) that gillnets may be associated with adverse impacts to coral reef habitats, but aside from these potential impacts to coral reef communities, Barnette (2001) concluded that "the available studies indicate that habitat degradation from gillnets is minor." The gear effects workshop also concluded that the degree of impacts to habitat features from this gear is low (NEFHSC 2002).

There is very little information on the potential impacts to benthic habitats associated with hook and line gear, including bottom longlines (Barnette, 2001). There may be impacts associated with the retrieval of the gear as it is dragged along the bottom, where it can potentially snag on complex vertical habitat such as sponges, gorgonians and rocks. This action could result in damage or death to structural biota and the turning over of small rocks and other physical structure. Although these potential impacts are associated with hook-and-line gear, overall these impacts are considered relatively insignificant due to the extent of the use of this gear compared with the use of otter trawls and other bottom-tending mobile fishing gears (3.3 percent of groundfish landings harvested with hook and line versus 87.2 percent with otter trawls) (NEFMC, 1998).

The most significant impact associated with bottom-tending mobile fishing gear, including the various designs of otter trawls, is the smoothing, or flattening, of substrate bedforms (Auster and Langton 1999). In sandy sediments, this gear type is associated with the flattening of sand ridges and the disturbance of some epifauna and infauna (Auster and Langton, 1999). The extent of these impacts is dependent on the frequency and intensity of gear use (Auster and Langton, 1999). In habitats of higher complexity, such as rock and gravel substrates, otter trawl gear is sometimes associated with the scraping and smoothing of gravel mounds and turning over of rocks and boulders (Auster and Langton, 1999). Epifauna present in these habitats are often removed or crushed (Auster and Langton, 1999; Collie, *et al.*, 1997).

The rate of habitat recovery from the disturbances associated with groundfish fishing is another important consideration to understanding habitat impacts. In general, high energy habitats (e.g., shallow areas with relatively strong currents and wave action) are thought to recover more quickly than low energy habitats (e.g., deep areas with relatively mild currents and little wave action), in part because the biologic communities present in these areas are adapted to those environments (Auster and Langton 1999; DeAlteris *et al.,* 1999; Witman, 1998). The biologic communities in relatively low energy environments tend to be long-lived and slow-growing (e.g., corals and sponges). The communities that form the biogenic structure

in these areas take a long time to recover and may only recover in the absence of disturbance (Sainsbury, *et al.*, 1997).

The NMFS final rule for EFH defines an adverse effect as "any impact which reduces quality and/or quantity of EFH" (January 17, 2002, 67 FR 2343). The significance of a fishing gear-related impact to habitat, and whether it is considered adverse, can depend on several factors, including: (1) The type of habitat; (2) the effect of the gear on the habitat; (3) the recovery rate of the habitat; (4) the location of the habitat and impact; (5) the natural disturbance regime; and (6) the functional elements of the habitat to managed species.

The flattening or smoothing of sandy bedforms (sand ripples and waves) by bottom-tending gear may be short-term and inconsequential if these bedforms are frequently disturbed naturally and reform quickly in the face of currents and wave action (Auster and Langton, 1999). The rolling and turning over of rocks and boulders and the removal of attached epifauna may appear to be a significant impact, but it may not be adverse if the functional elements required by fish species are the interstitial spaces around and between the rocks and boulders and not the attached epifauna. Since the rocks and boulders remain, albeit in a different place or configuration, the functional elements of the habitat may not have been qualitatively affected.

Similarly, if the functional elements in a gravel habitat required by an organism are the interstitial spaces between the gravel itself or the opportunities for cryptic coloration, then the removal of attached epifauna as a result of fishing activity may not be an adverse impact on the habitat of that species. Even if the epifauna is important to some species, the impact may not be adverse or significant if the primary epifaunal species are fast-growing and are able to quickly repopulate an area following an impact. There are also cases where a fishing gear impact is clearly significant and adverse to the habitat of fish species. If attached epifauna (on either gravel or rocks and boulders) provide an additional functional element for some species by providing higher levels of habitat complexity (which contribute to survival and/or added prey opportunities), then the reduction or removal of this epifauna would affect the habitat's function. If it takes a long time to regenerate and repopulate an area (such as in slow-growing sponge and coral species), then this effect would be compounded. The crushing and removal of "clay pipe" habitat is a long-term impact (Valentine, 1998) and could have implications for shelter-seeking species, such as redfish, in areas where fishing affects this habitat type.

5.3.2 Habitat Impacts of Management Alternatives Under Consideration

The measures proposed in the various alternatives are intended primarily to reduce F on GOM cod, but address other species as well, including GB cod. The three alternatives (including the status quo) are described in detail in Section 3.0 of this document. This section of the EA is intended to present a description of the potential effects and impacts to fish habitat that are expected to be associated with each alternative. It is not intended to be, nor should it be considered a substitute for, the more detailed EFH analysis currently being formulated under the rubric of the U.S. District Court's December 17, 2001, Order in the lawsuit American Oceans Campaign, *et al.* v. Daley. The effects and impacts to habitat associated with each measure included in an alternative may be beneficial, adverse, or neutral. To the extent possible, the analysis in this section identifies whether the measure would be expected to be beneficial, adverse, or neutral, relative to existing practices, and the relative degree of that effect.

Reductions in fishing effort are one mechanism known to minimize the adverse impacts on habitat associated with fishing practices by reducing the frequency and intensity of fishing gear use. The modification of fishing gear to reduce the weight of fishing gear or the amount of fishing gear in contact with the bottom is another mechanism known to reduce the adverse impacts on habitat associated with certain fishing activities. Additionally, restricting the spacial extent in which particular gears may operate (closed areas) is considered by many to be the most effective means of protecting sensitive habitats susceptible to gear impacts. Ideally, any reductions proposed in this interim action will be focused on the sensitive habitats of GOM and GB that have been designated as EFH by the Council.

Some of the proposed measures are expected to provide some benefit to the habitat of the region by directly reducing fishing effort: DAS restrictions, gear restrictions, temporary (rolling) fishing closures, and fishing closures that would be closed for the duration of this action and closed year-round through a follow-up Secretarial amendment. Measures that would not directly reduce fishing effort, but rather manage how the effort is distributed among the fishing industry or the size-class of fish targeted by the industry, such as mesh size restrictions, minimum fish size restrictions, bycatch reduction methods, or monitoring programs, are not be expected to have a direct effect on the habitat of the region. Measures that increase the fishing pressure in a specific area, such as through the reopening of a previously closed area or a part thereof, may increase the adverse impacts on EFH above the baseline set with the submission of Amendment 11 to the FMP (the omnibus EFH Amendment).

5.3.2.1 Alternative 1 - No-Action

This alternative would continue a set of measures, including target TACs, area closures, and trip limits, that are already in effect as a result of previous management actions. In addition, the WGOM Area Closure would reopen to fishing. The continuation of status quo measures are not expected to have a direct effect on the habitat of the GOM and GB, with the exception of the reopening of the WGOM Area Closure. The WGOM Area Closure, although not closed specifically to protect fish habitat, does serve to protect a variety of essential fish habitat (EFH) for many species from potential adverse impacts associated with some types of fishing activities. The reopening of this closed area could reduce the incidental protections afforded by this area.

5.3.2.2 Alternative 2 - Preferred

This alternative would reduce fishing mortality primarily through restrictions on DAS use and additional closed areas. Modifications would be made to the seasonal closures and an additional year-round closure would be added in the central to eastern portion of the GOM (Cashes Ledge Area Closure).

Under this alternative, the current WGOM Area Closure would remain closed. This area provides significant incidental benefits and protections for EFH in the GOM even though it was not closed with the objective of protecting fish habitat. The current boundaries of the WGOM Area Closure contain a variety of habitat types, including complex hard bottom, mud bottom, and sand bottom. This area has been designated by the Council as EFH for 14 species and the area provides the only year-round protection for any EFH in the GOM. The maintenance of this area as a fishery closed area has allowed the habitats contained within to begin the process of recovery following the previous fishing-related disturbances and impacts. These benefits and habitat recovery would be continued if this alternative is selected. The addition of the Cashes Ledge Area Closure would increase in the amount of the GOM area that is closed year-round to fishing for groundfish. This area is comprised of mixed substrate types based upon a very coarse substrate map (Poppe, *et al.,* 1986).

The proposal to increase the area of the year-round closures has the potential to allow for some recovery of the habitats within these areas, but the amount of recovery cannot be quantified without research to determine habitat recovery rates in the GOM. While surrounding areas may face an increase in fishing activity due to effort displacement, insufficient data prevent a quantitative analysis of the habitat impacts of effort displacement associated with the actions proposed in this measure. If a fraction of the fishing effort within the proposed year-round closed area is not displaced to other areas or seasons, the proposed closures may decrease the impacts on habitat, especially that habitat preferred by

cod. A more detailed description of the potential impacts on habitat is provided in Section 4.11 of Amendment 11 to the FMP, which specifically discusses the effects of effort displacement. It is also possible that concentrating fishing effort into smaller areas that remain open may have the unintended effect of increasing impacts on EFH for other species.

Changes to the seasonal (rolling) closures are also being considered under this option. The short duration of the rolling closures and the proposed changes make it unlikely, however, that any degraded habitats would have an increased opportunity to recover. Thus, the proposed changes to the seasonal area closures would not be expected to have any direct effect on the habitat of the GOM.

This alternative also includes measures to restrict DAS use and reduce by 20 percent. DAS restrictions that result in overall reductions of fishing effort may result in indirect benefits to EFH.

This alternative includes measures to limit Day boat gillnet vessels to 50 stand-up and 100 tie-down gillnets as well as other gill net restrictions depending upon area. This measure may result in a decrease in the amount of fishing gear used by the affected vessels. Although gillnets, as a static fishing gear, are not generally associated with adverse impacts to fish habitat, all fishing gears that come in contact with the bottom have some degree of effect on benthic habitats. Thus, this measure may serve to provide some degree of reduction in habitat impacts. Although the amount of the reduction cannot be quantified, it is expected to be small due to the relative habitat impacts associated with static fishing gear such as gillnets, and the limited decrease that may result from this measure.

The gear restrictions proposed in this alternative are all focused on mesh size changes that are not generally thought to have any effect on fish habitat. The proposed changes to the large mesh permit category are not expected to have any direct effect on habitat, due to the limitation of these proposed changes to mesh size. Because recreational fishing activities are not generally associated with adverse impacts to fish habitat, any changes to the regulation of recreational fishing would not be expected to have any effect on the habitat of the GOM. This alternative also contains restrictions on vessels using hooks such as hook size and numbers. These actions are not expected to have any effects on habitat. Trip limits and possession limits have the potential to impact habitat if they result in a shift of fishing effort to other areas of habitat that are more sensitive and susceptible to gear impacts. Existing management measures in this FMP as well as other FMPs would most likely prevent a shift of effort into other fisheries, however, this assumption cannot be verified.

Overall, the measures proposed in this alternative are expected to result in a benefit to EFH by maintaining the WGOM closure area as well as attaining some fishing effort reductions.

5.3.3 Habitat Experiments in the Vicinity of the WGOM Area Closure

The current WGOM Area Closure includes a section of the Stellwagen Bank National Marine Sanctuary (SBNMS), referred to as "the sliver" (see Figure 6). The SBNMS is making a significant investment in research in the "sliver" and surrounding area that will exceed over $4 million in funding over this decade. This research closure provides an unprecedented opportunity to understand the impacts of fishing gear on habitat, and the recovery from those impacts.

There are several properties of the WGOM/SBNMS overlap that make it an excellent choice for a habitat research area. These properties include scientific, practical, and political elements.

The area includes the four major habitat types found in SBNMS and in the GOM—boulder, gravel, mud and sand. This will enhance the exportability of any research results to areas outside the reserve. Further, the habitats are distributed on either side of the closed area boundary, making comparative habitat studies possible across the boundary.

The proximity of the area to the ports of Boston, Gloucester, Scituate, Plymouth and Provincetown make it accessible to researchers for day trips using small and relatively inexpensive vessels, including fishing vessels.

The area has already been closed to fishing for approximately 3 years. From a scientific perspective, this greatly enhances our ability to study the ecological processes and expedites the timeline on which results of research will be attained.

Several on-going studies are being conducted in the WGOM Area Closure. The SBNMS initiated a Seafloor Habitat Recovery Monitoring Program in 1998 to look at rates of habitat recovery from fishing in the four major habitat types found in the GOM. Three years of data now exist for the eight monitoring stations inside and outside of the closed area. A 10-year continuation of this study of seafloor habitat recovery following cessation of anthropogenic disturbance (e.g., fishing and fiber-optic cable installation) began in summer 2001. Other current projects in the closed area include the quantification of fish movement rates relative to seafloor habitat and species-area relationships of multiple taxa. This research is supported by NMFS, NEFMC and SBNMS.

Also, the WGOM/SBNMS seafloor has been mapped in its entirety by the US Geological Survey. One of the key issues for a GOM research reserve is the generalized applicability of research conducted there to other sites. Assuming that only one site will be designated as a habitat research area in the near future, the WGOM/SBNMS closed area provides the greatest opportunity to generalize research results to other areas due to the range of habitats it contains. The high resolution mapping completed provides for unprecedented specificity in the selection of research sites for a range of projects, and is a notably invaluable asset.

5.3.4 Essential Fish Habitat Assessment

Section 305 (b)(2) of the Magnuson-Stevens Act requires that each Federal agency shall consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken by such agency that may adversely effect EFH. This EFH Assessment is provided pursuant to 50 CFR 600.920 to initiate EFH consultation requirements with NMFS.

As stated in section 3.2 of this document, this action (preferred action) would continue, for the duration of this action, and indefinitely through a follow-up Secretarial amendment, in its current configuration, the WGOM Area Closure, unless changed by a future action. This area provides significant incidental benefit and protection for EFH in the GOM even though it was not closed with the objective of protecting fish habitat. Within the current boundaries of the WGOM Area Closure exist a variety of habitat types: Complex hard bottom, mud bottom, and sand bottom. This area was designated by the Council as EFH for 14 species and, prior to this action, provided the only year-round protection for EFH in the GOM. This action would also create a year-round closure in the formerly seasonal closure area referred to as Cashes Ledge. The Cashes Ledge Area Closure has the potential to allow for some recovery of the habitats within this area, however, the amount of recovery cannot be quantified. While surrounding areas may face an increase in fishing activity due to effort displacement, insufficient data prevent a quantitative analysis of the habitat impacts of effort displacement associated with the actions proposed in this measure. If a fraction of the fishing effort within the proposed year-round closed area is not displaced to other areas or seasons, the proposed closure may decrease the impacts on habitat, especially that habitat preferred by cod. It is also possible that concentrating fishing effort into smaller areas that remain open may have the unintended effect of increasing impacts on EFH for other species. Regardless, the maintenance of the WGOM Area Closure and the introduction of the Cashes Ledge Area Closure will allow the habitats contained within them to continue or begin the process of recovery following the previous fishing-related disturbances and impacts.

Changes to the seasonal (rolling) closures would be adopted under the preferred alternative. The short duration of the rolling closures and the proposed changes makes it unlikely, however, that any degraded habitats would have an increased opportunity to recover. Thus, the proposed changes to the seasonal area closures would not be expected to have any direct effect on the habitat of the GOM.

There are measures proposed to directly reduce fishing effort through DAS use. As reductions offer direct reductions in the frequency and intensity of fishing activity averaged across the entire region (although there may be small-scale increases in the frequency and intensity of fishing effort in particular areas as vessels attempt to increase the efficiency of their remaining fishing effort).

This alternative includes a measure to limit Day boat gillnet vessels to 50 stand-up and 100 tie-down gillnets as well as other restrictions by area. This measure may result in a decrease in the amount of fishing gear used by the affected vessels. Although gillnets, as a static fishing gear, are not generally associated with adverse impacts to fish habitat, all fishing gears that come in contact with the bottom have some degree of effect on benthic habitats. Thus, this measure may serve to provide some degree of reduction in habitat impacts. Although the amount of the reduction cannot be quantified, it is expected to be small due to the relative habitat impacts associated with static fishing gear such as gillnets, and the limited decrease that may result from this measure.

