



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

**Environmental Assessment
and Regulatory Impact Review**

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Executive Summary

The Secretary of Commerce (Secretary) has determined that immediate action is necessary to reduce overfishing on major stocks of fish in the Northeast multispecies fishery while the National Marine Fisheries Service (NMFS) and the New England Fishery Management Council (Council) develop Amendment 13 to the Northeast Multispecies Fishery Management Plan (FMP). Amendment 13 will bring the FMP into full compliance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act (SFA). The Preferred alternative (Section 3.4) specified in this document consists of 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. The measures reduce overfishing and provide substantive protection for Gulf of Maine (GOM) cod, as well as several other groundfish stocks in the Northeast for the first quarter of the 2002 fishing year. A more extensive observer program to better monitor and collect information on bycatch in the multispecies fishery will also be put in place. These measures were developed as part of a Court-sponsored mediation in the case of Conservation Law Foundation, et al. v. Evans (Case No. 00CV01134, (D.D.C., December 28, 2001))

Table of Contents

1.0 Introduction [6](#)
 1.1 Background [6](#)

2.0 Purpose and Need for Action [6](#)
 2.1 Interim management [7](#)
 2.2. Need for action [7](#)

3.0 Alternatives [8](#)
 3.1 Alternative 1 (No Action) [8](#)
 3.2 Alternative 2 [13](#)
 3.3 Alternative 3 [20](#)
 3.4 Alternative 4 (Preferred) [21](#)

4.0 Affected Environment [26](#)
 4.1 Marine Mammals, Endangered Species and Other Protected Resources [27](#)
 4.1.1 Threatened and Endangered Species [27](#)
 4.1.2 Species of Concern [29](#)
 4.2 Essential Fish Habitat (EFH) [30](#)

5.0 Environmental Consequences [30](#)
 5.1 Biological Impacts [30](#)
 5.1.1. Area Closure and Effort Control Model [30](#)
 5.1.2 Sources of Uncertainty [31](#)
 5.1.2.1 Model [31](#)
 5.1.2.2 Analysis [31](#)
 5.1.3 Quantitative analysis [32](#)
 5.1.3.1 Area Closure Modeling [32](#)
 5.1.3.1.1 Alternative 1 (No Action) [32](#)
 5.1.3.1.2 Alternative 2 [32](#)
 5.1.3.1.3 Alternative 3 [33](#)
 5.1.3.1.4 Alternative 4 (Preferred) [34](#)
 5.1.3.2 Proposed Change in DAS Counting [34](#)
 5.1.3.2.1 Data [35](#)
 5.1.3.2.2 Method [35](#)
 5.1.3.2.3 Results [36](#)
 5.1.4 Qualitative Analysis [41](#)
 5.1.4.1 Prohibition on Front – Loading of DAS Clock [41](#)
 5.1.4.2 Gear Restrictions - Mesh Size Changes [44](#)
 5.1.5 Impacts on Other Regulated Groundfish [47](#)
 5.1.6 Biological Impacts of Recreational Fishing Measures [50](#)
 5.1.6.1 Data [50](#)
 5.1.6.2 Procedures and Assumptions [51](#)
 5.1.6.3 Estimated Conservation Benefits [52](#)
 5.1.7 Combined Biological Impacts [55](#)
 5.1.8 Cumulative Impacts [57](#)
 5.2 Economic Impacts [58](#)
 5.2.1 Data [59](#)

5.2.2	Procedures	60
5.2.3	Results	61
5.2.3.1	Economic Impacts of Commercial Measures	61
5.2.3.1.1	Effects by Vessel Size	62
5.2.3.1.2	Effects by Gear Groups	63
5.2.3.1.3	Effects by Gear/Vessel Size Groups	64
5.2.3.1.4	Effects by Home Port State	64
5.2.3.1.5	Effects by Port Group	67
5.2.3.1.6	Economic Effects of Mesh Changes	68
5.2.3.2	Economic Impacts of Recreational Measures	71
5.2.3.2.1	Angler Impacts	71
5.2.3.2.2	Charter/Party Impacts	71
5.2.3.3	Economic Impacts on Other Sectors	72
5.2.3.4	Impacts of Alternatives	73
5.3	Habitat Impacts	74
5.3.1	Overview of Habitat Impacts	74
5.3.2	Habitat Impacts of Management Alternatives Under Consideration	76
5.3.2.1	Alternative 1 (No-Action)	77
5.3.2.2	Alternative 2	77
5.3.2.3	Alternative 3	78
5.3.2.4	Alternative 4 (Preferred)	79
5.3.3	Habitat Experiments in the Vicinity of the WGOM Area Closure	80
5.3.4	Essential Fish Habitat Assessment	83
5.4	Evaluation of Executive Order (E.O.) 12866 Significance - Regulatory Impact Review	84
5.4.1	Direct Effects	85
5.4.2	Indirect Effects	86
5.4.3	Cumulative Impacts	87
5.4.4	Small Entity Effects	88
5.4.5	Long-Term Economic Effects	90
6.0	Social Impact Analysis	90
6.1	Background: Legislative Mandate	90
6.2	Alternative 1 (No-Action)	90
6.3	Alternative 2	91
6.3.1	Area Closures	91
6.3.2	DAS Restrictions	92
6.3.3	Gear Changes	93
6.3.4	Recreational and Charter/Party Vessel Restrictions	96
6.4	Alternative 3	96
6.5	Alternative 4 (Preferred)	98
6.5.1	Area closures	98
6.5.2	DAS Restrictions	99
6.5.3	Gear changes	99
6.5.4	Recreational and Charter/Party Vessel Restrictions	102
6.6	Comparison of Alternatives and Discussion of Impacts	102
6.7	National Standard 8	107
7.0	Other Applicable Law	110
7.1	Coastal Zone Management Act (CZMA)	110

7.2 Paperwork Reduction Act (PRA)	110
7.3 Magnuson-Stevens Act	111
7.3.1 Consistency with National Standards	111
7.3.2 Required provisions	114
8.0 Finding of No Significant Impact	114
9.0 Agencies Consulted in Formulating the Action	119
10.0 Preparers of Environmental Assessment	119
11.0 Literature Cited	120

List of Figures

Figure 1. Area closure block reference map.	9
Figure 2. GOM rolling closures under Alternative 1 (No Action).	12
Figure 3. Rolling closure areas (including WGOM and EGOM Area Closures) under Alternative 2. . .	14
Figure 4. Year-round WGOM and EGOM Area Closures under Alternative 2. Block designation numbers can be found in Figure 1.	16
Figure 5. Area Closure Under Alternative 3	21
Figure 6. Rolling Closures (including WGOM and Cashes Ledge) under Alternative 4 (Preferred)	24
Figure 7. Northeast Regulated Mesh Areas under Alternative 4 (Preferred).	25
Figure 8. Map depicting SBNMS boundary, truncated WGOM Area Closure, fiber optic cable route through SBNMS, and long-term Seafloor Habitat Recovery Monitoring stations.	82
Figure 9. NMFS Statistical Areas.	104

List of Tables

Table 3.1 Status quo trip limits for select groundfish stocks	10
Table 3.2 DAS counting scheme for Alternative 2	15
Table 3.3 Summary of changes to recreational management measures under Alternative 2	19
Table 3.4 Summary of changes to recreational management measures under Alternative 3.	21
Table 3.5 DAS counting scheme during May through July under Alternative 4 (Preferred).	22
Table 3.6. Summary of changes to recreational management measures under Alternative 4 (Preferred).	26
Table 5.1 GAMS analysis results indicating changes in catch (percent) under Alternative 1 (No Action).	32
Table 5.2 GAMS analysis results indicating changes in catch (percent) under Alternative 2	33
Table 5.3 GAMS analysis results indicating changes in catch (percent) under Alternative 3	33
Table 5.4 GAMS analysis results indicating changes in catch (percent) under Alternative 4 (Preferred).	34
Table 5.5 Summary of Fishing Year 2000 DAS Allocations and Use by Permit Category*	37
Table 5.6 Summary of FY 2000 DAS Allocations and Use by Home Port State	37
Table 5.7 Summary of FY 2000 DAS Allocations and Use by Vessel Length Class	37
Table 5.8. Summary of Changes in Fishing DAS and Clock DAS for Alternative 2 and Alternative 4 by Permit Category	39
Table 5.9. Summary of Changes in Fishing DAS and Clock DAS for Alternative 2 and Alternative 4 by Vessel Length Class	39