Trip limits and possession limits have the potential to impact habitat if they result in a shift of fishing effort to other areas of habitat that are more sensitive and susceptible to gear impacts. Existing management measures in this FMP as well as other FMPs would most likely prevent a shift of effort into other fisheries, however, this assumption cannot be verified. The remaining measures proposed in this alternative, (e.g., Recreational fishing measures, Mesh size requirements, and hook sizes and limits,) will not have an adverse effect on EFH.

Overall, the measures proposed in the preferred alternative are expected to reduce the adverse effects to any EFH associated with the fishing activities managed under the FMP as a result of the maintenance of the WGOM Area Closure, the inclusion of the Cashes Ledge Area Closure, and the proposed DAS restrictions. NMFS concludes that this action would have no more than minimal adverse impacts to EFH and may even provide benefits to EFH. Therefore, pursuant to 50 CFR 600.815 (a)(2)(ii), NMFS has determined that this alternative minimizes, to the extent practicable, the adverse impacts to EFH.

5.4 Evaluation of E.O. 12866 Significance

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant where a significant action is any regulatory action that may

- Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, of the principles set forth in the Executive Order.

Of these four criteria, the discussion to follow focuses only on the expected magnitude and duration of the economic impacts of the proposed Interim Action. Given available data it seems unlikely that the Interim Action would result in an annual effect on the National or regional economy that would reach the $100 million annual threshold for a significant action. Extension of the same or similar regulatory action for an indefinite period of time would have a larger economic effect but whether these continuing economic impacts including all direct, indirect, and cumulative impacts would rise to the $100 million threshold is uncertain. There is little doubt that the proposed action will have an adverse material affect on a large proportion of participants in both the commercial and recreational fishing sectors and will have an adverse impact on seafood wholesalers, processors, and retailers. The absolute magnitude of these impacts cannot truly be measured with precision, as much of the supporting analytical methods were designed to provide relative measures of biological and economic change. As such their primary utility is in comparing the relative magnitude and distribution of impacts across alternatives rather then providing a point estimates of economic costs and benefits. Nevertheless, the scope of impacts, if not their magnitude, will likely be extensive throughout the fishing and fishing related economics sectors. These impacts will also affect jobs in these economic sectors and will have broad-based impacts on fishing communities primarily located in the states of Maine, New Hampshire, and Massachusetts. Based on the scope and potential magnitude of these material effects the proposed action is determined to be significant for purposes of the Executive Order.

5.4.1 Direct Effects

The proposed action is intended to be implemented through August, 2003 at which time the measures described herein would be replaced by a longer term action that will remain in place indefinitely or until it is modified or replaced. The potential economic effects that could be quantified were discussed in Section 5.2. Based on these analyses, the Interim Action would result in approximately a $5 million loss in groundfish revenues paid to commercial fishermen. This estimated effect includes only the impact of the area closures, DAS changes, and trip limits. Additional monetary losses may be associated with the change in fixed gear quantities that may be fished and with the added costs of replacing gillnet and trawl nets required to comply with higher minimum mesh sizes for the Interim Action.

The potential economic cost of replacing non-conforming nets was described in Section 5.2.4.5. Based on reported FY2000 VTR data there may be 6.4 thousand nets that will have to be replaced 751 different multispecies vessels at an aggregate cost of almost $2 million. The potential economic impact of the limits on amount of fixed gear (hooks and gillnets) that may be used was described in Section 5.2.4.6. Based on that analysis an estimated 30 longline, 72 day gillnet, and 24 trip gillnet vessels would lose a combined $2.7 million in fishing revenue. The potential impact of reducing the cod, haddock and yellowtail flounder trip limit from 300 lb to 200 lb on open access Hand gear permitted vessels was described in Section 5.2.4.1. Based on that analysis, income losses could be $0.2 million. The combined monetized losses to commercial fishing vessel owners and crew comes to a total of $9.9 million.

In addition to direct effects on commercial fishing, the proposed action would also directly affect individuals engaged in recreational fishing or providing passenger services to anglers that catch cod in the Gulf of Maine. On average, recreational anglers took 132 thousand trips where Atlantic cod were harvested from 1998-2000. A large proportion of these anglers would be affected by one or more of the proposed measures in such a way that their opportunities to keep Atlantic cod will be constrained or curtailed altogether.

5.4.2 Indirect Effects

The proposed regulatory measures would have direct effects on fishing vessels, recreational anglers and providers of party/charter services. These measures would also indirectly affect a broad range of other economic activities particularly those activities involved in the wholesaling and distribution of fresh seafood and suppliers of purchased inputs to the fishing industry.

Dealer Impacts - Dealers will generally have less groundfish (particularly cod) available to provide for their customers. This reduced supply will be more difficult to overcome than may have been the case in the past since the regulations will reduce supplies not only of cod but of the full range of groundfish species. These reductions vary by stock (6 percent for GOM cod) but are generally on the order of 5 to 10 percent. Dealers will be forced to identify alternative sources of product outside the Northeast region such as Pacific groundfish or international imports. Regardless of source, dealers are likely to incur higher transportation and shipping costs and will be forced to pass at least some of these costs on to their customers.

Processor Impacts - Processor impacts are likely to depend on their reliance on fresh groundfish. Processors that specialize in fresh products for resale to restaurants or retail outlets will, need to find alternative supplies of fresh fish to keep product lines available to their customers. Within the past year there had been anecdotal reports of processing bottlenecks as fresh-fish processors had been reluctant to increase processing capacity due to concerns about continued reliability of groundfish supplies. It is not known to what extent processors have added processing capacity over time but individual businesses that have made recent investments in new equipment or physical plant would likely be relatively more disadvantaged than processors that have not expanded their capacity. Processors that rely mostly on frozen product for further processing will probably not be appreciably affected by the Interim Action.

Suppliers to Fishing Vessels Impacts - A number of businesses are engaged in providing the necessary inputs to fishing vessels. Sales by the these businesses will be reduced to the extent that individual fishing businesses either reduce the number of trips they take or, in some instances, cease operating. The impact on any given business will depend upon the relative proportion of their business that is dedicated to commercial fishing clients. As indicated in the discussion of economic impacts, the degree of impact is likely to have relatively greater impacts in ports along the Gulf of Maine (Portland, Portsmouth, and Gloucester in particular).

Employment Impacts - The Interim Action is likely to affect jobs in several different economic sectors. The anticipated effects on commercial and party/charter vessels is likely to at least result in a reduction in crew income but may also result in a reduction in the number of crew employed particularly in Maine, New Hampshire, and Massachusetts. Reduced supplies of groundfish and other related species will also result in a reduced demand for labor in shoreside occupations such as lumpers or cutters.

5.4.3 Cumulative Effects

Comprehensive economic analysis of the economic impact of all the regulatory measures was not possible. Instead, a piecemeal approach was required. Unfortunately, this approach may not fully capture the combined impact of all of the regulatory measures and how they may have very different impacts among vessel sizes, gear, or port. In general, the combined nominal regulatory burden may be greater for fixed as compared to mobile gear vessels. Both mobile and fixed gear vessels will be subject to the same trip limits and area closures and may receive equivalent DAS allocations. However, both hook and gillnet vessels will be subject different mesh and gear quantity restrictions based on where they fish. Mobile gear vessels will not be so limited.

Most vessels that are currently regulated under the Multispecies FMP also hold permits issued under other FMP's and would be affected not only by the Interim Action but may also be affected by management changes in other permitted fisheries. Of particular note is the development of new FMP's and regulatory actions taken for spiny dogfish and for monkfish. Both dogfish and monkfish were important fisheries that were available to many vessels as alternatives to reliance on groundfish. With increased regulatory action taken to protect these two resources, there are fewer alternatives to turn to and may have caused many vessels to increase their reliance on groundfish. In addition to dogfish and monkfish, the Atlantic States Marine Fisheries Commission (ASMFC) has dramatically reduced the Northern shrimp season for this year; regulations have been implemented placing limits on mobile gear takes of lobster; and regulatory action has been taken affecting gillnet gear modifications as well as area restrictions to protect right whales.

Just as the variety of actions taken in other fisheries that affect multispecies vessels, the groundfish protection measures implemented under the Interim Action may affect vessels engaged in fisheries other than groundfish. Such effects may be manifested either in terms of regulatory action taken to protect groundfish that affects prosecution of another fishery or by causing groundfish vessels to redirect effort onto other fisheries.

Under Preferred Alternative the regulatory measures are relatively more restrictive for vessels operating in the GOM as compared to elsewhere in the Northeast region. These restrictions may be sufficient for vessels to seek alternative fisheries. Individuals that may want to continue to use a GOM port as a base of operation may turn to the lobster fishery if a license can be obtained or try herring fishing. Vessels that are able to move out of the GOM may attempt to switch to ports in Southern New England or the Mid-Atlantic depending what permits any given vessel may hold or may be

able to obtain. Such a redirection of effort could lead to increased fishing pressure on Southern New England or Mid-Atlantic stocks and would add increased competition for local markets.

5.4.4 Long Term Economic Effects

The preceding discussion of impacts was based on the short time horizon covering the period August 2002 through implementation of Amendment 13 during which the Interim Action would be in place. Even though the adverse economic effects are likely to be extended as this Interim Action is replaced by subsequent action, the associated adverse economic effects will be compensated for by increased economic yield over time as groundfish resources recover. As groundfish resources recover, economic yield will increase even as fishing effort is kept at low levels relative to the status quo. The longer term impact on small entities should be positive as higher yields should be obtainable at lower effort hence profitability of the groundfish fleet should be enhanced. Such prospects for increased profitability will depend on the ability and wherewithal to control the rate at which latent effort becomes activated.

5.5 Initial Regulatory Flexibility Analysis

Description of the Reasons Why Action by the Agency is Being Considered.

A description of reasons this action is being considered appears in the Introduction and Purpose and Need sections of this document.

The Objectives and Legal Basis for the Proposed Rule.

The objectives and legal basis for the proposed rule are also found in the Introduction and Purpose and Need sections of this document.

Estimate of the Number of Small Entities.

All the commercial vessels with a multispecies permit had gross sales below the SBA size standard for commercial fishing business (3,864),and are therefore considered small entities. The economic impacts described in Section 5.2 also summarize the distributive impacts on commercial fishing vessels by vessel size in feet (Section 5.2.2.3.2), gear (Section 5.2.2.3.3), combinations of gear and size (Section 5.2.2.3.4), home port state (Section 5.2.2.3.5), port group (Section 5.2.2.3.6) and relative reliance on groundfish income (Section 5.2.2.3.7). Because virtually all the fishing vessels are small entities, based on these analyses the Interim Action was determined to have a significant impact on a substantial number of small entities (commercial fishermen and party/charter operators in particular).

The Interim Action would have a nominal effect on all limited access permit holders (1,442) all open access Hand gear-only permit holders (1,812), and all party/charter operators (610 open access permit holders). Of these vessel owners, approximately 1,000 called-in one or more DAS in FY2000; about 10 percent of all open-access permit holders report sales of groundfish through dealer reports; and 241 party/charter operators reported landings of regulated groundfish in FY2000. Therefore, the number of participating vessels that may be affected by any one or more of the regulatory measures is about 37 percent of the total number of those eligible to participate in the some component of the multispecies fishery.

Of the participating limited access vessels the Interim Action would have an adverse economic impact on gross fishing income of at least 5 percent on 25 percent (about 250 vessels) of industry participants. By contrast, fishing income would improve for approximately the same number of other vessels. These positive impacts are associated with differences between the area closures to be implemented relative to the FY2001 baseline and an increase in the GOM cod trip limit.

Among those vessels that were adversely impacted, small otter trawl vessels trawls tended to be most affected. These vessels also tended to be from ports in the NH seacoast or Gloucester area. These vessels are relatively more impacted as they do not have the range of larger vessels to get to different fishing areas. For these vessels, the rolling closures in the in-shore Gulf of Maine have proportionately greater impact.

Vessels that would be positively affected were most likely to be gillnet or hook vessels. For these vessels, the modest change in the daily trip limit on GOM cod is relatively more beneficial because cod constitutes a much higher proportion of total fishing income. Therefore, even a small change in the trip limit can have significant beneficial impact for these gears.

At an industry level the DAS changes were not deemed to contribute to fishing mortality reductions since sufficient DAS allocations would still be available to allow for DAS use at least as great as any historical level. This does not mean that the DAS reduction would not have any economic impact on specific vessels. This is likely to be particularly the case for vessels that have historically fished all or nearly all of their annual allocation. A break-even analysis was conducted to determine how changes in DAS allocations may affect small commercial fishing businesses (Section 5.2.3). Based on this analysis a total of 213 vessels (about one-quarter of participating limited access vessels) would not receive sufficient DAS allocations for FY2002 to break-even on groundfish trips alone.

In addition to DAS changes, area closures, and trip limits the Interim Action would change trip limits for open access hand-gear only permits, prohibit front-loading, change the mesh requirements for Large Mesh permit categories, and change mesh size and quantity of gear fished.

The economic impact of the change in open access hand-gear only trip limits were described in Section 5.2.4.1. Based on this analysis the trip limit would affect about half of the 172 permit holders reporting fishing activity through dealer records. The remaining half did not report landing combined groundfish over the proposed 200 pound trip limit. For those vessels that may lose groundfish income the average loss was estimated to be $2.6 thousand per vessel.

The economic impact of the front-loading prohibition was described in Section 5.2.4.2. Based on that analysis there were 331 occasions where front loading the DAS clock could be documented. Due to likely discrepancies between the various data bases used it is not possible to reliably determine the number of affected entities. However, the average change in trip income associated with the prohibition ranged from $911 to $1,450 per trip.

The economic impact of the change in minimum mesh for the large mesh permit category was described in Section 5.2.4.4. Based on that analysis, 13 of the 31 permit holders were determined to be adversely affected if they were to switch permit categories with lower potential DAS allocations. The average annual revenue loss for these vessels was estimated to be $78 thousand.

The economic impact of the changes in mesh size were described in Section 5.2.4.5. The mesh changes were estimated to affect 424 trawl vessels fishing in the GOM or GB area and 221 trawl vessels the fished in the SNE area. The average cost to replace the cod end was estimated to be $1,250. The mesh changes were estimated to affect 18 day boat gillnet vessels that used tie-down nets fished in the GOM. The average cost to these vessels to replace their nets was $7,794. The mesh changes were estimated to affect 31 day boat gillnet vessels that used stand-up nets that fished in the GOM. The average cost to these vessels to replace their nets was $9,300. The mesh changes were estimated to affect 25 trip gillnet vessels that fished in the GOM. The average cost to these vessels to replace their nets was $18,352. The mesh changes were estimated to affect 32 gillnet vessels that fished in either GB or SNE The average cost to these vessels to replace their nets was $8,800.

The economic impact of the changes in amount of gear fished was described in Section 5.2.4.6. Based on this analysis the gear limits would affect 30 bottom longline vessels, 72 day gillnet vessels, and

24 trip gillnet vessels. The average revenue loss for these vessels was estimated to be $21.4 thousand.

Under the Preferred Alternative, a large portion of recreational anglers fishing for cod in the Gulf of Maine, and individuals that provide passenger services to such anglers (charter/party vessels) will also be directly affected.

Alternatives which Minimize any Significant Economic Impact of the Proposed Rule on Small Entities.

Relative to the Preferred Alternative the No Action alternative would mitigate most of the adverse economic impacts associated with the Preferred Alternative. In general, gross fishing incomes would increase particularly for vessels operating in the GOM and would have particularly beneficial impact on small vessels and gillnet vessels in general. However, the No Action alternative also would result in unacceptably high increases in fishing mortality rates that could compromise the rebuilding of several GOM stocks, GOM cod in particular. For this reason the No Action alternative would not meet the regulatory objectives for this Interim Action.

Relative to the Preferred Alternative, the hard TAC alternative would have a more severe adverse impact because of the severe consequences of closing down fisheries when a TAC is reached as more fully discussed in Attachment A.

In any event, neither the No Action Alternative nor the Hard TAC Alternative are viable because they were not agreed to in the Settlement Agreement ordered by the Court to be implemented.

Reporting Requirements
The Preferred Alternative contains 3 new collection-of-information requirements. Vessels fishing for yellowtail flounder would be required to obtain one of two exemption certificates, depending upon the geographic area fished. Vessel owners who appeal their used DAS baseline would be required to provide information to NMFS.