Table 5.10. Summary of Changes in Fishing DAS and Clock DAS for Alternative 2 and Alternative 4 by Home Port State	40
Table 5.11 - Trips in the GOM by vessels greater than 30ft 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.	43
Table 5.12 - Changes in F reference points (for GOM Cod) given varying assumptions in changes in partial recruitment patterns associated with mesh change.	47
Table 5.13 Theoretical exploitation at age for plaice. Trawl mesh selectivity from DeAlteris and Grogan (1997) using average mesh characteristics	47
Table 5.14 – Theoretical probability of selection at age for GOM haddock using trawl gear. Average mesh characteristics.	48
Table 5.15 Theoretical probability of gillnet selection at age for GOM cod. Based on average gillnet selection factors.	49
Table 5.16 Reported cod kept (number of fish) by party/charter vessels fishing in the GOM and the WGOM Area Closure.	52
Table 5.17 Best Case Reduction (Percent) in Recreational GOM Cod Mortality by Wave, Alternative 2	53
Table 5.18 Worst Case Reduction (Percent) in Recreational GOM Cod Mortality, Alternative 2.	53
Table 5.19. Intermediate case reduction (percent) in recreational GOM cod mortality, Alternative 2.	53
Table 5.20. Best case reduction (percent) in recreational GOM cod mortality, Alternative 3	53
Table 5.21 Worst case reduction (percent) in recreational GOM cod mortality, Alternative 3.	54
Table 5.22 Intermediate case reduction (percent) in recreational GOM cod mortality, Alternative 3. ..	54
Table 5.23. Best case reduction (percent) in recreational GOM cod mortality, Alternative 4	55
Table 5.24 Worst case reduction (percent) in recreational GOM cod mortality, Alternative 4.	55
Table 5.25 Intermediate case reduction (percent) in recreational GOM cod mortality, Alternative 4. ..	55
Table 5.26. Summary of Combined Biological Impacts (for both the commercial and recreational sectors) in Terms of Reductions in Catch Relative to May-October Status Quo. by Alternative.	56
Table 5.26a. Summary of Combined Biological Impacts (for the commercial sector only) in Terms of Reductions in Commercial Catch Relative to May-July Status Quo, by Alternative.	57
Table 5.27 Relative reduction in commercial fishing vessel gross revenue.	62
Table 5.28 Proportional change in May-October gross revenues by vessel size (Large = +70'; Medium = 50 to 70', Small = under 50')	62
Table 5.29 Proportional change in May-October gross revenues by gear group.	63
Table 5.30. Proportional Change in May-October gross revenues by gear group and vessel size (Large = +70'; Medium = 50 to 70', Small = under 50')	65
Table 5.31 Proportional change in May-October gross revenues by home port state	66
Table 5.32 Proportional change in gross annual revenues by port group	70
Table 5.33 Summary of Relative Difference Between Economic Effects of Regulatory Measures for Alternative 2 and Alternative 4.	89
Table 6.1. Landings* (in thousands of lb) and areal dependence for calendar years 1994-2000, under Alternative 2.	91
Table 6.2. Ports in year 2000 most affected by the proposed closed areas (p.c.a.) under	92
Table 6.3. Distribution of impacts from dependence on proposed closed areas (p.c.a.) under Alternative 2 by size* of vessel (year 2000)	92
Table 6.4. Groundfish landings from large-mesh permitted vessels, by port of landing (year 2000). ...	93
Table 6.5. Mesh size used by vessels in the GOM (year 2000).	94
Table 6.6. Mesh size use by vessels in the GOM, by port of landing* (year 2000).	94

Table 6.7. Gillnet usage in the GOM by day-trip gillnetters (FY 2000).	95
Table 6.8. Trips with greater than 50 standup gillnets by port of landing* (FY 2000).	95
Table 6.9 Charter/party boat fishing activity in the WGOM Area Closure by port of landing, 1998-2000.	96
Table 6.10. Landings (in thousands of lb) and areal dependence for calendar years 1994-2000, under Alternative 3	97
Table 6.11. Ports in year 2000 most affected by the proposed closed areas (p.c.a.) in Alternative 3 (in order of p.c.a. groundfish dependence).*	97
Table 6.12. Distribution of impacts from dependence on proposed closed areas (p.c.a.) in Alternative 3 by size* of vessel (year 2000).	98
Table 6.13. Landings* (in thousands of lb) and areal dependence for calendar years 1994-2000, under Alternative 4.	98
Table 6.14. Ports in year 2000 most affected by the proposed closed areas (p.c.a.) under Alternative 4 (in order of p.c.a. groundfish dependence).*	99
Table 6.15. Distribution of impacts from dependence on proposed closed areas (p.c.a.) under Alternative 4 (Preferred) by size* of vessel (year 2000)	99
Table 6.16. Mesh size used by vessels fishing under a multispecies DAS in the GOM (year 2000) . . .	100
Table 6.17. Mesh size use by vessels in the GOM, by port of landing* (year 2000).	100
Table 6.18. Gillnet usage by day-trip gillnetters (fishing year 2000).	101
Table 6.19. Dayboat gillnet trips with greater than 50 standup gillnets (or over minimum 6.5" mesh) by port of landing* (year 2000).	101
Table 6.20. Dayboat Gillnet Trips with greater than 100 tiedown gillnets (or over minimum 7" mesh) by port of landing* (year 2000).	101
Table 6.21. Dayboat Gillnet Trips with greater than 150 monkfish nets (or over minimum 10" mesh) by port of landing* (year 2000).	102
Table 6.22. Spatial patterns of groundfish fishing, 1995-2000.	103
Table 6.23. Fishing characteristics for groundfish, by statistical area, 1995 – 2000.*	105
Table 6.24. Comparative fishing dependence indices for the 11 sub-NRRs of New England.	107
Table 6.25. Comparison between the proposed closed areas' impacts on groundfishing.	109

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 on a lawsuit brought by the Conservation Law Foundation, Center for Marine Conservation, National Audubon Society and Natural Resources Defense Council against NMFS (Conservation Law Foundation, et al. v. Evans). The suit alleged that Framework Adjustment 33 to the FMP violated the overfishing, rebuilding and bycatch provisions of the Magnuson-Stevens Act, as amended by the SFA, and Amendment 9 to the 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. Amendment 9, however, 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 SFA because they did not include a "standardized bycatch reporting methodology" and they did not adequately justify the lack of new measures to minimize bycatch to the extent practicable.

On March 1, 2002, NMFS, at the request of the Court, proposed a remedy to bring the FMP into full compliance with the SFA, the Magnuson-Stevens Act and all other applicable law as quickly as possible. That proposed remedy would have resulted in a series of three actions over the next year and a half. Plaintiffs and the intervenors in the case also proposed remedies to the Court. From April 5-9, 2002, plaintiffs, defendants and intervenors engaged in Court-assisted mediation to try to agree upon mutually acceptable short-term and long-term solutions to present to the Court as a possible settlement. Although these discussions ended with no settlement, several of the parties continued mediation and filed with the Court a Settlement Agreement Among Certain Parties (Settlement Agreement) on April 16, 2002.

The Secretarial interim action that is the subject of this environmental assessment (EA) will put in place a suite of short-term management measures that are contained in the Settlement Agreement filed with the Court. These measures, although analyzed for a 180-day period because of the possibility of extending the measures for an additional 90-days or less, are intended and considered to reduce overfishing during the first quarter of the 2002-03 fishing season, which begins on May 1, 2002. Additional interim measures, which would be the subject of a future proposed rule, are to be implemented on August 1, 2002, at the expiration of the interim rule implementing this action. 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 Northeast 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 additional interim measures to be implemented on August 1, 2002; and the improving status of the stocks; delaying implementation of Amendment 13 to August 2003 is not expected to jeopardize the ability of the 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 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 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 be 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, particularly on GOM cod and its above-average 1998 year class, in time for the start of the new fishing year on May 1, 2002. In addition, action by that date is critical to ensure that the Western GOM (WGOM) Area Closure, set to reopen on May 1, 2002, remains closed. This closure is a critical component of the measures needed to control fishing mortality on GOM cod.

This document examines four alternatives. One 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. The second alternative is a modification of the Council's Framework 36 Alternative 5, and proposes restrictions on DAS, limitations on DAS usage, closed areas, and gear restrictions, among other measures, including more restrictive recreational measures. The third alternative is an area closure alternative and recreational restrictions that would achieve reductions

comparable to Alternative 2 in the Council's Framework 36. The Council had begun work on Framework 36 as an annual adjustment to the FMP, intended to be effective May 1, 2002. However, the Council stopped work on Framework 36 in December, 2001, in order to devote its full resources to completion of Amendment 13. The fourth alternative is based on the Settlement Agreement reached by the majority of the parties in the litigation. The analyses presented in this document examine these alternatives with regard to their environmental consequences and economic impacts. Alternatives to bring the FMP into complete compliance with SFA were rejected as an interim, short-term solution because it was determined that it is not feasible or practicable to develop, analyze, and implement such alternatives by May 1, 2002, and to still comply with all applicable law.

3.0 Alternatives

An EA must consider a range of reasonable alternatives, including the preferred action and the no action alternative. The Preferred alternative, discussed below, is part of the Settlement Agreement. In addition, NMFS analyzed two other alternatives to reduce overfishing on groundfish stocks. The reductions in F that would result from the measures in this interim action cannot be precisely measured against an annual target, because overfishing is generally quantified in terms of an annual F. However, NMFS intends to follow this action with a second Secretarial interim rule, which would establish further restrictions pending completion and implementation of Amendment 13 to the FMP.

In addition, this action includes measures for the recreational fishery. 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, they must also be considered in measures to reduce F. 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 currently in place for this fishery, as contained in 50 CFR part 648, would remain in effect. The WGOM Area Closure--implemented by Framework 25 in 1998, and extended in time by Framework 33 in 2000--would reopen as scheduled on May 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 ($1,918 \times .5 = 959$ 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.

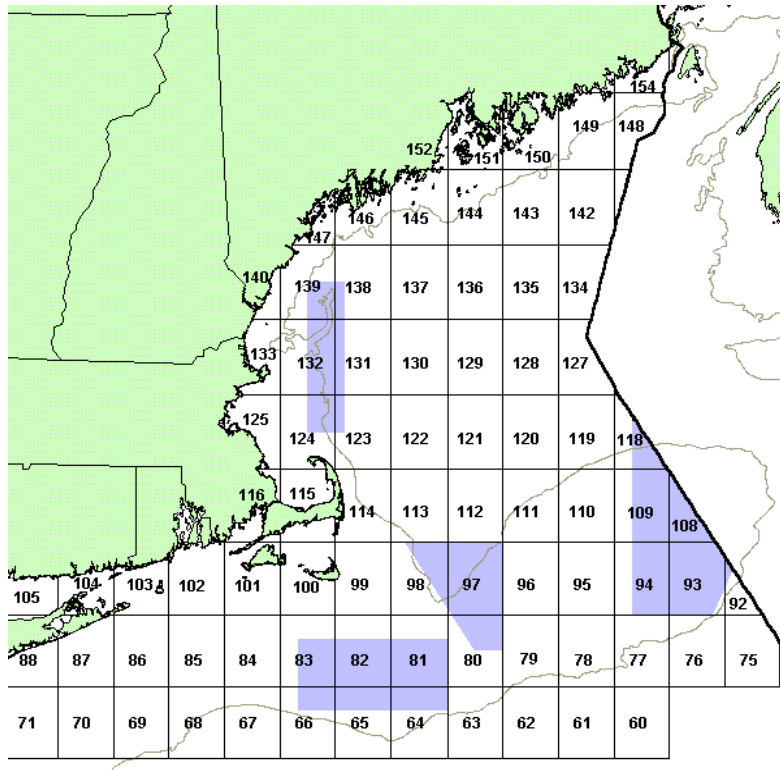


Figure 1. Area closure block reference map.

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 select 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

There would be no revisions to current DAS allocations as contained in § 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 § 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 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 multispecies DAS in the 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 (§ 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

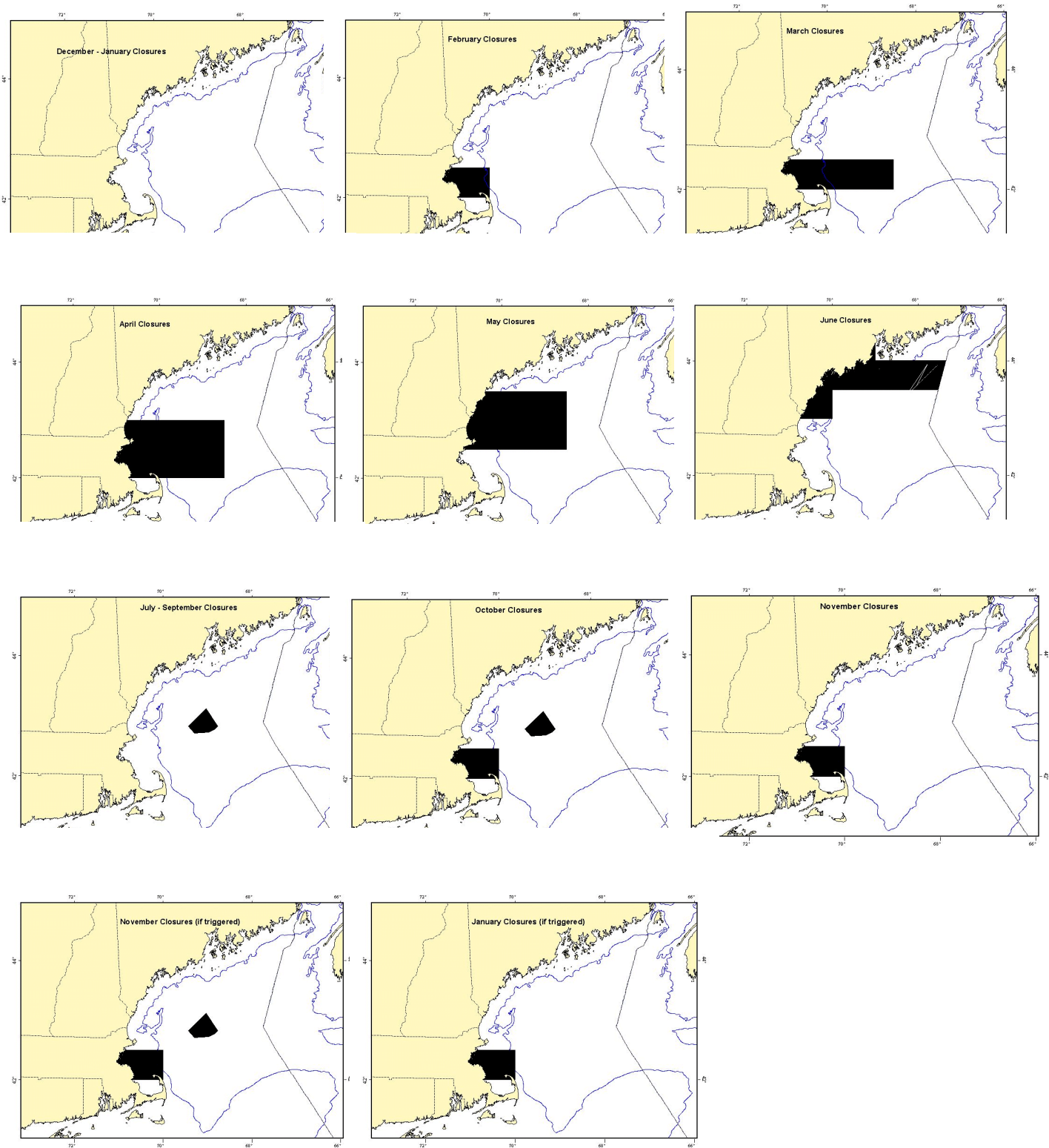


Figure 2. GOM rolling closures under Alternative 1 (No Action).

3.2 Alternative 2

This alternative would reduce overfishing and F primarily through restrictions on (as opposed to reductions in) DAS use, revised seasonal closed areas, additional year-round area closures, and gear modifications. This alternative is derived from Alternative 5 of Framework 36 to the FMP, as developed, but not acted upon, by the Council. This alternative is that proposed by the Government in its proposed remedy responding to the Court's December 28, 2001, order. However, whereas the Council's Alternative 5 was designed to implement conservation measures over 2 years, under this alternative, NMFS would accelerate the implementation of measures to achieve the full conservation benefits in 1 year, and would include additional measures to reduce F. This action would implement measures for up to 180 days, as allowed by statute, but is derived from a 1-year program to reduce overfishing. This alternative is not designed to, nor is it intended to, achieve the full reduction in GOM cod fishing mortality for the 2002 fishing year within the 180-day implementation period, but rather is an interim, short-term measure intended to allow NMFS and the Council additional time to develop comprehensive measures to bring the FMP into full compliance with the SFA and other applicable law. Following is a list of management measures that would be implemented under this alternative. All other measures that would not be changed or modified by this alternative would remain status quo, including the GOM cod 400-lb per day/4,000-lb per trip landing limit.

The following paragraphs describe the impacts of the measures under Alternative 2.

Closed areas

This alternative would expand, both temporally and spatially, the current area closures, and would implement additional seasonal and year-round area closures to ensure that areas with traditionally high catches of cod are further protected. Specifically, this alternative would continue, in its current configuration, the WGOM Area Closure beyond the scheduled May 1, 2002, re-opening. In addition to the WGOM Area Closure, and in addition to the status quo closed areas in Figure 2, this alternative would close area blocks 124 and 125 in May, and blocks 132 and 133 in June (see Figure 3). Additionally, blocks 128, 129, and 130, Eastern GOM (EGOM) Area Closure, would be closed for the duration of this action under this alternative (see Figures 3 & 4), encompassing most of the area of the Cashes Ledge Area Closure, which would be eliminated as a separate area closure. All other area closures would remain unaffected by this alternative.

All vessels would be prohibited from fishing in the monthly closed areas unless the vessel is fishing with or using exempted gear as defined in the FMP, subject to the restrictions on midwater trawl gear specified in the regulations, excluding pelagic gillnet gear capable of catching multispecies, except for vessels fishing with a single pelagic gillnet. In addition, recreational vessels would be exempt, as would scallop dredge gear when the vessel is fishing under a scallop DAS or when fishing in the Scallop Dredge Fishery Exemption Area as described in § 648.80(a)(24), provided the vessel does not retain any regulated multispecies during a trip, or on any part of a trip. In addition, vessels would be exempt from the monthly area closures when fishing in the Raised Footrope Trawl Exempted Whiting Fishery, as specified in § 648.80(a)(28).

All of the exemptions listed above would also apply to the WGOM Area Closure and to the EGOM Area Closure, with the exception of scallop dredge gear, vessels fishing in the Raised Footrope Trawl Exempted Whiting Fishery, and recreational vessels (both charter/party and private).

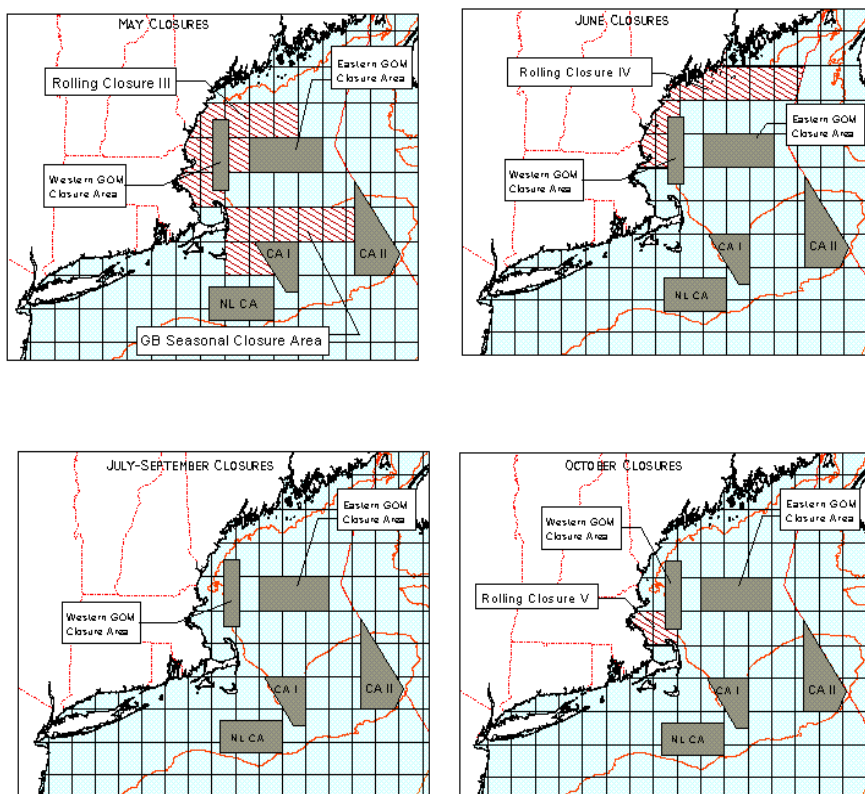


Figure 3. Rolling closure areas (including WGOM and EGOM Area Closures) under Alternative 2 .

Effort controls

Days-at-Sea

Under this alternative, all multispecies DAS trips of more than 3 hours would be counted as a minimum of 24 hours on the DAS clock, except when fishing under the more restrictive differential DAS clock (2:1) specified below. Trips of 3 hours or less would be counted as actual hours to account for bad weather, breakdowns, etc. The Day boat gillnet differential for counting multispecies DAS (see § 648.82(1)(4)(v)) would be suspended.