Conflict with Other Federal Rules
This proposed action does not duplicate other Federal rules and takes into consideration the monkfish regulations in order to be consistent with the objectives of the Monkfish Fishery Management Plan.

6.0 Social Impact Analysis

6.1 Background: Legislative Mandate

The mandate to consider the social impacts from proposed Federal fishery regulations stems from two main sources: the National

Environmental Policy Act (NEPA) and the Magnuson-Stevens Act. NEPA requires that any regulation that will have impacts on the environment must also consider the economic and social impacts of such actions. National Standard 8 of the Magnuson-Stevens Act requires specifically that "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities" (16 U.S.C.§ 1851(2)(8)). SFA further defines a fishing community as one that is "substantially dependent or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" (16 U.S.C.§ 1802 (16)). The distributional impacts of the alternatives and their component measures are first briefly described. A fuller discussion of the impacts and their implications for fishermen, fishing families, businesses, and fishing communities can be found in the sections following, which compare the alternatives and address National Standard 8.

A general discussion of social impacts for Alternative 3 (Hard TACs) is included in Attachment A. This alternative is likely to have the most severe social impact because of the likelihood of closing down fisheries altogether when a specific species TAC is reached.

6.2 Status quo (No-Action)

For the purposes of the interim action, the status quo is considered to be the regulatory environment that would exist if the interim action were not implemented. This alternative includes the following measures:

- Seasonal/rolling area closures implemented through Frameworks 27, 31, and 33 – effective until modified by future Council action;
- Continuation of the triggered closures if 50 percent of the target TAC for GOM cod is landed by July 31 (Cashes in November and blocks 124 and 125 in January);
- GOM cod trip limit of 400 lb per day/4,000 lb trip maximum;
- Status quo gear restrictions (6-inch diamond, 6.5-inch square mesh, 80/160 gillnets); and
- Status quo recreational fishery restrictions (10 fish recreational bag limit, minimum size of 21 inches for cod, access to GOM closed areas with 3-month exemption letter).

Economic analysis has suggested that many fishing sectors would benefit from the reopening of WGOM, and thus would see positive

short-term impacts from the no action alternative. Other analysis has indicated, however, that the status quo management measures for GOM and GB cod will not meet the objectives specified in Amendment 7. Moreover, long-term projections of cod landings have suggested that landings would be much higher under the Amendment 7 target fishing mortality rate than under the status quo. The long-term impacts of the status quo are therefore likely to be more negative than the long-term impacts of any alternative that can meet the mortality objectives and rebuild the stock to sustainable levels, since declining landings would reduce revenues from groundfishing and cause related problems in fishing communities. The long-term social impacts of maintaining the status quo would also be affected by the probability that future additional Council action would be necessary to protect the GOM and GB cod stocks. If fishing mortality on these stocks remains too high, it is likely that stock biomass would decline, possibly below the threshold levels, as defined in the current overfishing definitions. The Council would then be required by law to take additional management action, the social consequences of which could be more severe and much larger in scale. Moreover, further declines in stock levels would lengthen recovery periods and, therefore, the period over which the greatest negative social impacts are experienced by affected communities.

6.3 Preferred Alternative

6.3.1 All Areas Fished under DAS

6.3.1.1 Changes to Open Access Hand Gear Trip Limit and Freeze on New Permits

The proposed reduction in the Hand-gear trip limit to 200 lbs of cod, haddock and yellowtail flounder could affect nearly half of the groundfish landings from the 271 Hand-gear vessels that showed activity during fishing year 2000 (Table 6.1). As the economic analysis shows (Section 5.2.4.1), such a trip limit would result in an estimated 3 percent average revenue reduction, which may be mitigated somewhat by the substitution of higher-valued species. However this average revenue reduction would be unevenly felt as 39 vessels could lose over 25 percent of their fishing revenues (Section 5.2.4.1); landing reductions appear also to be concentrated in smaller groundfish ports in primarily Massachusetts (Table 6.2). In terms of long-term impacts, the freeze on the issuance of new open access Hand-gear permits could be even more significant, for although just a small number of issued permits are actually used in any given year (Section Section 5.2.4.1), the permit category represents an important means of access to the fishery for newcomers–such as crew members seeking independent access, or fishermen without inheritance rights to vessels–and may enable traditional cycles of crew-to-owner to continue in coastal communities dependent on groundfish.

Table 6.1. Fishing activity by groundfish vessels fishing under the Hand gear permit (fishing year 2000)

No. of trips	No. of vessels	Total groundfish catch (in lbs.)	Pounds of which are over a 200-lb trip
1,749	271	356,380	168,424

* Source: logbooks.

Table 6.2. Hand gear groundfish activity, by port of landings (fishing year 2000)

Port of landing	No. of vessels	Total groundfish catch (in lbs.)	Pounds of which are over a 200-lb trip limit	Percent of the above-trip-limit-landings over all groundfish landings in port
Cape May NJ	1	cr	cr	cr
Cape Porpoise ME	1	cr	cr	cr
Dennis MA	3	8391	1980	3.4
Fairhaven MA	2	cr	cr	cr
Marshfield MA	9	10596	4819	1.7
Salisbury MA	4	2817	874	1.6

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 50,000 pounds AND greater than 2 percent of groundfish landings caught by handgear vessels going over the 200-lb trip limit. Cannot report (cr) confidential information if less than 3 entities.

6.3.1.2 Mesh changes for Monkfish and Large-mesh permit category

The preferred alternative contains a number of mesh and gear changes, two of which are area non-specific: changes in monkfish gillnet mesh and in the Large-mesh permit category. The requirement for monkfish gillnets to use at least 10" mesh and no more than 150 nets would affect about half the vessels using gillnet for the monkfish fishery (Table 6.3), however for some of these vessels the change is only a reduction of 10 nets from the current 160 net limit. The majority of the monkfish gillnet catch is already caught using the mesh and nets that meet the preferred alternative, though the reduction in groundfish bycatch from vessels currently using smaller mesh could have negative impacts on vessel revenue, and positive impacts on biomass and thus ultimately long-term landings. The requirement for vessels in the large-mesh category to increase mesh size by 2" appears to affect mainly gillnet fishermen, whose only other option would be to move into another groundfish category but which would involve a reduction in DAS; in either case these vessels can expect to see a reduction in groundfish income. The impacts from both these measures are primarily concentrated in ports throughout New England, particularly Portsmouth and Scituate (Table 6.4 and 6.6). These tables should be taken to imply that a significant portion of the active groundfish fleet in these ports will have to invest in new gear, and that their total landings will diminish by some unknown amount with the more restrictive gears.

Table 6.3. Gear used by monkfish gillnet vessels fishing under a multispecies DAS (fishing year 2000).

Size of mesh (Sink gill net only)	No. of trips	No. of vessels	Trip average monkfish	Monkfish (in lbs.)	Trip average groundf	Groundfish (in lbs.)
Greater than or equal to 10", less	3057	80	1473.1	4,503,346	102.7	313,930
Greater than or equal to 10", but more than 150 nets	42	13	4580.9	192,396	1673.6	70,291
Smaller than 10", less than or equal to 150 nets	812	61	1217.9	988,941	2323.0	1,886,291
Smaller than 10", but more than 150 nets	21	5	4129.6	86,721	5081.8	106,717

*Source: logbooks. Does not include trips with incidental monkfish catch (50 lb tail-weight equivalent).

Table 6.4. Monkfish gillnet vessels fishing under a multispecies DAS and using mesh less than 10" and/or more than 150 nets, by port of landing* (fishing year 2000).

Port of landing	Mesh size and/or net quantity	No. of vessels	Monkfish (in	Percent of monkfish caught by this gear-mesh,	Groundfish (in lbs.)	Percent of groundfish caught by this gear-mesh,
Chatham MA	Small mesh only	9	54,380	11.5	174,598	3.8
Fairhaven MA	Too many nets only	1	cr	cr	cr	cr
	Small mesh only	1	cr	cr	cr	cr
Gloucester MA	Too many nets only	2	cr	cr	cr	cr
	Small mesh and too many	3	84,059	3.7	95,915	0.6
	Small mesh only	18	408,343	18.2	924,720	6.1
Little Compton	Too many nets only	2	cr	cr	cr	cr
	Small mesh only	5	28,308	7.5	8,315	9.5
Newport RI	Small mesh only	1	cr	cr	cr	cr
Ocean City MD	Too many nets only	1	cr	cr	cr	cr
	Small mesh only	1	cr	cr	cr	cr
Portland ME	Too many nets only	1	cr	cr	cr	cr
	Small mesh only	4	126,002	6.0	128,247	1.0
Portsmouth NH	Small mesh and too many	1	cr	cr	cr	cr
	Small mesh only	7	196,243	17.8	456,809	22.3
Rye NH	Small mesh only	2	cr	cr	cr	cr
Scituate MA	Small mesh and too many	1	cr	cr	cr	cr
	Small mesh only	6	59,425	17.0	85,067	7.9
Wanchese NC	Small mesh only	1	cr	cr	cr	cr
York ME	Too many nets only	1	cr	cr	cr	cr

* Source: logbooks. Only shows ports with monkfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of monkfish landings caught by combined illegal (by the preferred alternative) gillnet gear. Does not include trips with incidental monkfish catch (50 lb tail-weight equivalent). Cannot report (cr) confidential information if less than 3 entities.

Table 6.5. Mesh size used by vessels fishing under a multispecies large-mesh permit (fishing year 2000).

Type of gear	Size of mesh	No. of trips	No. of vessels	Groundfish (in lbs.)
Bottom otter trawl	Smaller than 10"	21	1	cr
Gill net	Greater than or equal	225	14	145,966
	Smaller than 9"	588	18	1,084,701

* Source: logbooks.

Table 6.6. Vessels fishing under a multispecies large-mesh permit using trawl mesh less than 10" or gillnet mesh less than 9", by port of landing* (fishing year 2000).

Port of landing	No. of vessels	Groundfish (in lbs.) caught	Percent of groundfish caught by this gear-
Chatham MA	1	cr	cr
Plymouth MA	1	cr	cr
Portsmouth NH	3	285,247	13.9

Scituate MA	3	208,097	19.2
Seabrook NH	1	cr	cr
York ME	1	cr	cr

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by small mesh. Cannot report (cr) confidential information if less than 3 entities.

6.3.1.3 Other area non-specific measures, including DAS measures and prohibition on front loading

See Section 6.4, Comparison of Alternatives and Discussion of Impacts, below.

6.3.2 Georges Bank Measures

6.3.2.1 Areas Closures

During 1994-2000, those vessels that fished in the proposed additional closed areas on Georges Bank with gear prohibited by the preferred alternative depended on those areas for between 6.8 and 14.1 percent of their annual groundfish catch (in terms of landed lb), 0.0 and 24.8 percent of their annual scallop catch (although with very small total landings), and 1.4 and 6.5 percent of their annual catch of all other species combined; the number of vessels catching groundfish varied between 14 and 49 vessels (see Table 6.7). The impacts from the proposed closure would be strongest in Newport RI, as well as a number of ports in Massachusetts (see Table 6.8), and on medium-sized vessels (see Table 6.9). These results are based on past fishing practices (using 1994-2000 logbook data), and show a distribution similar to the impacts that are predicted in the economic impact analyses.

Table 6.7. Landings* (in thousands of lb) and areal dependence for calendar years 1994-2000 of the preferred alternative's May closed areas (blocks 80 and 81, and partial 118-120).

Area	Year	Groundfish landings	Scallop landings	Landings of other species	Ave. areal dependence on groundfish	Ave. areal dependence on scallops	Ave. areal dependence on other species	No. vessels landing groundfish	No. vessels landing scallops	No. vessels landing other species
Proposed Closed Area	1994	323.0	0.0	112.7	10.7	0.0	6.0	17	0	18
	1995	508.7	0.0	189.3	6.9	24.8	4.7	39	2	38
	1996	423.2	0.0	159.9	11.4	13.0	4.5	28	1	24
	1997	344.3	0.0	87.2	8.8	0.0	4.1	21	0	18
	1998	667.6	0.0	73.6	14.1	0.0	5.3	33	0	27
	1999	992.3	0.0	285.7	10.8	0.0	6.5	49	0	49
	2000	133.1	0.0	24.8	6.8	0.0	1.4	14	0	9
Rest of Northeast	1994	66,744.9	10,896.6	129,643.	99.9	100.0	99.9	1,332	367	1,670
	1995	88,889.6	16,765.6	181,857.	99.8	99.9	99.9	1,688	476	2,171
	1996	103,415.	16,896.1	209,743.	99.8	100.0	99.9	1,644	494	2,165
	1997	100,463.	13,464.5	212,127.	99.9	100.0	100.0	1,474	494	2,054

1998	98,908.3	11,744.2	239,601.	99.8	100.0	99.9	1,513	462	2,088
1999	93,481.1	21,860.3	232,978.	99.6	100.0	99.9	1,508	454	2,167
2000	105,437.	31,731.0	239,412.	99.9	100.0	100.0	1,477	502	2,104

* Source: logbooks

Table 6.8. Ports in year 1999 most affected by the preferred alternative's proposed closed areas (p.c.a.) (in order of p.c.a. groundfish dependence).*

Port landed	No. vessels landing groundfish	No. vessels landing scallops	No. vessels landing other species	Groundfish landings from p.c.a.	Groundfish dependence on p.c.a.	Scallops landings from p.c.a.	Other species landings from p.c.a.	Total effort	Ave. days absent per trip	Ave. crew size per trip
Newport RI	3	0	3	65,825	5.7	0	64,320	191	7.9	3.4
Gloucester	13	0	12	372,196	2.7	0	88,820	550	5.5	4.2
New Bedford	9	0	9	267,092	1.3	0	34,549	358	8.3	3.9

* Source: logbooks. Only shows those ports with at least three vessels that showed either landings from the p.c.a. of at least 100,000 lb; or had a dependence on the p.c.a. for at least 5 percent of groundfish landings, with a total (from all areas) groundfish landings of at least 100,000 lb.

Table 6.9. Distribution of impacts from dependence on preferred alternative's proposed closed areas (p.c.a.) by size* of vessel (year 1999)

Vessel size	No. of trips	No. vessels landing groundfish	No. vessels landing scallops	No. vessels landing other species	Groundfish landings from p.c.a	Groundfish dependence on p.c.a.	Scallops landings from p.c.a.	Other species landings from p.c.a.	Total effort	Ave. days absent per trip	Ave. crew size per trip
Small	23	11	0	11	57,473	0.3	0	30,846	114	1.8	2.4
Medium	30	15	0	16	431,092	1.5	0	76,972	584	5.0	3.8
Large	29	23	0	22	503,771	1.0	0	177,893	870	8.1	3.7

* Source: logbooks and permit records. Small refers to vessels less than 50 feet in length; medium refers to vessels between 50 and 70 feet in length; and large refers to vessels greater than 70 feet in length.

6.3.2.2 Mesh Changes

The mesh and gear changes in Georges Bank could affect the nearly 250 trawl vessels using smaller-sized mesh, 25 hook vessels using more than 2000 hooks, and 75 gillnet vessels either using smaller-sized mesh or more than 50 nets (Table 6.10). Such regulations may differentially affect gillnet fishermen, who would have in their possession considerably more nets than trawl vessels, and thus have greater replacement costs, but the regulations will affect all of these fishermen, since they are instituting non-standard mesh sizes. In terms of affected ports, these impacts will be felt throughout New England (Table 6.11). These tables should be taken to imply that a significant portion of the active groundfish fleet in these ports will have to invest in new gear, and that their total landings will diminish by some unknown amount with the more restrictive gears.

Table 6.10. Gear used by vessels fishing under a multispecies DAS in Georges Bank (fishing year 2000).

Type of	Size of mesh or quantity of gear	No. of trips	No. of	Groundfish (in
Bottom	Greater than or equal to 6.5"	620	102	9,166,317
	Smaller than 6.5"	2430	248	41,703,812
Bottom longline	Less than or equal to 2000 hooks	349	31	438,615
	Greater than 2000 hooks	709	25	1,152,590
Sink gill net	Greater than or equal to 6.5", less than or equal to 50	645	33	1,526,817
	Greater than or equal to 6.5", but more than 50 nets	648	38	1,575,841
	Smaller than 6.5", less than or equal to 50 nets	186	17	358,284
	Smaller than 6.5", but more than 50 nets	135	20	570,772

*Source: logbooks.