This alternative would divide the 180-day interim action period into two periods: May-July, and August-October. Any vessel fishing under a NE multispecies DAS during the first period (May-July) could use no more than 25 percent of its allocated DAS in that period. DAS used during that period would be counted at a 2:1 rate (differential DAS); that is, for each day called out that is >3 hours, 2 days (48 hours) would be deducted from the vessel's DAS allocation. Any vessel fishing under a multispecies DAS in the

GOM¹ during the second period (August-October) would also be subject to these measures (25 percent use restriction on allocated DAS and 2:1 differential DAS counting). Vessels would not be charged 2:1 for trips of 3 hours or less, but rather charged for actual time, to account for bad weather, breakdowns, etc. Because all vessels would be charged a minimum of 24 hours for trips of more than 3 hours, 2:1 DAS counting would work as follows: For each trip greater than 3 hours, but less than or equal to 12 hours, DAS charged to the vessel would equal 24 hours. For trips greater than 12 hours, DAS would be counted as 2:1 (e.g., a trip of 16 hours duration would be charged as 32 hours). Any vessel fishing in an area other than the GOM during the second period (August-October) would not be subject to the percentage use restriction or differential DAS counting, but would be charged 24 hours for trips greater than 3 hours up to 24 hours.

Table 3.2 DAS counting scheme for Alternative 2 .

	May through July	August through October
GOM		
DAS Counting- all vessels	2:1	
From 0 to 3 hrs	Counted as 1:1 (aborted trip allowance) ¹	
From >3 to 12 hrs	Counted as 24 hrs ²	
> 12 hrs	Counted as 2:1	
DAS use restriction	Limited to use of 25 % of annual DAS allocation	Limited to use of 25 % of annual DAS allocation
AREAS OUTSIDE OF THE GOM		
DAS Counting - all vessels	2:1	1:1
From 0 to 3 hrs	Counted as 1:1 (aborted trip allowance) ¹	1:1
From >3 to 12 hrs	Counted as 24 hrs ²	Counted as 24 hrs ³
> 12 hrs	Counted as 2:1	Counted as 24 hrs ³
DAS use restriction	Limited to use of 25 % of annual DAS allocation	No DAS use restriction within annual DAS allocation

¹From 0 to 3 hours counts as actual time, counted 1:1, under both 2:1 and 1:1 regimes.

²From >3 to 12 hours will be counted as 24 hours for all vessels under a 2:1 counting regime.

³From >3 to 24 hours will be counted as 24 hours for all vessels under a 1:1 counting regime.

These effort controls are intended to reduce effort during periods when cod landings are traditionally at their highest, for both GOM and GB cod. Under this measure, a vessel with a multispecies Fleet DAS allocation fishing in the GOM during the period May-July could use only 22 allocated multispecies DAS (88 DAS x 0.25) during that period. Since the DAS would be counted at a differential rate of 2:1, the vessel would, in fact, be allowed to fish only 11 multispecies DAS (22 DAS/2) during that period. When calling in a monkfish DAS during the effective period of the 2:1 multispecies DAS measure, DAS for Category C and D monkfish vessels (limited access monkfish vessels that also have a limited access multispecies permit) would be counted as 1:1 for monkfish and 2:1 for multispecies, so as not to unnecessarily constrain use of monkfish DAS. However, the differential DAS counting could affect the ability of monkfish vessels to utilize all of their allocated monkfish DAS.

1 As defined in § 648.86(b)(4), or when fishing south of a line beginning at the Cape Cod, MA, coastline at 42°00' N. lat. until it intersects with 69°30' N long., then northward along 69°30' W. long. until it intersects with 42°20' N. lat., then eastward along 42°20' N. lat., then eastward along 42°20' N. lat. until it intersects with 67°20' W. long. then northward along 67°20' W. long. until it intersects with the U.S.-Canada maritime boundary.

The DAS measures of this alternative are summarized in Table 3.2.

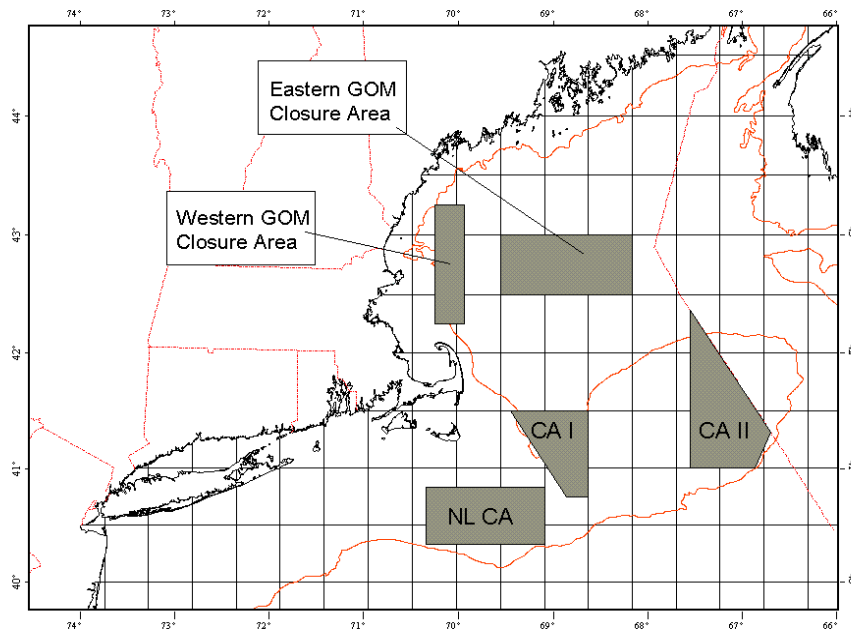


Figure 4. Year-round WGOM and EGOM Area Closures under Alternative 2. Block designation numbers can be found in Figure 1.

Prohibition on front-loading the DAS clock

Multispecies vessels are currently required to use the DAS call-in system to report the start and the end of a multispecies DAS trip. Due to a daily trip limit provision (see Table 3.2), 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 ending a DAS. Initial implementation of the GOM cod trip limit allowed vessels to catch more than the daily trip allowance, provided the vessel ran the DAS clock upon returning to port to reach the required trip limit/DAS. Recent modifications to the "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 and thus to reduce target fishing for GOM cod. However, there is no restriction on when a vessel can start its DAS 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 as many as 10 days prior to departing on a trip, essentially allowing a vessel to catch 10-days worth of GOM cod, the maximum trip limit, in 1 day of fishing. For example, a vessel may remain in port for 9 days and on the 10th day, leave port and fish for 6 hours, for example, and return to port with 4,000 lb of GOM cod. Although the vessel actually fished

for only 6 hours, its 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 cod.

In addition to the inappropriate targeting of GOM cod by those who front-load the DAS clock, the provision also creates inequities between some fishing vessels. Rather than using the DAS call-in system to track multispecies fishing effort, multispecies vessels may voluntarily use a vessel monitoring system (VMS). In addition, vessels that possess a 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 under sail to cross the demarcation line, it is impossible for these vessels to front-load the multispecies DAS clock. Vessel owners using VMS have indicated to NMFS that it is unfair that DAS call-in vessels can front-load and they cannot.

While other provisions in this alternative may discourage front-loading (specifically, the 25-percent DAS use restriction and differential DAS counting), this alternative would specifically prohibit the practice of front-loading the DAS clock. Under this provision, the vessel owner or authorized representative must notify the RA no earlier than 1 hour prior to the vessel leaving port to fish under the multispecies DAS program. A DAS begins once the call has been received and a confirmation number is given by the RA. This measure would apply in all management areas.

GOM cod trip limit modification

This alternative would maintain the 400-lb/day, 4,000-lb/trip, GOM cod trip limit, but would modify the DAS call-out requirement in the following manner: When fishing on a trip longer than 24 hours, a vessel that lands up to an additional 400 lb of cod for any part of an additional 24-hour block of DAS would be allowed to call out of the DAS program upon returning to port. The current regulations allow the vessel to retain an additional 400 lb for any part of an additional 24-hour block of DAS, provided 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. This modification would be consistent with the way that the other trip limit provisions in the multispecies regulations are specified.

Gear restrictions

Large-Mesh permit category

This measure would eliminate both Large-Mesh vessel permit categories - Large-Mesh Fleet DAS, and Large-Mesh Individual DAS. Currently, gillnet and trawl vessels choosing to use 7-inch mesh gillnets or 8-inch mesh trawl nets can select a Large-Mesh permit category with the incentive of receiving additional DAS. Industry participants have indicated that these large meshes are primarily used to target cod or monkfish. To the extent they are used to target cod, it is inappropriate to continue this category in the face of the large F reductions needed for cod stocks.

Mesh requirements

The status quo mesh size regulations when fishing under a multispecies DAS in the GOM/GB Regulated Mesh Area (RMA) require vessels to use at least 6.0-inch diamond or 6.5-inch square mesh throughout the net. This alternative would first split the GOM/GB into two separate RMAs—GOM and GB--and then

require that otter trawl vessels fishing in the GOM RMA, when fishing under a multispecies DAS, fish with a minimum mesh size of 6.5-inch diamond or 7-inch square in the codend. The status quo mesh size of 6.0-inch (15.2-cm) diamond or 6.5-inch (16.5-cm) square mesh throughout the net when fishing under a multispecies DAS remains in effect in the GB RMA. The mesh change proposed under this alternative would apply only to the codend of the net. For this measure, the codend is defined as 25 meshes for diamond mesh (50 bars, in the case of square mesh) from the terminus of the net for vessels 45 ft (13.7 m) in length and less, and 50 meshes for diamond mesh (100 bars, in the case of square mesh) from the terminus of the net for vessels greater than 45 ft (13.7-m) in length. This alternative would also require that gillnet vessels use at least 7-inch mesh when fishing on a multispecies DAS.

Under this measure, yield per recruit (YPR) should increase for most (if not all) groundfish stocks. YPR is the average expected yield in weight from a single recruit, calculated assuming that F is constant over the life span of a year class. DeAlteris and Grogan (1997) found that YPR would increase with mesh sizes larger than the current minimum mesh size requirements (6.0-inch diamond, 6.5-inch square). In addition, this measure may reduce discards, as larger mesh would capture smaller numbers of fish below the minimum size limits. The impacts of this measure also depend on the type of mesh used, as square and diamond mesh have different selection patterns for flat and round fish. The impact of this measure is more thoroughly discussed in Section 5.0.

Gillnet net restrictions

This alternative would also increase the minimum mesh size for gillnets to 7 inches and restrict Day boat gillnet vessels to using only 50 stand-up (roundfish) or 100 tie-down (flatfish) gillnets, from the currently allowed 80/160 nets, respectively, which is a 38-percent reduction. If effort remains the same, this measure is expected to reduce mortality on cod and other stocks of fish. The restriction on tie-down nets may reduce mortality in two ways. The limitation on the number of stand-up nets allowed is a nominal reduction from the current limit of 160. If vessels are using the maximum number of stand-up nets allowed, this restriction is a significant reduction and should reduce mortality on cod and other fish. The impacts of this measure cannot be explicitly quantified, however, since it is not possible to determine whether effort will increase. Tie-down nets are typically used to target flatfish rather than cod. There are some reports, and preliminary net design studies, that show tie-down nets catch less cod than stand-up nets. The results have not been fully studied, however, and there are some reports that tie-down nets may retain smaller cod because the cod are tangled rather than gilled. Generally, however, cod catch rates are expected to be lower with tie-down nets than with stand-up nets.

Monkfish vessels that have a monkfish limited access Category C or D permit (vessels that possess both a monkfish and multispecies limited access permit) and that are fishing as a Day boat gillnet vessel under a monkfish DAS will be allowed to continue to fish with 160 nets with a minimum of 10-inch mesh.

Recreational and charter/party vessel restrictions

This alternative would implement new and expanded restrictions for the recreational fishery when fishing in the GOM that would result in comparable F reductions as the measures proposed for the commercial sector. The minimum length for retention of cod by federally permitted charter/party vessels would be increased to 22 inches from the current size limit of 21 inches. In addition, charter/party vessels would be prohibited from fishing in the WGOM Area Closure.

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 an LOA issued by the RA pursuant to § 648.89(e)(1).

This LOA is valid for a period of 3 months, and prevents a vessel from fishing as a commercial entity during the time of authorization; it thus exempts the charter/party vessel from the closure. Under this Alternative 2, however, charter/party vessels would need to obtain an LOA for the full span of the interim action in order to fish as a charter/party vessel in all of the GOM area closures (with the exception of the WGOM Area Closure, from which they would be prohibited).

Private boat owners not holding a Federal permit and fishing in the EEZ would be subject to a 24-inch minimum fish size for cod. This alternative would also reduce the cod bag (possession) limit for the private recreational sector. The status quo possession limit of no more than 10 cod and/or haddock combined, would be changed to reflect a possession limit of no more than 5 cod and no more than 10 haddock per angler on board a vessel. Private recreational vessels would also be prohibited from fishing in the WGOM Area Closure.

All other status quo recreational measures would remain unchanged, including the no sale provision for both the charter/party and private recreational sector. Measures are summarized in Table 3.3.

Table 3.3 Summary of changes to recreational management measures under Alternative 2 .

	Minimum Fish Size, inches (Cod only)*	Bag Limit	WGOM Area Closure	Closure Exemption Authorization
Charter/party	22	No bag limit	Access prohibited	Duration of action
Private Recreational	24	5 cod 10 haddock	Access prohibited	N/A

* All other minimum fish sizes, as stated in Section 3.1, remain unchanged

Consistent with the recreational fishing policy adopted in Amendment 7 (NEFMC 1996), these measures provide reasonable and regulated access to the resource. In addition, they provide controls on the recreational catch so that the rebuilding program for GOM cod is not jeopardized. The increase in the minimum fish size for both recreational sectors and the five-fish possession limit for cod for the private recreational sector will reduce the number of fish retained by recreational fishery participants. The prohibition on fishing in the WGOM Area Closure will prevent the recreational fishery from fishing in that important closed area for the duration of the interim action. The WGOM Area Closure has been closed for the past several years, and continues to be closed through this interim action, for commercial vessels.

Although not a management measure, NMFS intends to expand significantly its observer coverage in the Northeast multispecies fishery to monitor and collect information on bycatch, as well as other biological and fishery related information. Observer coverage will be distributed over gear categories, vessel size categories and fishing regions, in order to provide more statistically sound estimates of directed catch, non-directed catch and discards (bycatch).

3.3 Alternative 3

This alternative would entail a large closure in the GOM for commercial vessels and additional restrictions for the recreational sector, with the objective of achieving comparable F reductions as those achieved under Alternative 2. For the commercial sector, one large GOM area would be closed to

demonstrate the extent of the closure that would be necessary in absence of other management measures. All other measures would remain status quo, as summarized in section 3.1

Closed area

This alternative would close blocks 121-125, 129-133, and 136-140, i.e., all areas west of 68°30' W. long. and south of 43°30' N lat. within the GOM (see Figure 5), for the duration of this interim action. This closure would encompass totally the western GOM, including the WGOM Area Closure. The northern portion of the GOM would be unaffected.

There were no additional measures for GB. However, some reduction in F for GB cod (on an annual basis) would occur because the dividing line between the GB and GOM stock areas is in the lower tier of blocks (121, 122, and 123) that would be closed under this alternative.

All vessels would be prohibited from fishing in the area closure unless the vessel is fishing with or using exempted gear as defined in the FMP, subject to the restrictions on midwater trawl gear specified in the regulations, excluding pelagic gillnet gear capable of catching multispecies, except for vessels fishing with a single pelagic gillnet. In addition, private recreational and charter/party vessels would be exempt, with the exception that they would be prohibited from fishing in the area within the Alternative 3 area closure known as the WGOM Area Closure.

Recreational and charter/party vessel restrictions

This alternative would implement new and expanded restrictions for the recreational fishery when fishing in the GOM that would result in a slightly lower F reduction than that achieved from restrictions on the commercial sector. The minimum length for retention of cod by private recreational vessels not holding a Federal permit and fishing in the EEZ, and federally permitted charter/party vessels, would be increased to 23 inches from the current minimum size limit of 21 inches. In addition, private recreational vessels and charter/party vessels would be prohibited from fishing in the WGOM Area Closure.

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 an LOA issued by the RA pursuant to § 648.89(e)(1). This LOA is valid for a period of 3 months, and prevents a vessel from fishing as a commercial entity during the time of authorization; it thus exempts the charter/party vessel from the closure. As with Alternative 2, under this alternative, charter/party vessels would need to obtain an LOA for the full span of the interim action in order to fish as a charter/party vessel in the GOM area closure proposed under this alternative.

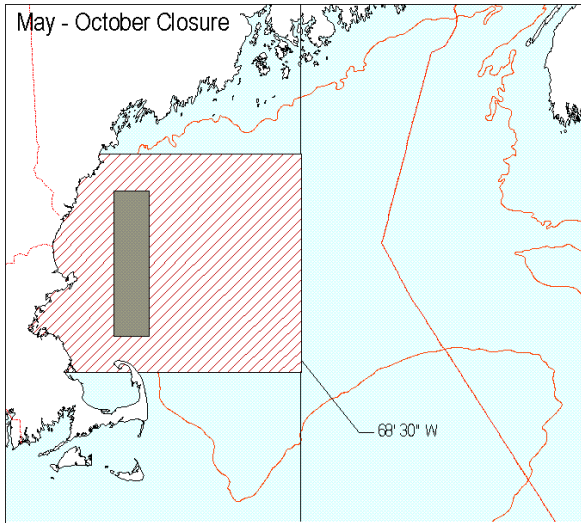


Figure 5. Area Closure Under Alternative 3 .

This alternative would also reduce the cod bag (possession) limit for both the private recreational sector and the charter/party sector. For private recreational vessels not holding a Federal permit and fishing in the EEZ, the status quo possession limit of no more than 5 cod and/or haddock combined would be changed to reflect no more than 5 cod and no more than 10 haddock for each angler onboard the vessel. For charter/party vessels, which currently are not subject to a possession limit, a possession limit of no more than 8 cod per angler would be established.

All other status quo recreational measures would remain unchanged, including the no sale provision for both the charter/party and private recreational sector. Proposed recreational measures under this alternative are summarized in Table 3.4.

Table 3.4 Summary of changes to recreational

management measures under Alternative 3.

	Minimum Fish Size, inches (Cod only)*	Bag Limit (per angler)	WGOM Area Closure	Closure Exemption Authorization
Charter/party	23	8 cod	Access prohibited	Duration of action
Private Recreational	23	5 cod 10 haddock	Access prohibited	N/A

* All other minimum fish sizes, as stated in Section 3.1, remain unchanged

Consistent with the recreational fishing policy adopted under Amendment 7 (NEFMC 1996), these measures would provide reasonable and regulated access to the resource. In addition, they would provide controls on the recreational catch so that the rebuilding program for GOM cod would not be jeopardized.

3.4 Alternative 4 (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. Existing measures that are not specifically changed or modified by this interim final rule would remain status quo, including the GOM cod 400-lb per day/4,000-lb per trip landing limit.

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. Specific management measures would also apply, depending on the area fished.

Effort Reduction Measures

DAS Counting

To make DAS usage more uniform among various sectors of the fishery, the first day of a fishing trip that lasts longer than 3 hours would be counted as a minimum of 15 hours on the DAS clock. Trips of 3 hours or less would be counted as actual time, to account for aborted trips due to bad weather, breakdowns, etc. For example, if a vessel calls in to the multispecies DAS program at 6 a.m. to begin a trip, and calls out of the DAS program at 4 p.m. that same day to end its trip, the vessel would be charged a minimum of 15 hours, rather than actual time (in this case, 10 hours). This measure currently applies only to gillnet vessels that have declared into the Day gillnet category when fishing under a multispecies DAS. This alternative would extend the measure to all gear sectors.