Table 6.11. Trawl vessels in Georges Bank using mesh less than 6.5", by port of landing (fishing year 2000).

Port of landing	No. of vessels	Groundfish (in lbs.) caught	Percent of groundfish caught by this gear-
Barnstable MA	3	12,825	4.4
Boston MA	12	2,420,112	69.7
Chatham MA	5	106,838	2.3
Gloucester MA	45	6,499,502	42.7
Greenport NY	1	cr	cr
Marshfield MA	1	cr	cr
Montauk NY	2	cr	cr
Nantucket MA	28	492,069	71.9
New Bedford MA	137	21,595,713	70.3
New London CT	4	2,255,118	78.0
Newburyport MA	2	cr	cr
Newport RI	18	884,172	34.8
Plymouth MA	3	69,087	17.2
Point Judith RI	26	2,169,016	17.0
Portland ME	31	3,015,201	23.5
Provincetown MA	26	458,662	20.3
Sandwich MA	2	cr	cr
Scituate MA	3	109,202	10.1
Shinnecock NY	2	cr	cr
Stonington CT	6	1,063,999	39.7
Tiverton RI	1	cr	cr

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by small mesh in Georges Bank. Cannot report (cr) confidential information if less than 3 entities.

Table 6.12. Hook vessels in Georges Bank using more than 3600 hooks (fishing year 2000).

Port of landing	No. of vessels	Groundfish (in lbs.) caught	Percent of groundfish caught by this gear-
Chatham MA	14	431,693	9.4
Harwichport MA	9	702,252	41.2

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by limited access vessels in Georges Bank using more than 3600 hooks. Cannot report (cr) confidential information if less than 3 entities.

Table 6.13. Gillnet vessels in Georges Bank using mesh less than 6.5" and/or more than 50 nets, by port of landing* (fishing year 2000).

Port of landing	Mesh size and/or net quantity	No. of vessels	Groundfish (in lbs.)	Percent of groundfish caught by this gear-mesh, out of all groundfish landed in port caught by this
Chatham MA	Too many nets only	17	1,269,858	27.6
	Small mesh only	12	310,857	6.8

	Small mesh and too many	7	131,538	2.9
Gloucester MA	Too many nets only	11	122,683	0.8
	Small mesh only	5	47,427	0.3
	Small mesh and too many	12	418,170	2.7
Plymouth MA	Too many nets only	2	cr	cr
Scituate MA	Too many nets only	4	35,314	3.3

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by combined illegal (by the preferred alternative) gillnet gear in Georges Bank. Cannot report (cr) confidential information if less than 3 entities.

6.3.2.3 Trip Limits

See Section 6.4, Comparison of Alternatives and Discussion of Impacts, below.

6.3.3 Gulf of Maine Measures

6.3.3.1 Areas Closures

During 1994-2000, those vessels that fished in the proposed additional rolling closed areas depended on those areas for between 16.0 and 32.2 percent of their annual groundfish catch (in terms of landed lb), 15.0 and 76.1 percent of their annual scallop catch (although with very small total landings), and 11.5 and 19.2 percent of their annual catch of all other species combined; the number of vessels catching groundfish varied between 120 and 206 vessels (see Table 6.13). The brunt of impacts from the proposed closure would be felt hardest in the ports of Massachusetts and New Hampshire (see Table 6.14), in particular some of the smaller ports, and on smaller vessels (see Table 6.15). These results are based on past fishing practices (using 1994-2000 logbook data), and show a distribution similar to the impacts that are predicted in the economic impact analyses. The opening of areas 124 and 125 during January-March would lessen this impact during the next fishing year, though the impacts from that closure during fishing year 2000 will contribute negative cumulative impacts to their closure in May.

Table 6.14. Landings* (in thousands of lb) and areal dependence for calendar years 1994-2000 of the preferred alternative's closed areas (blocks 124 and 125 in May, and 132 and 133 in June).

Area	Year	Groundfish landings	Scallop landings	Landings of other species	Ave. areal dependence on groundfish	Ave. areal dependence on scallops	Ave. areal dependence on other species	No. vessels landing groundfish	No. vessels landing scallops	No. vessels landing other species
Proposed	1994	428	0.4	385	26.7	76.1	11.5	120	9	117
Closed	1995	972	0.0	1,021	18.1	22.1	12.3	206	2	209
Area	1996	1,040	0.4	463	16.9	25.6	13.0	191	8	190
	1997	899	0.2	1,110	16.6	18.7	16.2	152	10	181
	1998	845	0.1	629	16.0	15.0	13.4	174	9	178
	1999	1,292	1.0	1,360	32.2	28.6	19.2	198	14	206
	2000	1,159	0.7	234	24.2	47.7	17.8	173	11	145

Rest of	1994	66,640	10,896	129,371	98.1	98.9	99.4	1,325	364	1,666
Northeast	1995	88,427	16,766	181,026	98.0	99.9	99.0	1,684	476	2,167
	1996	102,799	16,896	209,440	98.3	99.6	99.1	1,640	494	2,160
	1997	99,909	13,464	211,105	98.4	99.6	98.7	1,473	494	2,049
	1998	98,731	11,744	239,046	98.4	99.7	99.1	1,509	462	2,082
	1999	93,182	21,859	231,903	96.4	99.6	98.3	1,497	452	2,163
	2000	104,412	31,730	239,203	97.6	99.1	98.9	1,470	501	2,101

* Source: logbooks

Table 6.15. Ports in year 2000 most affected by the preferred alternative's proposed closed areas (p.c.a.) (in order of p.c.a. groundfish dependence).*

Port landed	No. vessels landing groundfish	No. vessels landing scallops	No. vessels landing other species	Groundfish landings from p.c.a.	Groundfish dependence on p.c.a.	Scallops landings from p.c.a.	Other species landings from p.c.a.	Total effort	Ave. days absent per trip	Ave. crew size per trip
Rockport MA	8	1	8	100,868	37.9	cr	11,479	184	1.0	1.8
Newburyport MA	10	3	10	69,749	25.3	23	5,867	116	1.0	1.5
Beverly MA	3	0	3	24,818	16.6	0	1,496	64	1.1	2.3
Marshfield MA	4	0	3	23,997	13.4	0	2,337	70	1.9	2.0
Hampton NH	4	0	3	28,449	12.3	0	4,081	49	1.0	2.0
Marblehead MA	3	0	2	31,159	11.1	0	cr	77	1.0	2.7
Seabrook NH	16	3	15	103,218	10.6	175	10,475	174	1.0	1.3
Rye NH	6	0	7	47,677	10.1	0	8,669	70	1.0	1.3
Scituate MA	12	0	10	90,202	7.9	0	14,471	240	1.1	2.5
Green Harbor	5	0	3	7,145	4.4	0	585	40	2.8	1.7
Gloucester MA	73	3	57	456,706	3.1	297	96,427	1,016	1.2	2.0
Provincetown	10	3	9	55,114	2.5	162	20,217	92	1.3	2.0
Plymouth MA	4	0	3	9,475	2.3	0	8,300	16	1.1	1.9
Portsmouth NH	11	0	10	30,932	1.5	0	40,001	115	1.5	1.8

* Source: logbooks. Only shows those ports with at least three vessels that showed either landings from the p.c.a. of at least 100,000 lb; or had a dependence on the p.c.a. for at least 10 percent of groundfish landings, with a total (from all areas) groundfish landings of at least 100,000 lb.

Table 6.16. Distribution of impacts from dependence on preferred alternative's proposed closed areas (p.c.a.) by size* of vessel (year 2000)

Vessel size	No. of trips	No. vessels landing groundfish	No. vessels landing scallops	No. vessels landing other species	Groundfish landings from p.c.a	Groundfish dependence on p.c.a.	Scallops landings from p.c.a.	Other species landings from p.c.a.	Total effort	Ave. days absent per trip	Ave. crew size per trip
Small	931	141	8	115	894,481	4.3	515	193,077	1,998	1.2	1.9
Medium	164	31	3	29	255,734	0.8	162	39,804	452	1.4	1.9
Large	10	1	0	1	cr	cr	0	cr	20	1.0	2.0

* Source: logbooks and permit records. Small refers to vessels less than 50 feet in length; medium refers to vessels between 50 and 70 feet in length; and large refers to vessels greater than 70 feet in length.

6.3.3.2 Mesh Changes

The mesh and gear changes in the GOM would affect the nearly 300 trawl vessels using smaller-sized mesh, 15 hook vessels using more than 2000 hooks, at least 26 Trip gillnet vessels using either smaller-sized mesh or more than 150 nets, 58 Day gillnet vessels using standup nets that would not meet new regulations, and the 17 Day gillnet vessels using tiedown nets that would not meet new regulations (Table 6.17-6.18). Such regulations may differentially affect gillnet fishermen, who would have in their possession

considerably more nets than trawl vessels, and thus have greater replacement costs, but the regulations will affect all of these fishermen, since they are instituting non-standard mesh sizes. The measure restricting Day-gillnetters to 50 stand-up nets with a minimum mesh size of 6.5 appears to affect vessels that, on an average trip, catch nearly double the amount than those already fishing under the preferred alternative's measures, though the results are mixed for the tie-down nets (Table 6.18). In terms of affected ports, these impacts will be felt throughout Maine, Massachusetts, and New Hampshire (Table 6.19-6.22). These tables should be taken to imply that a significant portion of the active groundfish fleet in these ports will have to invest in new gear, and that their total landings will diminish by some unknown amount with the more restrictive gears.

Table 6.17. Gear used by vessels fishing under a multispecies DAS in the GOM (fishing year 2000).

Type of gear	Size of mesh or quantity of gear	No. of trips	No. of vessels	Groundfish (in lbs.)
Bottom otter trawl	Greater than or equal to 6.5"	1,797	92	3,281,383
	Smaller than 6.5"	7,401	288	17,128,704
Bottom longline	Less than or equal to 2000 hooks	145	22	95,703
	Greater than 2000 hooks	68	15	113,754
Sink gill net,	Greater than or equal to 6.5", less	516	26	1,468,259
	Greater than or equal to 6.5", but more than 150 nets	77	6	238,926
	Smaller than 6.5", less than or equal to 150 nets	465	26	2,794,624
	Smaller than 6.5", but more than 150 nets	1	1	cr

*Source: logbooks.

Table 6.18. Gillnet usage by day-trip gillnetters in the GOM (fishing year 2000).

Gillnet*	Net numbers and mesh size	No. of trips	No. of vesse	Average trip catch	Average trip catch	Total catch of	Total catch of
Stand-up (or	Greater than 50 nets or mesh less than 6.5" (illegal under alternative)	1,065	58	1475.4	58.5	1,571,323	62,300
Stand-up (or roundfish)	Less than or equal to 50 nets with mesh greater than or equal to 6.5"	2,118	62	839.9	47.0	1,778,927	99,625
Tie-Down (or flatfish)	Greater than 100 nets or mesh less than 7" (illegal under alternative)	299	17	259.9	718.1	77,717	214,698
Tie-Down (or flatfish)	Less than or equal to 100 nets with mesh greater than or equal to 7.0"	352	25	342.3	776.0	120,491	273,164

*Source: 2000 and 2001 logbooks Since the logbooks do not differentiate between standup and tie-down nets, it was assumed that any trip landing more groundfish than flounders was using standup nets, and that any trip landing more flounders than groundfish was using tie-down nets. By doing so, 10 trips (representing 7 vessels, 4964 lb of groundfish and 4964 lb of flounders) were unaccounted for, since they landed equal amounts of groundfish and flounders. There is a question as to whether the variable gear type represents the aggregate number of nets or the number of nets per set; it was assumed to represent the aggregate quantity in this analysis, so this should be taken as a lower bound estimate of the impacts of this regulation.

Table 6.19. Trawl vessels in the GOM using mesh less than 6.5", by port of landing* (fishing year 2000).

Port of landing	No. of vessels	Groundfish (in lbs.) caught	Percent of groundfish caught by this gear-
Bar Harbor ME	4	150,529	100.0
Boothbay Harbor ME	4	119,435	76.7
Boston MA	9	488,817	14.1
Cape Porpoise ME	3	15,012	11.1
Gloucester MA	78	3,962,570	26.0
Green Harbor MA	5	41,286	40.6
Hampton NH	4	142,862	52.3
Marshfield MA	3	29,485	10.6
Newburyport MA	9	246,628	66.6
Plymouth MA	4	55,025	13.7
Port Clyde ME	13	834,006	80.4
Portland ME	82	6,779,745	52.9
Portsmouth NH	18	217,249	10.6
Provincetown MA	22	1,263,560	55.9
Rockland ME	6	241,516	91.9
Rockport MA	6	153,981	56.4
Rye NH	6	276,399	45.1
Sandwich MA	3	17,787	6.4
Scituate MA	4	80,638	7.4
Seabrook NH	15	686,258	71.4
South Bristol ME	13	520,708	90.0

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by small mesh in the GOM. Cannot report (cr) confidential information if less than 3 entities.

Table 6.20. Limited access hook vessels in the GOM using more than 2000 hooks (fishing year 2000).

Port of landing	No. of	Groundfish (in	Percent of groundfish caught
Marshfield MA	1	cr	cr

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by vessels in the GOM using more than 2000 hooks. Cannot report (cr) confidential information if less than 3 entities.

Table 6.21. Trip gillnet vessels in the GOM using mesh less than 6.5" and/or more than 150 nets, by port of landing* (fishing year 2000).

Port of landing	Mesh size and/or net quantity	No. of vessels	Groundfish (in	Percent of groundfish caught by this gear-mesh, out of all
Cape	Small mesh only	2	cr	cr
Gloucester MA	Too many nets only	3	222,817	1.5
	Small mesh only	7	894,818	5.9
Portland ME	Too many nets only	2	cr	cr
	Small mesh only	11	889,064	6.9
Portsmouth	Small mesh only	6	781,887	38.0
	Small mesh and too	1	cr	cr
South	Small mesh only	1	cr	cr

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by combined illegal (by the preferred alternative) trip gillnet gear in the GOM. Cannot report (cr) confidential information if less than 3 entities.

Table 6.22. Dayboat gillnet trips in the GOM with nets illegal under the preferred alternative, by port of landing* (fishing year 2000).

Port of landing	Gillnet type	No. of trips	No. of vessels	Ave. crew size	Ave. trip catch of groundfish	Ave. trip catch of flounders	Total catch of groundfish	Total catch of flounders	% of all groundfish landed in port	% of all flounders landed in port
Beverly MA	Stand-	25	2	2.1	cr	cr	cr	cr	cr	cr
	Tie-	17	2	2.3	cr	cr	cr	cr	cr	cr
Cape	Stand-	5	1	2.0	cr	cr	cr	cr	cr	cr
Gloucester	Stand-	527	27	2.5	1256.0	55.9	661,932	29,472	3.8	0.8
Marblehead	Stand-	4	1	3.0	cr	cr	cr	cr	cr	cr
	Tie-	137	3	2.7	352.5	880.2	48,286	120,581	36.4	81.2
Portsmouth	Stand-	219	8	2.7	2496.6	19.7	546,760	4,321	17.2	2.9
Rye NH	Stand-	19	2	2.2	cr	cr	cr	cr	cr	cr
Scituate MA	Stand-	128	7	2.9	994.7	160.8	127,319	20,587	15.0	3.5
	Tie-	113	4	2.7	129.9	556.3	14,674	62,857	1.7	10.7
Seabrook NH	Stand-	25	4	2.2	979.2	4.3	24,481	107	2.9	0.1
York ME	Stand-	5	1	3.2	cr	cr	cr	cr	cr	cr

* Source: logbooks. Only shows those ports that had total groundfish-flounder landings (from all gears and all areas) of greater than 100,000 pounds AND had greater than 2 percent of groundfish-flounder landings caught by illegal (under preferred alternative) gears. Cannot report (cr) confidential information if less than 3 entities.

6.3.3.3 Trip Limits

See Section 6.4, Comparison of Alternatives and Discussion of Impacts, below.