Limitation on DAS Use

Any vessel fishing under a multispecies DAS during May-July would be allowed to use no more than 25 percent of its annual allocated NE Multispecies DAS during that period. For example, a vessel with a NE multispecies Fleet DAS allocation fishing in the GOM RMA during May-July could use a maximum of 22 allocated multispecies DAS (88 DAS x 0.25). Because carry-over DAS are not part of a vessel's allocated DAS, carry-over DAS could not be used when determining the 25 percent DAS usage allowed for the May-July period. This effort control measure is intended to remove fishing effort from periods when landings are traditionally at their highest for both GOM and GB cod. This portion of the alternative is summarized in Table 3.5.

Although it is the intent that this action would expire on July 31, 2002, this EA analyzes limitation on DAS use (no more than 25 percent of a vessel's annual allocation) in the GOM RMA during the second quarter of the fishing year (August through October), as well, since there is the possibility that such measures may need to be extended for 90-days or less.

Table 3.5 DAS counting scheme during May through July under Alternative 4 (Preferred).

ALL AREAS	
DAS Counting--all vessels	
From 0 to 3 h	Counted as actual time
From > 3 to 15 h	Counted as 15 h
Greater than 15 h	Counted as actual time
DAS use restriction	Limited to 25 percent of annual DAS allocation

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, there is no restriction on when a vessel can start its clock. Consequently, some vessel owners start their DAS clock well in advance of the actual departure of the vessel, a practice known as "front-loading." Front-loading allows a vessel to run the clock for as many as 10 days prior to departing on a trip, essentially allowing a vessel to catch 10-days worth of GOM cod, the maximum trip limit, in 1 day of fishing. The current practice is not consistent with the intent of the GOM cod rebuilding program and makes the trip limit less effective at reducing F. In addition, the provision creates inequities between fishing vessels, since a number of vessels currently record their DAS through a vessel monitoring system (VMS), used voluntarily or, in some cases, as required by a fishery management plan for another fishery.

While other provisions of this interim action may discourage front-loading of the DAS clock (specifically, the 25-percent DAS use restriction), this measure would explicitly prohibit the practice of front-loading. Under this measure, a vessel owner or authorized representative must notify NMFS no earlier than 1 hour prior to the vessel leaving port to fish under the multispecies DAS program. A DAS begins 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 implement additional seasonal and year-round area closures to ensure that areas with traditionally high catches of cod are further protected. Specifically, this alternative would continue, in its current configuration, the closure of the WGOM Area Closure beyond the scheduled May 1, 2002, reopening date. This alternative would also expand Rolling Closure Area III by closing area blocks 124 and 125 for the month of May, and would expand Rolling Closure Area IV by closing area blocks 132 and 133 for the month of June (See Figure 6).

Additionally, the seasonal area closure known as Cashes Ledge Area Closure, in its current configuration, would be closed for the duration of this interim action. 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, as defined in § 648.81(t)(2), 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, as described in § 648.80(j)(11), 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, as specified in § 648.80(j)(15). 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.

All other closure areas would be unchanged. The WGOM and Cashes Ledge Area Closures and the additional GOM seasonal closures included under this action have been selected as times/areas with high cod landings that, when closed, will contribute to a significant reduction in cod mortality. Maps of the new and existing closure areas are available from the Regional Administrator upon request.

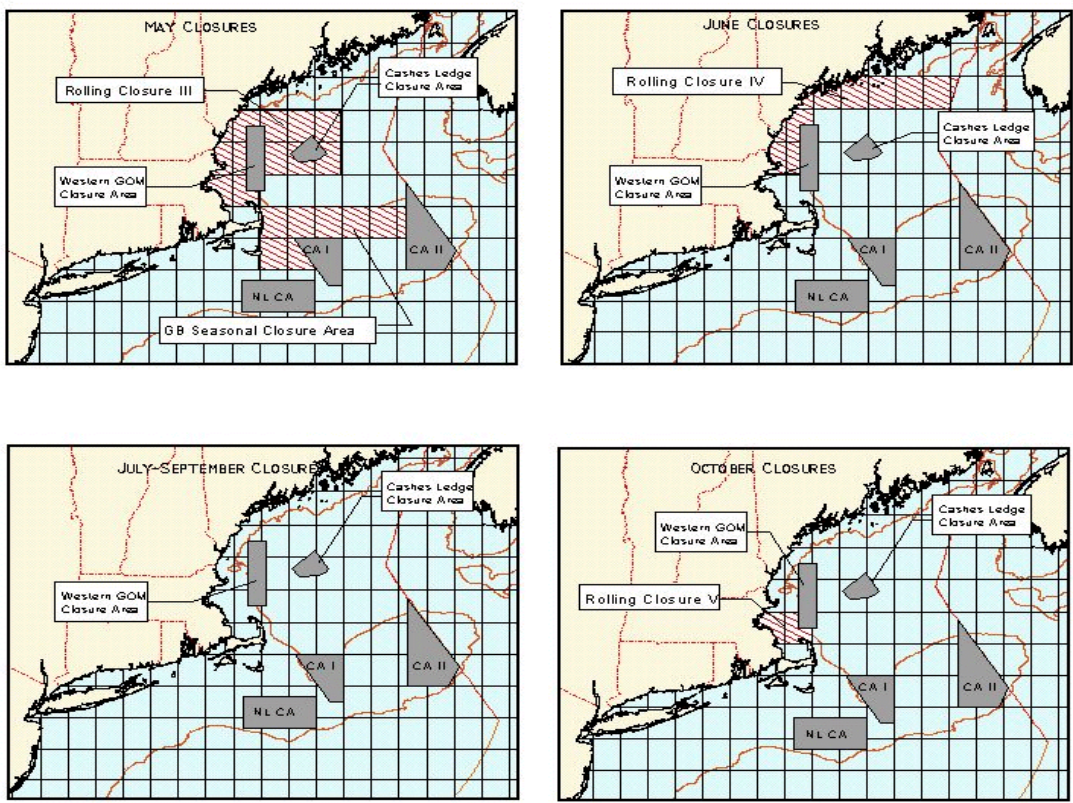


Figure 6. Rolling Closures (including WGOM and Cashes Ledge) under Alternative 4 (Preferred)

Gear Restrictions

Under this alternative, vessels using trawls (other than midwater trawls) and fishing any part of a NE multispecies DAS trip in the GOM RMA (See Figure 7) would be required to fish with a minimum 6.5-inch diamond or square mesh codend. This requirement applies only to the codend of the net; the minimum mesh-size for the remaining portion of the net is 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. The status quo minimum mesh size of 6.0-inch diamond or 6.5-inch square mesh throughout the net when fishing under a NE multispecies DAS would remain in effect in the GB RMA.

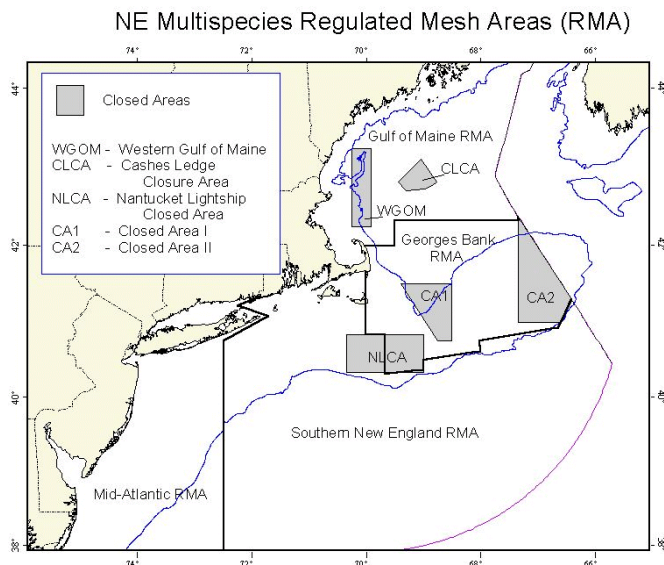


Figure 7. Northeast Regulated Mesh Areas under Alternative 4 (Preferred).

This alternative would also require that limited access NE multispecies vessels that obtain an annual designation as a Trip gillnet vessel, when fishing in the GOM RMA during any part of a trip under a NE multispecies DAS, fish with nets with a minimum of 6.5-inch mesh. NE multispecies vessels that obtain an annual designation as a Day gillnet vessel would be required to fish with nets with a minimum mesh size of 6.5 inches (16.5 cm) when fishing with roundfish gillnets, or 7 inches (17.8 cm) when fishing with flatfish gillnet gear when fishing any part of a trip under a multispecies DAS in the GOM RMA. The allowable amount of gillnet gear for Day gillnet vessels when fishing under a NE multispecies DAS would be reduced from the currently allowed 80 roundfish nets/160 flatfish nets to 50 roundfish nets/100 flatfish nets. 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 as a Day gillnet vessel under a monkfish DAS would be restricted to 150 nets (from the current 160 nets), provided the vessel fishes with nets with a minimum mesh size of 10 inches. Net reductions apply everywhere. Net tagging requirements would be suspended for the duration of this action.

Recreational and Charter/party Vessel Restrictions

Under this alternative, the minimum length for cod retained by a federally permitted charter/party vessels, and private recreational vessels not holding a Federal permit and fishing in the EEZ, would be increased to 23 inches from the current size limit of 21 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. The regulations currently prohibit a vessel fishing under the charter/party regulations from fishing in the GOM closure areas unless the vessel has on board a letter of authorization (LOA) issued by the Regional Administrator. This LOA is currently valid for a period of 3 months, and prevents a vessel from fishing under a NE multispecies DAS and selling fish during the time of authorization and thus exempts the charter/party vessel from the WGOM closure. Under this alternative, charter/party vessels would be required to obtain an LOA for the full span of this interim action in order to fish as a charter/party vessel in the GOM closure areas. LOAs issued to vessels before May 1, 2002, and that would expire prior to the expiration of this interim action, would automatically be canceled on April 30, 2002. 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 at 978-281-9370.

All other existing recreational measures would remain unchanged, including the no-sale provision for both the party/charter and private recreational sectors. Table 3.6 summarizes the party/charter and private recreational sector measures under Alternative 4.