6.3.4 Southern New England Measures

6.3.4.1 Mesh Changes

The mesh and gear changes in SNE would affect the nearly 300 - 400 trawl vessels using smaller-sized mesh (logbooks do not differentiate between diamond and square mesh, so exact numbers are uncertain), 11 hook vessels using more than 2000 hooks, and 22 gillnet vessels using either smaller-sized mesh or more than 75 nets (Table 6.23). Such regulations may differentially affect gillnet fishermen, who would have in their possession considerably more nets than trawl vessels, and thus have greater replacement costs, but the regulations will affect all of these fishermen, since they are instituting non-standard mesh sizes. In terms of affected ports, these impacts will be felt throughout Southern New England and upper Mid-Atlantic ports (Table 6.24). These tables should be taken to imply that a significant portion of the active groundfish fleet in these ports will have to invest in new gear, and that their total landings will diminish by some unknown amount with the more restrictive gears.

Table 6.23. Gear used by vessels fishing under a multispecies DAS in the SNE (fishing year 2000).

Type of gear	Size of mesh or quantity of gear	No. of	No. of	Groundfish
Bottom otter	Greater than or equal to 7.0"	52	27	171,619
	Between 6.5 and 7.0	2,157	117	3,923,345
	Smaller than 6.5"	6,901	288	20,871,050

Bottom	Less than or equal to 2000 hooks	87	10	75,537
	Greater than 2000 hooks	86	11	186,065
Sink gill net	Greater than or equal to 6.5",less than	309	28	113,511
	Greater than or equal to 6.5", but more	59	12	58,464
	Smaller than 6.5", less than or equal to	20	7	17,384
	Smaller than 6.5", but more than 75 nets	26	3	174,932

*Source: logbooks.

Table 6.24. Trawl vessels in SNE using mesh less than 6.5", by port of landing* (fishing year 2000).

Port of landing	No. of vessels	Groundfish (in lbs.) caught	Percent of groundfish caught by this gear-
Barnstable MA	4	7,899	2.7
Belford NJ	14	640,177	97.2
Boothbay Harbor ME	1	cr	cr
Freeport NY	6	123,466	96.1
Green Harbor MA	1	cr	cr
Greenport NY	5	93,648	37.9
Hampton Bays NY	4	609,774	91.5
Montauk NY	23	3,593,848	82.1
Nantucket MA	3	59,680	8.7
New Bedford MA	67	2,230,248	7.3
New London CT	2	cr	cr
Newburyport MA	1	cr	cr
Newport RI	27	1,172,074	46.1
Plymouth MA	1	cr	cr
Point Judith RI	77	8,053,847	63.3
Point Lookout NY	3	498,330	97.2
Point Pleasant NJ	20	728,575	62.8
Shinnecock NY	40	1,051,018	62.5
Stonington CT	16	1,043,346	38.9
Tiverton RI	3	12,800	8.5

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by small mesh in SNE. Cannot report (cr) confidential information if less than 3 entities.

Table 6.25. Limited access hook vessels in SNE using more than 2000 hooks (fishing year 2000).

Port of landing	No. of	Groundfish (in	Percent of groundfish caught
Harwichport MA	4	137,885	8.1

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish landings caught by vessels in SNE using more than 3600 hooks. Cannot report (cr) confidential information if less than 3 entities.

Table 6.26. Gillnet vessels in SNE using mesh less than 6.5" and/or more than 75 nets, by port of landing* (fishing year 2000).

Port of Landing	Mesh size and/or net quantity	No. of Vessels	Groundfish (in	Percent of groundfish caught by this gear-mesh, out of all
Portsmouth	Too many nets only	2	cr	cr
	Small mesh and too	2	cr	cr
Tiverton RI	Too many nets only	2	cr	cr
	Small mesh only	1	cr	cr

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND greater than 2 percent of groundfish

landings caught by combined illegal (by the preferred alternative) gillnet gear in SNE. Cannot report (cr) confidential information if less than 3 entities.

6.3.4.2 Trip Limits

See Section 6.4, Comparison of Alternatives and Discussion of Impacts, below.

6.3.5 Recreational Measures

See Section 6.4, Comparison of Alternatives and Discussion of Impacts, below.

6.4 Comparison of Alternatives and Discussion of Impacts

Though the status quo may have negative long-term impacts on fishermen and fishing communities if stock biomasses remain at levels insufficient to support continued fishing levels, the preferred alternative can also be expected to have significant impacts on the Northeast groundfish industry, with particular segments and communities within that industry bearing a heavier share. Ultimately, the long-term sustainability of fisheries, fishermen and fishing families, and fishing communities all depend on healthy stocks of fish; but it is also the case that the sustainability of the institutions, processes, and relations that constitute fishing communities depend on a minimum of social capital. As the discussion below indicates, the proposed measures–particularly as they occur in the context of the cumulative effects from Amendments 5 and 7 to the FMP–will have a significant impact on the revenues and flexibility of many fishing operations and shoreside facilities, such that many of the operations on the edge could go out of business, with the ensuing social and economic costs that such disruption entails.

The use of spatially based measures, such as the preferred alternative's closed areas in Georges Bank and the Gulf of Maine, has been noted in the anthropological literature as a means of controlling effort that is both widespread in many communities around the world, and often the most acceptable management measure to fishermen (McGoodwin, 1990; Acheson and Wilson, 1996). However, the acceptability of closed areas depends not only on how effective they are in achieving desired biological results, but also on the allocational affects, namely, whether those who bear the costs of management are the same as those who reap the benefits. It should be noted that, despite an image of a highly mobile fleet, many fishermen tend to fish in the same areas and in areas close to their home and landing ports. This behavior stems from any number of reasons - they fish with small boats, they have extensive knowledge of particular, but not all areas, etc. The majority of the commercial groundfish fleet (varying around 90 percent of the fleet) catch at least half of their annual groundfish catch in one statistical area alone, and a

significant majority (between 71 and 75 percent of the fleet) catch at least 75 percent of their annual groundfish catch in just one statistical area (see Table 6.27).

Table 6.27. Spatial patterns of groundfish fishing, 1995-2000.

	1995	1996	1997	1998	1999	2000
No. of vessels landing at least a 40-lb trip of groundfish	1658	1585	1432	1434	1425	1419
Percent of vessels landings at least 50	89.4	90.3	91.1	91.1	90.9	93.0
Percent of vessels landings at least 75	72.9	74.0	74.7	73.4	71.4	74.9

Source: logbooks

Moreover, particular areas are more important than others for groundfish–in terms of an annual catch dependence, vessel landings and number of vessels–and are concentrated in the fishing grounds that border coastal areas in New England and the upper Mid-Atlantic (see Table 6.28). For example, the two most important areas for groundfish dependence are statistical areas 513 and 514, which together comprise a significant portion of the GOM, as well as the additional rolling area closures. Vessels that fished in area 514 depended on it for an average 73.2 percent of their annual groundfish catch, and vessels that fished in area 513 depended on it for an average 68.4 percent of their annual groundfish catch; these were not, however, the areas that saw the highest average trip catches, but the areas that vessels were most dependent on for their annual groundfish income. The upshot is not that closed areas *per se* have unacceptably high or disproportionate impacts, but that ***which*** closed areas are selected matters crucially for the distribution and level of social and economic impacts, just as much as it does for the achievement of biological targets. As discussed in the previous sections, up to 206 vessels have a recent history of fishing in the proposed GOM closed area, accounting for 16-32 percent of their annual groundfish catch (Table 6.14), depending on the extent to which they are able to fish different species or find new areas in which to fish; similarly the proposed Georges Bank closed areas affect up to 49 vessels with a recent history in the areas, affecting up to 6.5 percent of their annual groundfish catch (Table 6.7). These impacts are not simply that fishing income will be reduced, though that is a probable impact; but that the closure of what may be traditional or close-to-shore areas can reduce the flexibility of fishing operations, an impact that may be more difficult for smaller vessels and the communities in which they operate; the closures may affect the safety of fishing operations if fishermen begin to fish farther from shore and on longer trips; and they can have significant

impacts on families, communities, and patterns of interaction, if fishermen do stay away from shore for significantly longer periods, including the disruptions resulting from longer periods at home (NEFMC 2000; Olson and Clay, in press; Pollnac and Littlefield 1983). As well, the proposed closed areas may also differentially affect onshore facilities, employment patterns, and community revenues, if they significantly shift fishing and landing patterns.

Table 6.28. Fishing characteristics for groundfish, by statistical area, 1995 – 2000.*

	1995			1996			1997			1998			1999			2000		
Area	Ave. %	Ave GF	No. boats	Ave %	Ave GF	No. boats	Ave %	Ave GF	No. boats	Ave %	Ave GF	No. boats	Ave %	Ave GF	No. boats	Ave %	Ave GF	No. boats	6 yr ave.
51	70.	21772	486	70	27,9	446	70.	29,8	415	77.	28,8	403	75.	22,6	347	75.	29,58	387	73.
51	69.	30,70	367	69	40,4	317	65.	28,7	278	66.	24,0	253	67.	19,2	220	72.	30,96	250	68.
61	63.	14,43	110	64	12,3	90	63.	21,5	102	55.	16,1	90	71.	18,4	98	75.	19,14	92	65.
52	60.	28,17	419	63	31,4	423	65.	40,4	390	62.	36,0	403	61.	44,4	404	62.	46,84	400	62.
61	54.	8,171	55	57	8,62	65	60.	13,4	45	55.	10,3	65	61.	10,2	63	65.	9,916	54	59.
53	61.	12,10	164	54	12,9	143	51.	17,1	122	51.	24,6	137	51.	21,6	130	53.	28,46	109	54.
61	41.	22,26	191	42	12,4	172	40.	24,7	199	39.	16,0	172	43.	18,0	151	43.	21,59	138	41.
51	36.	56,04	168	38	63,8	168	42.	61,8	158	44.	68,5	140	40.	53,4	139	40.	62,02	126	40.
53	41.	36,47	250	42	46,9	246	41.	54,4	188	37.	53,4	189	36.	48,6	190	37.	72,25	151	39.
51	32.	21,47	108	43	19,5	93	45.	25,2	72	40.	20,0	79	34.	15,0	75	33.	18,27	71	38.
53	35.	2,549	67	33	2,62	60	34.	3,58	47	37.	5,12	42	40.	3,13	34	33.	4,165	40	35.
51	36.	24,38	41	34	36,6	33	38.	20,2	19	38.	29,7	21	40.	14,0	17	25.	15,09	18	35.
62	28.	2,617	40	31	2,05	38	35.	8,68	22	45.	5,59	26	23.	2,38	33	45.	2,733	15	34.
52	35.	45,01	194	29	59,9	184	36.	64,7	187	31.	62,4	197	37.	70,0	230	37.	60,53	233	34.
62	27.	3,872	6	34	5,11	9	29.	182	4	32.	540	4	38.	8,28	9	35.	5,866	18	33.
54	17.	2,603	8	47	2,39	9	44.	50,9	5	c.r	c.r.	2	20.	10,4	5	25.	6,462	6	31.
56	20.	21,76	55	23	47,6	68	23.	43,5	54	23.	38,1	55	48.	13,7	174	46.	25,96	136	31.
52	23.	36,64	115	26	41,2	144	29.	50,3	124	36.	65,9	143	25.	68,4	122	33.	102,8	125	29.
52	25.	13,19	113	25	17,2	104	27.	16,0	62	29.	18,6	86	29.	27,2	103	34.	39,41	76	28.
61	27.	5,319	57	26	6,96	51	22.	4,73	55	23.	2,76	42	29.	1,98	49	31.	1,703	42	26.
61	32.	32,04	156	32	53,8	146	27.	47,3	127	23.	41,6	130	21.	35,1	103	18.	17,87	96	25.
46	27.	12,87	10	41	11,2	8	c.r	c.r.	1	10.	8,62	7	8.3	4,21	7	c.r	c.r.	2	25.
56	21.	24,03	77	18	25,3	68	20.	24,4	60	26.	40,6	85	24.	42,9	86	23.	46,18	78	22.
46	14.	19,71	16	8.	7,28	4	c.r	c.r.	1	19.	29,9	5	10.	9,71	6	41.	19,15	3	18.
55	c.r	c.r.	1	3.	4,67	4	14.	30,7	3	c.r	c.r.	2	37.	9,78	14	43.	17,65	8	17.
52	9.9	30,18	11	17	21,9	25	19.	28,0	16	13.	18,0	25	18.	37,4	15	15.	17,16	10	15.
50	10.	16,57	16	14	19,1	24	18.	15,5	35	15.	22,9	40	8.8	13,2	20	19.	28,51	10	14.
54	2.1	18,74	3	8.	28,3	7	10.	94,8	4	c.r	c.r.	2	c.r	c.r.	2	c.r	c.r.	2	14.
51	18.	7,898	3	13	12,8	17	15.	20,8	16	4.0	5,40	5	4.4	13,5	9	8.4	3,495	6	10.
52	19.	135,8	3	5.	5,32	5	c.r	c.r.	2	15.	198	3	6.0	9,70	6	3.9	2,622	7	9.7
63	c.r	c.r.	1	0.	0	0	c.r	c.r.	1	c.r	c.r.	1	c.r	c.r.	1	3.8	20,15	6	6.7
53	7.7	19,66	3	2.	6,58	5	1.9	3,38	4	8.7	25,0	7	8.0	5,70	5	0.0	0	0	4.9

* Source: logbooks. NB: only shows those areas that had at least 100,000 pounds of groundfish landed in at least one of the years 1995-2000. Average percent refers to the average percentage of a vessel's annual groundfish landings by area; average GF refers to the average vessel annual groundfish landings in that area; and boats refers to the number of vessels recording at least one trip in that area.

In addition to the proposed closed areas, the preferred alternative contains a number of other measures that combined would impact the groundfish industry and particular segments therein. As the economic impact analyses indicated, DAS changes would affect active fishermen

across the board, but would particularly impact, in terms of total DAS usage, those vessels that currently fish their maximum DAS, mostly large vessels, vessels in the Individual permit categories (category A), and vessels with homeport states in Maine, Massachusetts, and New Hampshire. The prohibition on front-loading, though economic analysis has indicated may not be very prevalent, would half trip income for those vessels who practiced front-loading (section 5.2.4.2). Its prohibition would not only negatively impact income, but could induce those vessels to remain at sea for longer periods for the higher trip limit, with consequences for safety. On a positive note, its prohibition would equalize the fishing opportunities between those who did and did not practice front-loading, perhaps reducing perceptions of unfairness (though not entirely, since the baseline of DAS allocated in 2002 would reflect any front-loading practiced). Through the DAS reductions more generally, business and financial solvency may be at stake for many vessels, and business failures could have significant social impacts, such as increased community instability, crime rates, domestic violence, and other issues. In addition to impacting revenues and year-round fishing for those vessels for which the DAS reductions would be binding, a decrease in overall landings could affect shoreside facilities and communities that are historically dependent on groundfish, and the number and stability of crew positions. The long-term impacts of a reduction in crew, for example, is not only in the way a reduction affects the operation and safety of fishing vessels, but also in how the reduction affects the life cycle of crew-to-owner that is prevalent in some fisheries, and thus the long-term social sustainability of fishing families and fishing communities (see also NEFMC Report from the groundfish social impact informational meetings 2000). This crew-to-owner cycle, and the entry of fishermen into the profession more generally, will be additionally impacted by the freeze on issuance of hand-gear open access permits, one of the few remaining entry points for new fishermen, as discussed in the previous section.

While the increased trip limit for GOM cod would have positive impacts for some hook and gillnet fishermen, (with less impact on trawl vessels), the decreased trip limit for yellowtail flounder is expected to negatively impact trawl vessels operating out of southern New England and the upper Mid-Atlantic, as explained in the Economic Impact Analysis (see Section 5.2.3.1). It is difficult to predict the effects of the proposed mesh size changes, other than that many fishermen would have to invest in new gear at a time that fishing income is considerably more uncertain; moreover, the change in mesh size would both reduce and change the composition of the catch in ways that may impact income. Without a transitional period, gear suppliers with excess inventories of prohibited gear may suffer losses in revenues. Such changes will likely be felt throughout New England, from small ports to large ones, as discussed in the previous

sections and detailed further in the section on National Standard 8. The net limits could also have income effects on gillnet fishermen, and as the economic analysis has shown, the effects at the 10th percentile–the most adversely affected-- were the trip gillnetters, who face heavy net reductions in Georges Bank and Southern New England.

For the recreational fishery, as the economic impact analyses have indicated, the impacts will depend on the extent to which charter/party boat patrons would continue to participate in fishing, despite the creel limits and the additional likelihood that fewer fish could be retained due to the larger size limit. The requirement to declare into either recreational or commercial fishing for the duration of the GOM closure, would also limit the flexibility of charter/party boat operations in the GOM.

As mentioned above, the social impacts of a hard TAC alternative, discussed generally in Attachment A, is expected to be most severe of the three alternatives because it closes down fisheries altogether when a TAC is reached.

6.5 National Standard 8

6.5.1 Introduction

National Standard 8 requires the consideration of impacts on fishery dependent communities. Current guidance on National Standard 8 defines communities as towns or cities, a geographic unit which might fit the Census Bureau's definition of a “place.” Thus, while communities based on gear or target species will be discussed within the Social Impact Analysis (SIA), they are not part of this section. A number of factors to consider in making determinations of dependence are also supplied in current guidance, though methodological guidelines are in the process of refinement. Moreover, resources have not been directed towards the systematic and long-term collection of the kinds of baseline data needed to make such determinations in an empirically grounded way. However, the Northeast Region has made some headway in collecting the kinds of information and performing the kinds of analyses to support National Standard 8 determinations, most notably the Marine Fisheries Initiative (MARFIN) project on fishing communities and fishing dependency in New England (Hall-Arber *et.al*. 2001) and an updated port-profiles report for the Mid-Atlantic (McCay and Cieri 2000). While some of these efforts include discussions of communities at larger levels than a “place” they are still useful in providing context and background for a discussion of communities as defined for National Standard 8.

The MARFIN report tried to assess levels of dependence for natural resource regions (NRRs) in New England using a variety of dependency indices, as summarized in Table 6.29 below, from the report. Downeast Maine (or Washington County, including ports such as Beals Island, Jonesport, Cutler, Eastport, and Lubec), Upper Midcoast Maine (including such ports as Stonington, Deer Isle, Rockland, and Vinalhaven) and the Cape and Islands (with ports such as Sandwich, Hyannis, Chatham, Provincetown, and Vineyard Haven) were all characterized as highly dependent on fishing, in terms of actual employment and/or because of a lack of alternative occupations for fishermen. Additionally the report noted six ports–New Bedford, MA; Portland, ME; Gloucester, MA; Chatham, MA; Point Judith, RI; and Portsmouth, NH–as having primary infrastructure capacities, and a number of secondary ports with positive factor rankings–Stonington, ME; Rockland, ME;, Vineyard Haven, MA; Stonington, CT; South Norwalk, CT; Port Clyde, ME; Newport, RI; Sandwich, MA; Kennebunkport ME; and Beals Island/Jonesport ME (Hall-Arber *et al.* 2001). Similar dependency analyses for the Mid-Atlantic region is underway but still pending.

Table 6.29. Comparative fishing dependence indices for the 11 sub-NRRs of New England.

Sub-NRR	A. Percent Related	B. Percent of Total Employed	C. Alternative Occupation Ratio Summary
Downeast Maine	45	3.6	255.54
Upper Midcoast	36	2	171.05
Cape and Islands	27	0.79	104.43
Lower Midcoast	23	0.46	51.32
New Bedford/	27	0.4	38.95
Southern Maine	23	0.39	36.94
Rhode Island	24	0.31	30.86
Gloucester/ North	20	0.21	24.91
New Hampshire	8	0.09	9.46
Boston Area	7	0.05	6.39
Connecticut Coast	2	0.01	2.61

Source: Hall-Arber *et al.* 2001

6.5.2 Taking into account the importance of fishery resources to fishing communities

Sections 6.2 and 6.3 looked at the proposed alternatives and the distributional effects from the components measures of the preferred alternative in some individual detail. But the actual impact from the measures will come from the suite of measures as experienced in total and their cumulative effect on fishermen and fishing communities. The following table (Table 6.30) looks at the cumulative impacts on affected groundfish activity from the mesh and gear changes and the proposed area closures. Affected activity does not equate to a one-to-one reduction in activity; rather it refers to the volume of landings and port activity that will be affected by the new regulations and which will be presumably reduced by some amount

depending on the ability of or opportunity for fishermen to find new areas in which to fish, for example, or adapt to the new gear specifications.

Table 6.30. Total affected activity from mesh and area closures in the preferred alternative (fishing year 2000)

State	Port Landed	No. of vessels	% of total groundfish affected	Total groundfish landed	State	Port Landed	No. of vessels	% of total groundfish affected	Total groundfish landed
Maine	Bar Harbor	4	100.0	150,529	Massachusetts	New Bedford	150	73.3	30,729,098
	Boothbay Harbor	4	79.3	156,550		Newburyport	12	85.5	370,398
	Cape Porpoise	5	100.0	134,784		Plymouth	9	48.7	401,827
	Port Clyde	13	80.4	1,037,660		Provincetown	37	77.0	2,258,782
	Portland	104	84.9	12,819,616		Rockport	9	56.6	273,106
	Rockland	6	91.9	262,679		Sandwich	7	18.7	278,367
	South Bristol	13	96.7	578,293		Scituate	22	49.1	1,084,848
	York	4	97.3	100,116	Rhode Island	Newport	36	80.2	2,541,745
New Hampshire	Hampton	5	52.3	273,367		Point Judith	85	82.7	12,727,794
	Portsmouth	35	77.2	2,058,041		Tiverton	5	24.6	151,368
	Rye	9	46.3	612,536	Connecticut	New London	4	99.0	2,892,489
	Seabrook	21	77.5	960,910		Stonington	18	79.9	2,681,518
Massachusetts	Barnstable	5	7.1	291,922	New York	Freeport	6	96.5	128,423
	Boston	14	83.2	3,471,624		Greenport	6	89.2	247,169
	Chatham	52	50.3	4,603,028		Hampton Bays	4	91.5	666,657
	Gloucester	166	84.5	15,212,821		Montauk	31	86.0	4,376,822
	Green Harbor	5	49.7	101,723		Point Lookout	3	97.2	512,461
	Harwichport	16	42.6	1,705,324		Shinnecock	45	71.7	1,680,614
	Marblehead	3	37.9	259,356	New Jersey	Belford	15	97.2	658,867
	Marshfield	6	18.1	278,561		Point Pleasant	20	64.0	1,160,630
	Nantucket	29	73.4	684,750					

* Source: logbooks. Only shows ports with total groundfish landings (from all gears and all areas) of greater than 100,000 pounds landed by at least 3 vessels.

In terms of National Standard 8, some of the communities most affected by the proposed regulations may not fit a strict interpretation of the criteria for substantial dependence on fishing. The ports have also not been assessed in terms of their dependence on groundfish as compared to other species, nor have extensive analyses been performed to assess the ability of different kinds of fishermen and communities to adapt to the increasingly stringent regulations: some of the ports that show the most groundfish activity affected, for example, could conceivably adapt more ably if their vessels are larger and more mobile (important for adapting to the proposed closed areas) or are in a more stable financial position to absorb the costs of new gear. Additionally, a number of small-sized fishing ports–Newburyport, Marshfield, Marblehead, Beverly, York, Cape Porpoise, Tiverton, Greenport, to name a few–would be collectively affected by the measures in the preferred alternative, and to what extent these small ports may be enmeshed in networks that constitute new spaces of fishing communities, as the MARFIN report indicates is happening in the New England fishing economy (Hall-Arber *et al.* 2001), is

unknown, as is also the vulnerability of these networks to regulations such as the ones proposed. Again, the fact that many of these are small-boat, day-trip ports suggests that they are particularly vulnerable to the near shore closed areas proposed. Moreover, such small-scale operations may also be more vulnerable to the financial costs from other measures such as the gear changes, though, as the economic analysis suggests, there is a complex relationship between vessel size, gear used, income potential affecting the profitability of vessels (see section 5.3.3.2. on the break-even analysis). The following looks at the ethnographic data available for the ports listed in Table 6.30 in order to give some context for interpreting the potential effects on groundfish activity stemming from the preferred alternative.

In Maine, the major groundfishing port of Portland could see 84.9 percent of its groundfish activity affected by the preferred alternative through gear and area measures alone (Table 6.30). The MARFIN report writes that "Portland clearly fulfills the definition of a fishing community on the basis of central place theory [...]. Though Portland is a diverse city with a variety of commercial enterprises including a growing service industry catering to tourists, fishing and fishing-related businesses retain a strong presence" (Hall-Arber *et al.* 2001). South Bristol, which could see 96.7 percent of its groundfish landings affected, "fulfills the definition of a fishing community on the basis of central place theory" (ibid.); Boothbay Harbor, which could see 79.3 percent of its groundfish landings affected, "together fulfill the definition of a fishing community on the basis of central place theory [...] Fishing is considered 'slightly important' to the community" (ibid.). Cape Porpoise, which could see all of its groundfish activity affected, lies next to Kennebunkport which the MARFIN report wrote "fulfills the definition of a fishing community on the basis on central place theory," with Cape Porpoise supporting approximately 100 households by fishing (ibid.). Rockland, which could see 91.9 percent of its groundfish activity affected, is now primarily a herring and lobster port but is considered "an essential provider to the fishing industry" because of its role in landing, marketing, and transportation and has "all the characteristics of a fishing community [...though] the character of the town has changed dramatically over time. With a limited processing sector (one groundfish, one seaweed, no sardines), the town serves principally as a depot for the transport of fish to other places" (ibid.). (Bar Harbor, Port Clyde, and York were not visited by the MARFIN researchers.)

New Hampshire ports–Portsmouth, Hampton, Rye, and Seabrook–would also be affected by the measures in the preferred alternative, particularly the proposed gear changes in the gillnet fishery; total impacted activity for the ports listed is 77.2, 52.3, 46.3, and 77.5

percent respectively. As described in the MARFIN report, these ports can be more clearly thought of as fishing communities: “Portsmouth is the site of the primary fishing fleet of New Hampshire [...]. The support of the fishing industry by the city reflects the view that the commercial fishing industry is an important component in both the diversification of the local economy and provision of cultural color that makes the waterfront attractive” (Hall-Arber *et al.* 2001). As well, “[...] Hampton Beach fulfills the definition of a fishing community on the basis of central place theory” (ibid.). And, though local economies may have begun to depend more on tourism, “This has not, however, drastically affected [the] productivity [of Portsmouth and Hampon/Seabrook] as fishing enclaves. Their linkages with regional networks have compensated for the diminished economic status in their own particular places and spaces” (ibid.).

In Massachusetts, New Bedford could see 73.3 percent of its groundfish activity affected, though the port as a whole may be less impacted since it is primarily dependent upon scallops. In terms of sheer volume, Gloucester is an important groundfish port, and could see 84.5 percent of its groundfish activity affected; moreover, “Gloucester fulfills the definition of a fishing community on the basis of central place theory [...]. Whether or not Gloucester should be classified as ‘fisheries-dependent’ is not consistently answered in the affirmative. Several respondents noted that the city is sufficiently diversified to survive even if the fishing industry does not. However, the image of Gloucester as a fishing community remains very prominent” (Hall-Arber *et al.* 2001). Another major groundfish port in the state affected, Chatham, could see 50.3 percent of its groundfish activity affected; as the MARFIN report indicates, “Chatham is ranked fourth on the scale of infrastructure differentiation [...]. As part of the Cape Cod and Islands sub-region, Chatham ranks third for dependency” (ibid.). The Cape Cod ports of Provincetown, and to a lesser extent Sandwich, would also see groundfish activity affected, by 77.0 and 18.7 percent respectively. “Although fishing represents an historical activity [in Sandwich], it has always been part of a mixed economy including tourism, agriculture, and transport” (ibid.). Provincetown, once a significant groundfish port, is in decline as its position as a groundfish port is threatened by gentrification and tourism (ibid.); this decline could be accelerated by the preferred alternative, and should also be seen in the context of the MARFIN report’s characterization of the Cape and Islands as one of the more fishery-dependent regions in terms of employment alternatives for fishermen (see Table 6.29). Scituate, which could see 49.1 percent of its groundfish landings affected,“sits on the edge of a harbor, once filled with commercial fishing vessels, but now being transformed into a gentrified community with a struggling fishing presence” (ibid.). Neighboring Green Harbor could see 49.7 percent of its groundfish landings affected and neighboring Marshfield, which could

see 18.1 percent of its groundfish landings affected, “has 75-100 including 15 charterboats. All are small boats, less than 45 feet long, as the channel into Green Harbor is very narrow” (ibid.). Rockport, MA could see 56.6 percent of its groundfish activity affected; it is characterized by the MARFIN report as more geared towards the tourist industry but states that “[its] proximity to Gloucester and its fishing industry infrastructure makes it easier for Rockport to maintain a viable, if modest, fleet” (ibid.). Marblehead, which could see 37.9 percent of its groundfish activity affected, is described as “no longer a fishing dependent community. While there are a few fishermen who live here, the pool is small and it is difficult for the remaining fishermen to find local crew” (ibid.). Like Rockport, it depends on Gloucester for many of its fishing needs, a consolidation which the preferred alternative and current conditions may continue. While Plymouth could see 48.7 percent of its groundfish landings affected, “Locals look on fishing as an integral part of the historic setting [of Plymouth], but the weakness of the industry is reflected in the lack of interest or opportunity for local youth to enter the occupation and an overall decline in the place and space dedicated to the cultural capital of fishing” (ibid.). Boston could see 83.2 percent of its groundfish landings affected, and “While fishing-related business is dwarfed by some of the others, it is significant not only for its role as a component of Boston’s economy, but also for its importance in serving dispersed, smaller communities that are more obviously dependent on fishing and fishing-related businesses. Boston remains an essential provider of fishing-related support services” (ibid.). (Barnstable, Harwichport, Nantucket, and Newburyport were not visited by the MARFIN researchers).

In Rhode Island, Tiverton, which could see 24.6 percent of its groundfish activity affected, is described by the MARFIN report as “fulfill[ing] the definition of a fishing community on the basis of central place theory” (ibid.). Newport could see 80.2 percent of its groundfish activity affected. The MARFIN report writes that while Newport may not be fisheries dependent, “A different perspective is to think of the fishing ‘community’ as a regional contributor to the commerce associated with fishing, and as a means of providing support to approximately 200 families with a sustainable livelihood” (ibid: 93). Point Judith could see 82.7 percent of its groundfish activity affected. The MARFIN report writes of Point Judith that it “fulfills the definition of a fishing community on the basis of central place theory […and that] Fishermen comprise a social and occupational network” (ibid: 78), but the report also notes that the fishing community is becoming increasingly vulnerable to the pressures of gentrification. In terms of employment, “Point Judith is the most fisheries-dependent of the communities in Rhode Island. There are approximately 500 households involved in the commercial fisheries, and another 400 indirectly dependent” (ibid: 80). Further, the port

scored 5th in fishery infrastructure and ranks high in landed value among U.S. ports (ibid).

In Connecticut, New London could see 99.0 percent of its groundfish activity affected. The MARFIN report writes that "New London/Groton represents a fishing enclave consisting of a small finfish fishery and a relatively substantial lobstering fleet without any central docking facility for fishing vessels" (ibid.: 65). Stonington could see 79.9 percent of its groundfish activity affected. For Stonington, the MARFIN report writes that "An attitude prevails that commercial fishing represents a significant cultural and economic feature of the town, and the present fishing infrastructure will most certainly support the fishing industry at its present level" (ibid: 55). The report estimates that "150 fishermen/fish processors work out of Stonington, and an additional 50 work in support roles. This makes an estimated 200 households directly dependent on the fisheries, and there are an estimated 300 additional households that are indirectly dependent" (ibid: 58).