Table 3.6. Summary of changes to recreational management measures under Alternative 4 (Preferred).

	Minimum Fish Size, Inches (cod only) ¹	Bag Limit (combined)	Closure Exemption Authorization
Charter/party	23	10 cod/haddock ²	Duration of interim action
Private Recreational	23	10 cod/haddock	N/A

¹ All other minimum fish sizes remain unchanged.

² When fishing in the GOM RMA only.

Observer Coverage

Although not a 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. Observer coverage will be distributed over gear categories, vessel size categories and fishing regions, in order to provide statistically sound estimates of directed catch, non-directed catch and discards (bycatch).

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 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 affects 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 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 Exclusive Economic Zone 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 at the 69°24' W longitude 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. 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.

Sea Turtles - While there is 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 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 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 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 as bycatch 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 multispecies fishery are considered unlikely.

- ▶ The 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 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 Northeast, this species is the subject of a Take Reduction Plan (TRP) implemented by NMFS in December 2, 1998. To reduce takes, the TRP targets multispecies gillnet, as well as monkfish, dogfish and mid-Atlantic 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 are most common in the GOM, on GB, and in the Southern New England offshore strata regions, with very few fish caught in inshore or in the Mid-Atlantic 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 in the FMP 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. A

detailed description and definition of EFH for species managed in these FMPs is contained in the NEFMC Omnibus EFH Amendment, 1998.

5.0 Environmental Consequences

5.1 Biological Impacts

The proposed measures include additional area closures and differential DAS counting. Where possible, quantitative impacts are estimated, but the General Algebraic Modeling System (GAMS), the tool used to conduct this analysis, has limited ability to quantify the impacts of some of the indirect management measures proposed in this action, such as the prohibition on front-loading or the elimination of the Large Mesh permit categories. As a result, Alternatives 2 and 4 contain a combination of quantitative and qualitative analyses.

5.1.1. Area Closure and Effort Control Model

One of the primary analytic 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 F as a result of area closures 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 year 2000 multispecies permit, and landing groundfish during the time period 1996-2000. A 5-year period was used to smooth out any peaks or valleys in the data. Data used by the model include average catch per unit effort (CPUE) by species, gear type, block and month; prices by species and month; and effort by vessel and month. Vessels are 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 cod had several different trip limit regulations during the time period. All prices were deflated to 1996 levels in order to remove the influence of inflation from the analysis. The model attempts to maximize 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 the status quo management regime. The status quo includes year-round and seasonal area closures that are already in place, the 400-lb daily trip limit, and caps effort for each vessel at their allocated DAS. Additional model runs were then made based on proposed changes in seasonal and year-round area closures, and changes in DAS under Alternatives 2, 3, & 4. The estimated catch stream from each option was then compared to the status quo catch stream, 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 the “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 assumes fishing effort moves out of a closed area into an open area 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 tonnage class of vessel. 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 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 year data. Additionally, there is variability around the estimates that is not fully captured by the model. One weakness of the GAMS model is the uncertainty about catch rates that results 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 opening an area.

As noted earlier, the percentage results should be interpreted as indicators of the relative change in exploitation between options, and not as precise predictions of the result. While changes in exploitation rate are shown for a number of stocks, only the changes in F for GOM cod and GB cod are calculated in the biological impacts discussion. The closed area model output includes information on the revenues of individual vessels, and this is used in the analysis of economic impacts of the alternatives.

5.1.2.2 Analysis

Analysis of the impacts of the proposed management alternatives 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

5.1.3.1 Area Closure Modeling

All results presented are in relation to the status quo management alternative. In order to do this, the status quo scenario was modeled for the entire year, and the catches were accumulated for the 6-month period May 1 - October 31. Each alternative was evaluated in the same manner so that all results reported in this section are in terms of relative changes limited to the first 6 months of the fishing year. Analyses showing the percent change in catch under each alternative for the period May through July only, the intent of the interim rule that would implement this action, can be found in Table 5.26a, in section 5.1.7.

5.1.3.1.1 Alternative 1 (No Action)

This alternative allows the WGOM Area Closure to re-open on May 1. This "no-action" alternative describes what would occur if no management measures other than what is currently in effect were put in place. Biological impacts are expressed in terms of changes in exploitation rate from the status quo scenario for the 6-month interim action. Under this alternative, it is expected that the exploitation rate for GOM cod would increase by 14.7 percent. Increases in exploitation would also be observed in GOM haddock, winter flounder, windowpane flounder, American plaice, witch flounder, pollock, redfish and white hake.

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

	GOM	GB	Stock Area			N/A*
			Southern New England	Cape Cod	Mid-Atlantic	
Cod	14.7	0				
Haddock	3.4	0				
Winter Flounder	8.7	0	0			
Yellowtail Flounder		0	0	0	0	
Windowpane Flounder	0.1					
American Plaice						1.8
Witch Flounder						2.3
Pollock						5
Redfish						2.3
White Hake						1.8

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

5.1.3.1.2 Alternative 2

For commercial vessels, this alternative combines additional area closures, differential DAS counting and limits on the amount of effort (DAS) vessels are allowed to use (a) in the GOM during the effective period of the interim action (May-October 2002) and (b) elsewhere during the period May-July. Additionally, DAS counting for boats fishing less than 1-day trips would be changed (see description of alternatives). This last measure is approximated by counting any effort on a trip of between 3 and 24 hours as 24 hours when the data sets for the model are constructed. The measures would result in a reduction in exploitation for both GOM cod (53.3 percent), and GB cod (27.3 percent) for those measures included in the area model (see Table 5.2). Non-modeled measures, that is, the mesh size change, gillnet gear reductions, prohibition on front-loading the DAS clock, and elimination of the Large Mesh permit categories, would provide an additional 17.6 percent reduction in exploitation for GOM cod. Note that these reductions are relative only to the duration of the interim action. Extrapolating these measures to a full fishing year results in lower estimated annual exploitation rate changes due to changes in the seasonal and spatial distribution of effort. These responses include choosing to shift effort away from the first two quarters to the latter half of the fishing year, and redirection of effort from the GOM to other stock areas. The estimated annual change in exploitation for GOM cod, and the associated F reduction, is reported in section 5.1.9.

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

	GOM	GB	Stock Area			N/A*
			Southern New England	Cape Cod	Mid-Atlantic	
Cod	-53.3	-27.3				
Haddock	-43.6	-25.3				
Winter Flounder	-41.7	-11	-19.4			
Yellowtail Flounder		-14.2	-19.1	-30.7	-16.5	
Windowpane Flounder	-73.5					
American Plaice						-27.9
Witch Flounder						-25.3
Pollock						-30.3
Redfish						-28.5
White Hake						-22

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

5.1.3.1.3 Alternative 3

For commercial vessels, this alternative would implement a large area closure in the GOM on a year-round basis. This closure would encompass area blocks 121-125, 129-133, and 136-140. This option would result in greater reduction in F for GOM cod than Alternative 2 (see Table 5.3). Exploitation on GB cod would be reduced, relative to Alternative 2, because the boundary between the two stock areas (GOM and GB) is in the southern part of blocks 121 and 122. Also, a GB cod reduction is attributed to the fact that vessels that are able to do so will likely leave the GOM and redirect fishing effort onto GB stocks.

Table 5.3 GAMS analysis results indicating changes in catch (percent) under Alternative 3 .

	GOM	GB	Stock Area			N/A*
			Southern New England	Cape Cod	Mid-Atlantic	
Cod	-73.4	-7.9				
Haddock	-42.4	-17.3				
Winter Flounder	-61.9	-1.4	0.5			
Yellowtail Flounder		-0.9	0.9	-53.4	-0.6	
Windowpane Flounder	-69.7					
American Plaice						-45
Witch Flounder						-40.4
Pollock						-42.4
Redfish						-37.3
White Hake						-21.6

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

5.1.3.1.4 Alternative 4 (Preferred)

For commercial vessels, this alternative combines additional area closures, DAS counting as a minimum of 15 hours, limits on the amount of effort (DAS) vessels are allowed to use May-July 2002 (in all areas) and August - October, 2002 (in the GOM RMA), and additional gear restrictions. Even though these measures are expected to be superseded by subsequent interim action by August 1, 2002, the impacts of

Alternative 4 were estimated for a 6-month period. An summary of the changes in catch for the May-July period of this alternative can be found in Table 5.26a, in section 5.1.7. This analysis is consistent with the usual 180-day duration for interim actions and provides for greater comparability among the alternatives. For much of this analysis, in qualitative terms, it is immaterial whether the measures are for 3 months or 6 months. Therefore, all impacts (both biological and economic impacts) reported hereafter for Alternative 4 are relative to the same May-October baseline.

The interim measures would result in a reduction in catch for both GOM cod (30.6 percent), and GB cod (15.9 percent) for those measures included in the area model (see Table 5.4).

Table 5.4 GAMS analysis results indicating changes in catch (percent) under Alternative 4 (Preferred).

	GOM	GB	Stock Area			N/A*
			Southern New England	Cape Cod	Mid-Atlantic	
Cod	-31.6	-15.9				
Haddock	-24.2	-17.4				
Winter Flounder	-26.8	-3.4	-5.6			
Yellowtail Flounder		-4.1	-5.6	-21.2	-3.5	
Windowpane Flounder	-69.2					
American Plaice						-10.2
Witch Flounder						-7.5
Pollock						-3.1
Redfish						-3.4
White Hake						-4.9

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

5.1.3.2 Proposed Change in DAS Counting

Alternatives 2 and 4 would change the manner in which DAS are counted and would impose certain constraints on DAS use on a seasonal and spatial basis. The following analysis describes how the proposed changes would affect groundfish vessels fishing on a NE multispecies DAS. For purposes of analysis, each of these two alternatives were evaluated for a time period that corresponds to the 180-day duration of an interim action. For Alternative 2, the DAS counting was modeled under the assumption that DAS would be counted as a rate of 2:1 in the first quarter in all areas and 2:1 in the second quarter for the GOM only. For all other times and areas, DAS were counted as 24 hours for all trips of greater than 3 hours. Constraints on DAS use were also imposed equal to 25 percent of DAS allocations in the first quarter for all areas and 25 percent of DAS allocations in the second quarter in the GOM (See Table 3.2 in Section 3.2). The 25-percent DAS use constraint was retained for Alternative 4, and DAS were counted as a minimum of 15 hours for all trips between 3 and 15 hours, rather than at a 2:1 differential rate (See Table 3.5 in Section 3.4).