In New York, Freeport could see 96.5 percent of its groundfish activity affected and neighboring Point Lookout could see 97.2 percent of its groundfish activity affected. The McCay and Cieri report notes for Point Lookout "Our local informant said they used to have fourteen trawlers tied up in Pt. Lookout and that they used to do a lot of out-of-state business. Now all their sales are local. However, another observer reports that out-of-state boats still land there (winter 2000). He said the relationship with the community is good: there has been no pressure to be off the docks up to this point" (McCay and Cieri 2000: 11). Their Freeport informant focused on the pressures of development (what the MARFIN report called gentrification) and the difficulties that was causing for the fishing community there (ibid: 12). Greenport could see 89.2 percent of its groundfish activity affected; "Greenport is the largest fishing center on the north fork of Long Island" (ibid.:16) and "The Village of Greenport is said to be 'fisherman friendly,' generally more supportive of the fishing industry than other communities" (ibid.: 17). For their Greenport informant, "Like other mixed-trawl fishermen of the Mid-Atlantic region, he is concerned that regulations are mostly written for single species, which doesn't mirror the reality of fishing [...]. One consequence of the myriad of regulations and state-by-state quotas for some species is that fishing operations, especially draggers, are pressured to fish in different waters and offload in different ports" (ibid.: 17). Montauk could see 86.0 percent of its groundfish activity affected. "Montauk, the largest fishing port in New York, is situated near the eastern tip of the South Fork of Long Island. Otter-trawls and longlines are the principal gear-types, in terms of pounds landed and value" (ibid.: 23). The report goes on to note the extensive fishing activity, infrastructure and related services making up the fishing

community in Montauk (ibid.: 25-29). Hampton Bays could see 91.5 percent of its groundfish activity affected and Shinnecock could see 71.7 percent of its groundfish activity affected. “Shinnecock/Hampton Bays is second only to Montauk as a commercial fishing center in New York. [...] This is primarily a dragger fishing port” (ibid.: 29). Their informant in these two ports estimated “that there are 30 boats working out of Shinnecock. Most are draggers, but there are probably 6 gillnetters [...]. One big change in Shinnecock is that there are fewer owner/operators than before. According to another observer, this is because the more successful fishermen have acquired more boats and thus must hire captains. It remains a small-business fishery, with little investment by non-fishing entities” (ibid.: 32). Additionally, “He said that given Long Island's geographical position between New England and the South, the closings on Georges Bank have had a major impact on fishing in Shinnecock” (ibid.). However, “He said that the town of Southampton is ‘generally supportive’ of the fishing industry” (ibid.: 33).

In New Jersey, Point Pleasant could see 64.0 percent of its groundfish activity affected. The McCay and Cieri report notes that “The commercial fisheries of Point Pleasant are third in New Jersey to those of the Cape May-Wildwood area and Atlantic City” (McCay and Cieri 2000: 41) and goes on to list the extensive fishing businesses and infrastructure present in the port. Nonetheless, the report notes the difficulties that the fishing community has faced in recent years, including gentrification pressures, and that “The town's economy is geared toward the summer tourist and recreational business. However, it is more than a "beach town”, and has a large resident population” (ibid: 42). Belford could see 97.2 percent of its groundfish activity affected. An estimated 150 fishermen work out of the port (ibid.: 39), whose “fisheries are small-scale and owner-operated [...]. Otter trawl finfishing is the most important activity, accounting for 50 percent of the landed value in 1998 (ibid: 37). Moreover, “A survey done in 1984 (Princeton Economic Research 1985) found high levels of dependence on the fishery; only 25 percent of those surveyed had any other work experience. When times are bad, fishermen may "go up the road" to find other employment, but it is relatively unspecialized and unskilled work. The fishing community --defined more in terms of fishing out of the port of Belford than residence in Belford-- has a high degree of relatedness. The 1984 survey found that only 2 respondents (5 percent) said they had no relatives in the fishery, past or present” (ibid: 40).

<u>6.5.3. (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities</u>

The proposed closed areas in the preferred alternative, particularly in the GOM because of its proximity to shore and location in concentrated areas, affect some ports –the small North and South shore MA ports, Portsmouth and the other NH ports, and the small Maine and Cape ports–more than others. Because these ports have also been historically dependent on groundfish, and because of the small-boat, day-trip nature of their fisheries, these fishermen are less likely to be able to respond in ways that can enable their continued participation in fishing. The mesh changes affect ports large and small throughout New England and the upper Mid-Atlantic, financial costs which are intensified by the DAS reductions for active groundfish fishermen. Given the need to protect groundfish stocks, the alternatives have proposed conservation measures that, however, do not provide the possibility of creatively encouraging grassroots efforts, such as carefully constructed harvest cooperatives or regional and community-based management systems that might draw on the rich histories, experience, and knowledge of the fishermen, families, and communities of the region.

7.0 Other Applicable Law

7.1 Coastal Zone Management Act (CZMA)

The Preferred alternative would be implemented in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved coastal zone management programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and North Carolina. This determination has been submitted to the responsible state agencies for review under section 307 of the Coastal Zone Management Act. Given the urgency of this action, NMFS has requested that the states comply with an abbreviated review schedule (i.e., 15 days) of all of the management measures under consideration, as allowed under 15 CFR 930.32(b).

7.2 Paperwork Reduction Act (PRA)

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

This action proposes measures that require review under PRA. The possession of yellowtail flounder will be prohibited south of 40˚00' N. lat., and yellowtail flounder possession restrictions (i.e., trip limits) would apply in a newly designated SNE and Mid-Atlantic RMAs, north of 40˚00' N. lat. Vessels fishing north of 40˚00' N. lat. would need to obtain from the Regional Administrator a certificate

(i.e., LOA), to be exempt from the yellowtail flounder possession prohibition, and vessels fishing in the GOM and GB RMAs north of 40˚00' N. lat. would need a second exemption to possess unrestricted amounts of yellowtail flounder. Also, under the Preferred alternative, vessels would be provided the opportunity to appeal their DAS baseline allocation by August 31, 2002. The request to appeal must be in writing and provide credible evidence that the information used by the Regional Administrator in making the determination of the vessel's used DAS baseline was based on mistaken or incorrect data.

Since clearance of these provisions under the requirements of the PRA would not allow these provisions to be enforced by August 1, 2002, these collections-of-information have been submitted to the Office of Management and Budget (OMB) for approval under the emergency clearance provisions of the PRA. Upon approval and final clearance of the emergency submission, NMFS intends to merge the requirements into the OMB-approved family of forms that currently covers the Northeast Region's permit requirements for fishing vessels, operators, and dealers for the Northeast Region Permits (OMB Control No. 0648-0202).

This action contains no other changes to the existing reporting requirements previously approved under OMB Control Nos. 0648-0202, nor does it contain changes to existing requirements approved under 0648-0212 (Vessel logbooks), 0648-0229 (Dealer reporting), 0648-0351 (Northeast Region Gear Identification Requirements), and 0648-0422 (Northeast Region Raised Footrope Trawl Exempted Fishery).

7.3 Magnuson-Stevens Act

Compliance with Magnuson-Stevens Act measures is based in large measure on the scope and context of this interim action. This action is a short-term compromise set of measures being implemented under section 305(c) of the Magnuson-Stevens Act and, thus, necessarily is not intended to or required to meet all requirements of SFA.

7.3.1 Consistency with National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any FMP or amendment be consistent with the 10 national standards listed below.

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

Under the provisions of section 304(e)(6) and 305(c), interim measures addressing overfishing may be implemented even if they are

not sufficient, in and of themselves, to stop overfishing. This interim action implements measures for both the commercial and recreational fishery sectors to reduce overfishing on several major stocks of fish in the Northeast multispecies fishery. The measures will provide immediate and substantive protection for the above-average 1998 year class of GOM cod, which is important to the rebuilding of that stock, as well as protection for the older, fully recruited year classes. This interim action will also reduce fishing effort and mortality on several other groundfish and non-groundfish stocks in the Northeast. This action is an important step to bring the FMP into full compliance with all provisions of the SFA, the Magnuson-Stevens Act, and other applicable law, as discussed in sections 1.0 and 2.0 of this EA.

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

This action incorporates the NMFS/NEFSC SAW-33, the most recent assessment for GOM cod, redfish and white hake. The assessment of GOM cod includes recreational landings for the first time. Because recreational landings are also factored into the most recent estimates of F for GOM cod, they must also be factored into measures to reduce F. Therefore, this action incorporates the best scientific information available to achieve critical F reductions. However, where the nature of assessments is one of constant revision and updating, a lag may exist from the release of information to the public, and its incorporation into the management system. Such is the case with a recent re-evaluation of the biological reference points for groundfish stocks. The necessary time constraints placed on the development of this action prevent NMFS from incorporating this information into this interim action, however; future actions will continue to include best scientific information.

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

This FMP is based on measures, such as effort controls, gear restrictions, and area closures, that apply across the range of species in the multispecies complex. In cases where additional measures are needed to achieve FMP objectives for individual stocks, such as GOM cod and GB cod, this action applies those measures stock-wide. In contrast to the first part of the Settlement Agreement (Part 1, implemented May 1, 2002) which focused reductions in fishing mortality primarily on GOM cod (since it is one of the most overfished stocks), the measures in this action will reduce fishing mortality on other stocks, as well. In most areas where the fishery operates, several stocks of groundfish exist together, along with

other non-groundfish species, such as skates, spiny dogfish, and monkfish. Closures and gear restrictions that are targeted on cod thus also reduce fishing effort on these other stocks. DAS reductions are more broad in application, and serve to reduce fishing effort on the full multispecies complex. This approach is consistent with the FMP, given the interrelated nature of the multispecies complex.

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

Although the measures in this interim action do not specifically discriminate between residents of different states, the impacts of some of the measures necessarily but unavoidably will be more severe for those vessels fishing in the GOM, particularly small vessels because that is where more restrictive measures are needed. Some areas are more important than others for the groundfish fishery–in terms of annual catch dependence, vessel landings and number of vessels that fish there. The seasonal and area closures included under this action were selected as areas reasonably calculated to contribute to a reduction in GOM cod mortality. The analytical model results indicate that the inshore and offshore GOM closures distribute impacts--and thereby mitigate, to some degree–the impact of these measures on vessels (see section 5 of this EA).

A prohibition of yellowtail flounder catch south of 40˚00' N. lat. and trip limits for Mid-Atlantic and SNE yellowtail flounder north of 40˚OO’ N. lat. were calculated to reduce sufficiently mortality on those stocks, while the exemption programs allow those who target other stocks of yellowtail flounder, not in need of such reductions in mortality, to continue to fish.

Recreational measures are adopted in accordance with Council policy to provide reasonable and regulated access to the resource for all participants, and while specific management measures differ between the recreational sectors, the measures achieve similar reductions in exploitation consistent with the differences between the sectors. The differential impacts on various states is a necessary consequence of the distribution of the stocks most in need of reductions in F. As described elsewhere in this document, to the extent possible, measures have been designed to spread the burden of new restrictions across geographical areas, gear types, vessel sizes, and user groups.

The Preferred alternative was chosen, in part, to reduce impacts on those vessels that may be most affected by these proposed measures. Further, this alternative is being implemented precisely because it would be more fair and equitable in the short-term while longer-term measures are developed.

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

Within the context of the conservation goals of the FMP, this interim action contains measures to promote efficiency in the utilization of the fishery resource. The prohibition on front-loading the DAS clock will require fishermen to leave the dock within 1 hour of starting their trip so as to utilize efficiently their allocation and the maintain the conservation goals of the FMP by not allowing targeted trips for GOM cod. Also, areas closures were chosen to achieve the greatest conservation benefit in the shortest possible time.

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

The interim action takes into account the differences in fisheries and fishery resources by incorporating differential measures by stock area. Recreational measures, while specific to the GOM, take into account variations between the charter/party and private recreational sectors, as discussed in section 5.1.6 of this EA.

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

NMFS considered the costs and benefits of a range of alternatives that would achieve the conservation goals of the FMP. It considered costs to the industry, as well as enforcement and administrative costs, in selecting the proposed action. Alternative 2, the Preferred alternative, would provide broad protection to groundfish resources in the Northeast region while mitigating some of the economic and social dislocations that would have resulted otherwise. Therefore, the proposed action would minimize the material economic affect on the regional economy.

8. *Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for*

the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

This provision and how this interim action complies with this national standard are discussed in detail in section 6.5 of this EA. This alternative was specifically chosen based on negotiations with industry and fishing community representatives, in connection with Court-sponsored mediation regarding the Court order discussed above. The primary objective of this alternative is precisely to minimize short-term impacts on the industry and fishing communities, without sacrificing needed conservation benefits.

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

Although not its primary purpose, this interim action, through measures to reduce overfishing, will put in place restrictive measures to reduce fishing effort and fishing mortality on groundfish stocks in the Northeast which will reduce bycatch in the groundfish fishery. Through simultaneous non-regulatory action, NMFS will increase substantially at-sea observer coverage to better monitor and assess bycatch. In most areas where the groundfish fishery operates, several stocks of groundfish occur together, along with other non-groundfish species, such as skates, spiny dogfish, and monkfish. Under the Preferred alternative, area closures, effort restrictions, modifications to the DAS clock, and gear restrictions such as mesh increases, gillnet net reductions, and hook gear restrictions will help reduce bycatch in both the groundfish fishery and on these other stocks by reducing levels of fishing effort and efficiency. For many of the other species, the expected reductions are substantial. Given the limited scope and context of this interim action and numerous measures already in place that reduce bycatch, its not practicable to add additional measures to minimize bycatch. This approach is consistent with the FMP, given the interrelated nature of the multispecies complex.

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

In light of the limited scope and context of this action, the conservation and management measures proposed here, to the extent practicable, promote the safety of human life at sea. This action is a compromise set of interim measures to avoid an immediate implementation of measures necessary to comply with Amendment 9 and the SFA. These measures are considerably less restrictive than measures to comply with Amendment 9. Generally, if measures are less

restrictive, there is less incentive for fishers to risk adverse weather or fishing conditions to harvest fish. In this respect, then, the preferred alternative promotes safety at sea compared to the alternative of coming into immediate compliance with Amendment 9. Nevertheless, the measures are more restrictive in several respects than status quo. However, nothing in the measures necessarily forces a fisher to risk his safety at sea other than an incentive to maximize landings or profits. Certain measures such as the increase in GOM cod trip limits, in fact, may decrease such given the scope and context of this action and existing measures already in place, there does not appear to be any more practicable alternatives that will promote safety at sea. See also the discussion on public health and safety in Section 8.0, number 3.

7.3.2 Required provisions

As more fully discussed elsewhere in this document, this interim action and the FMP it amends when taken together are consistent with the required provisions of section 303(a) of the Magnuson-Stevens Act.

8.0 Finding of No Significant Impact

National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6 (revised May 20, 1999) provides nine criteria for determining the significance of the impacts of a proposed action. The significance of this action is analyzed in the context of the fact that it is the second step in a three-step process agreed to as a compromise in a lawsuit to bring the FMP into full compliance with the SFA, the Magnuson-Stevens Act and all other applicable law as quickly as possible. It is intended to be a short-term interim measure that, by itself, does not result in a significant impact. The longer term impacts associated with the final step of this process, i.e., Amendment 13, will analyze impacts through a supplemental Environmental Impact Statement. These criteria are discussed below:

1. *Can the proposed action be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action?*

As more fully discussed in sections relating to biological impacts, the interim action is not expected to jeopardize the sustainability of any target species that may be affected by the action. In fact, the action is intended to protect the sustainability of all groundfish stocks managed under the FMP. The proposed action to extend the time period of the WGOM Area Closure will provide protection for a portion of the GOM cod resource that could be expected to be fished at a high level fishing effort in the absence

of any other measures to control that effort. That area, as well as additional seasonal closures represent time/areas with high cod landings and will contribute to a reduction in groundfish and non-groundfish mortality. Expanding temporally the Cashes Ledge Area Closure will provide additional protection for GOM cod and other stocks in the offshore areas. The mesh changes in this action should have positive biological benefits for several groundfish stocks. Effort reductions will also reduce fishing mortality. This action will protect the long-term productive capability of the GOM cod stock, as well as afford protection for several other stocks of fish.

2. *Can the proposed action be reasonably expected to allow substantial damage to the ocean and coastal habitats and/or EFH as defined under the Magnuson-Stevens Act and identified in FMPs?*

This interim action is not expected to allow damage to the ocean, coastal habitats, and/or EFH as defined under the Magnuson-Stevens Act and identified in the FMP. In general, bottom-tending mobile gear, primarily otter trawls, associated with the FMP have the potential to adversely effect EFH for 14 species of groundfish as well as EFH for sea scallops, monkfish, Atlantic sea herring, and Atlantic salmon. The interim action would continue the WGOM Area Closure and add new closure areas, thereby providing additional protection to ocean and coastal habitats. These closure areas represent a variety of habitat types and provide significant incidental benefit and protection for EFH in the GOM, even though these were not closed with the objective of protecting fish habitat. The maintenance of the closed areas will allow the habitats contained within them to continue or begin the process of recovery following the previous fishing-related disturbances and impacts, although changes to the short-term seasonal (rolling) closures would not be expected to have any direct effect on the habitat of the GOM.

The overall effect of other measures in this proposed action, such as those to address fishing effort (prohibition on front-loading of the DAS clock and DAS reductions) and gear modifications (gillnet net limits, and mesh changes for gillnet and trawl vessels) are largely dependent upon the responding behavior of those impacted by the change. Generally, the measures would serve to provide some degree of reduction in habitat impacts, although such reductions can be expected to be small. The remaining measures proposed in this alternative, (e.g., the recreational fishing measures) will not have an adverse effect on EFH.

As more full discussed in Section 5.3, overall, the measures proposed in this action are expected to result in a reduction in the adverse effects to any EFH associated with the fishing activities managed under the FMP as a result of the maintenance of the WGOM Area Closure and other closures and the DAS reductions. NMFS concludes that this

action will have no more than minimal adverse impacts to EFH and may even provide benefits to EFH.

3. *Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?*

The closure of what may be traditional or nearshore areas could reduce the flexibility of some fishing operations. The impact of these closures may be more severe for smaller vessels and operations, and the communities in which they operate. Closures may affect the safety of fishing operations if fishermen begin to fish farther from shore and on longer trips; and could have significant impacts on families, communities, and patterns of interaction if fishermen stay away from shore for significantly longer periods. However, restrictions in the nearshore areas of the GOM are necessary, because that is where concentrations of GOM cod, the stock in the most urgent need of protection, occur.

In addition to the area closures, the action contains a number of other measures to restrict effort in the fishery. DAS changes are expected to affect fishermen across the board, but would particularly impact–in terms of total DAS usage–those vessels that currently fish their maximum DAS allowances. Such vessels are mostly large and medium vessels and generally receive an individual DAS allocation. The Multispecies Monitoring Committee reported that a majority (90 percent) of the Individual DAS allocation holders used at least 70 percent of their allocation in 2000 (MMC, 2001). In contrast, only 42 percent of the smaller, fleet allocation holders used that percentage in 2000. Thus, many vessels, particularly smaller vessels, are not usually constrained by their total DAS allocation; that is, many of these smaller vessels do not currently use a majority of their DAS, and thus their flexibility is not viewed as sufficiently constrained to have a substantial adverse impact. See also section 5.2.1 for more information on DAS use.

Thus, while closures restrict immediate flexibility for smaller, inshore fishing vessels, those vessels are not usually constrained by their DAS allocation, and thus maintain a degree of flexibility in its use. Therefore, the overall effect of the proposed action on the fishery, including the communities in which it operates, will not impact adversely public health or safety. NMFS will consider comments received concerning safety and public health issues. See also discussion of safety at sea in Section 7.3.2, number 10.

4. *Can the proposed action be reasonably expected to have an adverse impact on endangered or threatened species, marine mammals, or critical habitat of these species?*

In the June 2001 Biological Opinion, NMFS concluded that fisheries conducted pursuant to the FMP are likely to jeopardize the continued existence of the Western North Atlantic right whale, and outlined a Reasonable and Prudent Alternative (RPA) with multiple management components that, once implemented, is expected to avoid the likelihood of jeopardizing right whales. Components include minimizing the overlap between right whales and multispecies gillnet gear, expanding gear modifications to the mid-Atlantic and Southeast, continuing gear research and monitoring the implementation and effectiveness of the RPA. On January 9, 2002, NMFS published both an interim final rule to implement gear restrictions for the anchored gillnet and lobster trap fisheries based on predictable annual concentrations of right whales (67 FR 1142) and a final rule to clarify the Agency's authority to restrict temporarily the use of lobster trap and gillnet fishing gear within defined areas to protect right whales and establish criteria for procedures for implementing a Dynamic Area Management (DAM) program in areas north of 40° N. latitude (67 FR 1133). On January 10, 2002 (67 FR 1300), NMFS published a final rule to expand gear modifications required by an earlier rule to the Mid-Atlantic and offshore lobster waters and modified Mid-Atlantic gillnet gear requirements. Since this action would not circumvent the efficacy of these actions, there is no reason to expect that the interim action would have any impacts that were not considered previously. If anything, the extension of the closures would lessen the likelihood of any impacts of the fishery on endangered or threatened species, marine mammals, or their critical habitat because of a reduction in fishing effort, closed areas, and the reduction in the number of gillnets. See also discussion on impacts on endangered and threatened species and marine mammals at Section 4.1.

5. *Can the proposed action be reasonably expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?*

This interim action is not expected to result in cumulative adverse effects on target or non-target species. This is due largely to the fact that these regulatory measures would be relatively more restrictive for vessels operating in the GOM as compared to elsewhere in the Northeast region. These restrictions may be sufficient for vessels to seek alternative fisheries. Both dogfish and monkfish were important fisheries that were available to many vessels as alternatives to reliance on groundfish. However, increased regulatory action taken independent of this action to protect those two resources limit the alternatives for groundfish vessels and should minimize cumulative adverse effects on those species. In addition to dogfish and monkfish, the Atlantic States Marine Fisheries Commission has reduced dramatically the Northern shrimp season for this year. Individuals that may want to continue to use a

GOM port as a base of operation may turn to the lobster fishery, if a license can be obtained, or try herring fishing, which is not a limited-access fishery. However, regulations have been implemented placing limits on mobile gear takes of lobster. Current regulations do not list scallop dredge gear as an exempted gear for year-round closures in the GOM, but scallop dredge gear is an exempted gear for GOM seasonal closures. Vessels that are able to move out of the GOM may attempt to switch to ports in southern New England or the Mid-Atlantic, depending on what permits a given vessel may hold or may be able to obtain. Such a redirection of effort could lead to increased fishing pressure on southern New England or Mid-Atlantic stocks.

6. *Can the proposed action be reasonably expected to jeopardize the sustainability of any non-target species?*

The proposed action is not expected to jeopardize the sustainability of any non-target species. As discussed in number 5, above, sufficient constraints exist in other fisheries to minimize the ability of groundfish vessels from redirecting into a previously non-target fishery to the extent that the shift in effort would jeopardize the sustainability of that resource.

7. *Can the proposed action be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

The proposed action is not expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.). The area affected by this action in the Northeast multispecies fishery has been identified as EFH for species managed by the Northeast Multispecies; Atlantic Sea Scallop; Atlantic Monkfish; Summer Flounder, Scup and Black Sea Bass; Squid, Atlantic Mackerel, and Butterfish; Atlantic Surf Clam and Ocean Quahog; Atlantic Bluefish; Atlantic Billfish; and Atlantic Tuna, Swordfish and Shark fishery management plans. The measures adopted in this interim action suggest a potential reduction in the adverse effects to any EFH associated with the fishing activities managed under the Northeast Multispecies FMP as a result of the maintenance of the WGOM and Cashes Ledge Area Closures and restrictions on DAS. NMFS concludes that this action will have no more than minimal adverse impacts to EFH and may even provide benefits to EFH.

8. *Are significant social or economic impacts interrelated with significant natural or physical environmental effects?*

The social and economic impacts are interrelated with natural or physical environmental effects. However, the analyses for this action concluded that neither the natural or physical environmental

effects nor the economic and social effects are significant. It is important to note that the impacts of the proposed interim action will likely vary from predicted because the model used to estimate the impacts of the management action did not include potential changes (either increases or decreases) in fishing income earned from species other than regulated groundfish that would normally be caught and sold along with groundfish. To compare with other alternatives, the No Action alternative, while it would result in increased fishing incomes relative to status quo conditions in the short term, would also result in increased fishing mortality on groundfish stocks which would violate applicable law. Alternative 3 would have significant positive impacts on the natural or physical environment, but at a much greater adverse social and economic impact, concentrated in the states of Maine, New Hampshire and Massachusetts.

9. *To what degree are the effects on the quality of human environment expected to be highly controversial?*

The measures contained in this action are expected to result in effects that are highly controversial. Given that the Council did not complete its annual FMP adjustment for 2002, there is a strong need to reduce F on key stocks of groundfish, particularly on GOM cod. Action is critical to ensure that WGOM Area Closure remains closed. This closure is a critical component of the measures needed to control F on GOM cod. In addition, this action would limit DAS available and would add new seasonal and year-round closures, as well as implement new gear restrictions. Primarily due to the new GOM area closures, these measures would have the greatest impact on those vessels that traditionally fish for groundfish in the GOM. Also, from April 5-9, 2002, Plaintiffs, Defendants and Intervenors in the Conservation law Foundation, et al., v. Evans engaged in Court-sponsored mediation to try to agree upon mutually acceptable short-term and long-term solutions to present to the Court. Although these discussions ended with no agreement, several of the parties continued mediation and filed a Settlement Agreement with the Court. This interim action implements measures specified in the Settlement Agreement, which was ordered to be implemented by the U.S. District Court for the District of Columbia in a Remedial Order issued on May 23, 2002.

The new and additional restrictions on the recreational fishery are also likely to be very controversial. The NEFSC's SAW-33 report included recreational landings for the first time in the most recent GOM cod assessment. Because recreational landings are factored into the most recent estimates of F, they must also be factored into measures to reduce F. Therefore, this action would implement addition restrictions on the recreational fishery.

Although the majority of the industry appears to support the WGOM Area Closure's extension, some fishermen may be disappointed that the closure area will not re-open this year, as scheduled, due to the desire to enter this area to fish on high densities of cod.

Factors relating to significance of an action, as specified at 40 CFR 1508.27, were also considered and determined to be consistent with a Finding of No Significant Impact.

FONSI Statement

In view of the analysis presented in this document and in the FSEIS for Amendment 7 to the FMP, it is hereby determined that the interim rule to reduce overfishing on major stocks of fish in the Northeast multispecies fishery through temporal extension of existing area closures, new area closures, new gear restrictions, DAS reductions, and additional restrictions on the recreational fishery will not significantly affect the quality of the human environment with specific reference to the criteria contained in NAO Order 216-6 implementing NEPA. Accordingly, the preparation of an SEIS for this interim action is not necessary.

Assistant Administrator for Fisheries, NOAA — Date

9.0 Agencies Consulted in Formulating the Action

National Marine Fisheries Service
New England Fishery Management Council

10.0 Preparers of Environmental Assessment

National Marine Fisheries Service
- Northeast Region, Gloucester, Massachusetts
- Northeast Fisheries Science Center, Woods Hole, Massachusetts

New England Fishery Management Council

11.0 Literature Cited

Acheson, James M. and James A. Wilson (1996) "Order out of Chaos: The Case for Parametric Fisheries Management," *American Anthropologist* 98(3): 579-94.

Aguirre International, 1996. *An Appraisal of the Social and Cultural Aspects of the Multispecies Groundfish Fishery in New England and the Mid-Atlantic Regions*, a report submitted to the National Oceanographic and Atmospheric Administration.

DeAlteris, J. and Grogan, C. 1997. An analysis of harvesting gear size selectivity for eight demersal groundfish species in the Northwest Atlantic Ocean. Fisheries Technical Report Nr. 1, University of Rhode Island.

DeAlteris, J. and Grogan, C. 1997a. An analysis of yield and spawning stock biomass per recruit for eight demersal groundfish species in the northwest Atlantic Ocean. Fisheries Technical Report Nr. 2, University of Rhode Island.

Hall-Arber, Madeleine, Chris Dyer, John Poggie, James McNally, and Renee Gagne (2001) *Fishing Communities and Fishing Dependency in the Northeast Region of the United States*. MARFIN Project Final Report to the National Marine Fisheries Service, Grant #NA87FF0547.

Halliday, R.G., C. G. Cooper, P. Fanning, W. M. Hickey, and P. Gagnon. 1999. Size selection of Atlantic cod, haddock, and pollock (saithe) by otter trawls with square and diamond mesh codends of 130-155 mm mesh size. Fish. Rex. 41:255-271.

Hutchings, J.A., T. D. Bishop, and C. R. McGregor-Shaw. 1999. Spawning behaviour of Atlantic cod, *Gadus morhua*: evidence of mate competition and mate choice in a broadcast spawner. Can. J. Fish. Aquat. Sci., 56: 97-104.

Kjesbu, O.S., P. Solemdal, P. Bratland, and M. Fonn. 1996. Variation in annual egg production in individual captive Atlantic cod (*Gadus morhua*). Can J. Fish. Aquat. Sci., 53: 610:620.

Knutsen, G. M. and S. Tisleth. 1985. Growth, development, and feeding success of Atlantic cod larvae (*Gadus morhua*) related to egg size. Trans. Am. Fish. Soc., 114:507-511.

McCay, Bonnie and Marie Cieri (2000) Fishing Ports of the Mid-Atlantic, Dover DE: Mid-Atlantic Fishery Management Council.

McGoodwin, James (1990) *Crisis in the World's Fisheries: People, Problems, and Policies*, Stanford Univ. Press.

NMFS and U.S. Fish and Wildlife Service. 1995. Status reviews for sea turtles listed under the Endangered Species Act of 1973. National Marine Fisheries Service, Silver Spring, MD, 139pp.

NMFS. 1999. Atlantic Highly Migratory Species Fishery Management Plan.

National Marine Fisheries Service (NMFS). 2001b. Draft Environmental Assessment, Incorporating a Regulatory Impact Review, for an Experimental Fishery to Allow Tuna Purse Seine Vessels to Fish in the Northeast Multispecies Closed Area I on Georges Bank.

New England Fishery Management Council (NEFMC). 1994. Amendment 5 to the Northeast Multispecies Fishery Management Plan.

New England Fishery Management Council (NEFMC). 1996. Amendment 7 to the Northeast Multispecies Fishery Management Plan.

New England Fishery Management Council. *Frameworks 25, 26, 27, 30, and 33 to the Northeast Multispecies Fishery Management Plan*.

NEFMC, 2000. Report on the Social Impacts Informational Meetings, see http://www.nefmc.org/index.htm

NEFMC, 2001. Report of the New England Fishery Management Council Multispecies Monitoring Committee (MMC) *Draft* October 29, 2001. See: http://www.nefmc.org

Northeast Fisheries Science Center (NEFSC). 1999 30th Northeast Regional Stock Assessment Workshop (30th SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. 01-05.

Northeast Fisheries Science Center (NEFSC). 2001. Report of the 33rd Northeast Regional Stock Assessment Workshop (33rd SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. *Northeast Fish. Sci. Cent. Ref. Doc.* 01-18.

O'Brien, Loretta, Jay Burnett, Ralph K. Mayo. 1993. Maturation of nineteen species of finfish off the Northeast Coast of the Untied States, 1985-1990. U. S. Department of Commerce, NOAA Technical Report NMFS 113.

O'Brien, Loretta. 1999. Factors influencing the rate of sexual maturity and the effect on spawning stock for Georges Bank and Gulf

of Maine Atlantic cod *(Gadus morhua*) stocks. J. Northw. Atl. Fish. Sci., Vol. 25: 179-203.

Olson, Julia and Patricia Clay (in press). "The (Round II) Disaster Assistance Social and Economic Survey: A Review and Orientation," NOAA Tech Memo series.

Pinhorn, A. T. and R. G. Halliday. 2001. The regulation of exploitation pattern in North Atlantic groundfish stocks. Fish. Res. 53:25-37.

Pol, Michael and W. Glenn Hovermale. 2000. A discussion of selectivity. Unpublished manuscript, Massachusetts Department of Marine Fisheries.

Pollnac, Richard B. and Littlefield, S.J., 1983. *Sociocultural Aspects of Fisheries Management.* Ocean Development and International Law Journal, 12:3-4, p. 209-246.

Trippel, E. A. and M. J. Morgan. 1994. Age-specific paternal influences on reproductive success of Atlantic cod (*Gadus morhua L.*) of the Grand Banks, Newfoundland. ICES Mar. Sci. Symp., 198:414-422.

Vallin, L. and A. Nissling. 2000. Maternal effects on egg size and egg buoyancy of Baltic cod, *Gadus morhua*: Implications for stock structure effects on recruitment. Fisheries Research 49:21-37.

Waring, G.T., J.M. Quintal, S.L. Swartz (eds). 2001. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2001. NOAA Technical Memorandum NMFS-NE-168.

(G:\fcm-j\ne\Amendment 13 ...\Interim rule - Aug 1 - Court order ...\August1-EA_June 20.wpd)