5.1.3.2.1 Data

Data from the NMFS Northeast Region's permit application records, the DAS call-in system, and vessel trip report (VTR) records were assembled for the most recent complete fishing year (May 1, 2000, to April 30, 2001).

Call-in data were used as the official record of fishing time assigned to each multispecies fishing trip. To compare Alternatives 2 and 4, the actual trip time and adjusted time for Day gillnet vessels were retained. Since the DAS counting will vary with season and area fished under Alternative 2, it was necessary to assign a fishing location to every call-in record (31,630 records during fishing year 2000).

An iterative process was used to match call-in data to VTR records to assign area fished. In the first iteration, DAS call-in and VTR records were matched by sailing and landing date (22,385 matched records). These successful matches were removed from both the VTR and call-in data to eliminate the possibility of duplicate matches. In the second iteration, DAS call-in and VTR records were matched on sail date only (2,240 match records). In the last iteration (7,005 records), area fished was prorated based on the proportion of trips taken in each area by quarter for each vessel. For example, if 100 percent of VTR records were from GOM statistical areas during May through October, then all DAS call-in records for that vessel were assigned to the GOM. If 75 percent of trips were taken in the GOM, then 75 percent of a call-in record was assigned to the GOM and 25 percent was assigned elsewhere. In this manner, the proportions were used as weights in estimating DAS use.

The NMFS Northeast Region's permit application data were used to identify DAS allocations (including carryover DAS from fishing year 1999) for fishing year 2001. Data on permit category, vessel length and home port state were also obtained and used to summarize the estimated impacts by these variables.

5.1.3.2.2 Method

Under both alternatives, a vessel with a multispecies Fleet DAS allocation fishing under a multispecies DAS during the period May-July could use only 22 allocated multispecies DAS (88 DAS x 0.25) during that period. Under Alternative 2, the DAS used during that time would be counted at a differential rate of 2:1, as specified in Section 3.2. Thus, a vessel would, in fact, be allowed to fish only 11 multispecies DAS (22 DAS/2) during that period. When calling in a monkfish DAS during the effective period of the 2:1 multispecies DAS measure, DAS for Category C and D monkfish vessels (limited access monkfish vessels that also have a limited access multispecies permit) would be counted as 1:1 for monkfish and 2:1 for multispecies, so as not to unnecessarily constrain use of monkfish DAS. However, the differential DAS counting could affect the ability of monkfish vessels to utilize all of their allocated monkfish DAS. If a vessel used 30 DAS in quarter 1 of fishing year 2000, then that vessel would be constrained to using only 11 DAS during quarter 1 of fishing year 2002 and would have to choose when and where to fish the residual 19 DAS. For Alternative 4, DAS were counted a minimum of 15 hours for any trip greater than 3 hours and less than, or equal to, 15 hours. Trips greater than 15 hours were counted as actual time.

For purposes of analysis, it was assumed vessels that were constrained by the proposed DAS limits would choose to fish in the same stock area but would shift that effort into the next available quarter. Assuming that the example vessel fished exclusively in the GOM, the 19 DAS would be shifted to quarter 2. It was further assumed that this vessel had used 10 DAS during fishing year 2000 in quarter 2. Adding the 19 DAS carried over from quarter 1 to the observed 10 DAS in quarter 2 means that the vessel would prefer to fish a total of 29 DAS but is, once again, constrained to only 11 DAS during quarter 2, resulting in another carry-over of 18 days into quarter 3 or quarter 4 of fishing year 2002 (Note: The analysis does not account for actual DAS use beyond a 6-month duration). So far, the example vessel would have consumed 44 DAS under the Preferred alternative during the first two quarters, with a carry-over of 18 DAS into the second half of fishing year 2002. If the vessel fished 26 or fewer DAS during the second half of fishing year 2000, then the vessel's cumulative DAS use for fishing year 2002 would be no more than the vessel's actual allocation. However, if the vessel fished more than 26 DAS, then the observed

fishing time would be effectively reduced, since the vessel would not be able to continue fishing after its DAS allocation was exhausted.

The process just described was applied to each vessel's observed fishing activity in fishing year 2000 to determine how fishing time and DAS as counted on the clock would change under the provisions of Alternatives 2 and 4. Under Alternative 4, however, vessels were constrained to 22 DAS by quarter, not 11, since the 2:1 differential counting of DAS would not apply. The purpose of the analysis is not to determine how vessels will respond to the proposed measure, but rather, to determine whether vessels may be able to mitigate the effects of the proposed DAS limits and accounting by shifting effort from one time period to another. The analysis did not attempt to estimate whether, by shifting effort through the year, fishing incomes or mortality would increase or decrease.

The analysis assumes that vessels that actually use DAS would prefer to fish groundfish rather than engage in other fisheries. This assumption may not hold for vessels that fish groundfish only seasonally and participate in other fisheries a part of the year. In this case, the proposed measures may be more constraining for some vessels than estimated herein. The assumption that vessels will not switch their fishing location for a specific observed trip may have the opposite effect. During the second quarter, under Alternative 2, DAS would be counted at 2:1 in the GOM but would be counted at 1:1 elsewhere. To the extent that switching fishing locations is a viable alternative for some vessels, the assumption that they will not change fishing locations will tend to overstate the degree to which the DAS constraints and counting measures would be constraining.

5.1.3.2.3 Results

There were a total of 160,550 DAS allocated to 1,619 limited access multispecies vessels during fishing year 2000 (see Table 5.5, with summaries by vessel length and home port state provided in Tables 5.6 and 5.7, respectively). The total allocated DAS include DAS that were carried over from fishing year 1999. Of the vessels that received a DAS allocation, 65.9 percent (1,067) called-in a DAS on at least one occasion in fishing year 2000. Total used DAS (including current counting of DAS for Day-boat gillnet vessel) were 57,079 or 35.6 percent of total allocated DAS. Note that the utilization rate for vessels that actually recorded DAS was higher at 52.7 percent.

Table 5.5 Summary of Fishing Year 2000 DAS Allocations and Use by Permit Category*

Permit Category	Allocated DAS	# of Vessels that have Allocations	# of Vessels that used DAS	Used DAS	Category Utilization Rate (Percent)	Percent Utilization Rate for Vessels that Used DAS
A	18,074	137	132	15,105	83.6	86.7
B	118,186	1,221	789	37,406	31.6	49.1
D	17,930	184	97	1,917	10.7	20.2
E	2,353	46	22	1,072	45.5	64.9
F & G	4,006	31	27	1,580	39.4	45.3
Total	160,550	1,619	1,067	57,079	35.6	52.7

*Permit Category A is Individual DAS, Permit Category B is Fleet DAS, Permit Category C is Small Vessel Exemption, Permit Category D is Hook Gear, Permit Category E is Combination, and Permit Category F & G are Large-Mesh Individual and Fleet DAS, respectively.

Table 5.6 Summary of FY 2000 DAS Allocations and Use by Home Port State

Home Port State	Allocated DAS	Number of Vessels that Have Allocations	Number of Vessels that Used DAS	Used DAS	Percent Utilization Rate	Percent Utilization Rate for Vessels that Used DAS
CT	2,494	27	17	639	25.6	39.9
MA	76,247	761	545	30,797	40.4	55.0
ME	28,439	281	163	11,431	40.2	66.8
NH	8,828	89	68	4,725	53.5	68.8
NJ	10,097	104	47	1,158	11.5	25.3
NY	13,685	141	93	2,552	18.7	28.4
RI	15,873	161	105	4,470	28.2	43.0
Other	4,888	55	29	1,307	26.7	48.2

Table 5.7 Summary of FY 2000 DAS Allocations and Use by Vessel Length Class

Length Class	Allocated DAS	Number of Vessels that Have Allocations	Number of Vessels that Used DAS	Used DAS	Percent Utilization Rate	Percent Utilization Rate for Vessels that Used DAS
Large	17,616	172	127	10,067	57.1	70.9
Medium	42,271	422	330	21,524	50.9	63.7
Small	100,663	1,025	610	25,488	25.3	42.3

Alternatives 2 and 4 were both modeled using the same 25 percent DAS use restriction for the first quarter (May - July) in all areas, and for the second quarter (August - October) in the GOM. The alternatives differed in how the DAS were counted, as described in Section 5.1.3.2.2, above.

During the first 6 months of FY2000, category A permit holders used 6,665 DAS as counted under status quo methods (see Table 5.8 and Tables 5.9 and 5.10 for summaries by vessel length and home port state, respectively). Due to the combination of the DAS constraints and 2:1 counting, these vessels were able to fish a total of 4,422 DAS; a reduction of 33.7 percent in total fishing time as compared to the same time period under status quo conditions. These 4,422 DAS were counted on the DAS clock as 8,678 DAS; an increase of 30 percent. By contrast, elimination of the 2:1 counting of DAS under Alternative 4 results in an 8.4-percent reduction in fishing time for Category A permit holders and a reduction in total DAS counted against the DAS clock of over 400 DAS. This reduction is due to limitations placed on vessels on the number of DAS that could be used in the first quarter, and in the second quarter in the GOM.

Across all combinations of permit categories, vessel length class, and home port states, Alternative 4 is much less constraining in terms of DAS counted against total annual allocations and in terms of effective fishing time. In fact, it is likely that the constraints on DAS use in the first two quarters are more effective in reducing effective fishing time during the assumed 6-month duration of the action than counting DAS as a minimum of 15 hours.

Table 5.8. Summary of Changes in Fishing DAS and Clock DAS for Alternative 2 and Alternative 4 by Permit Category

Permit Category	Fishing DAS Called in May-October FY 2000	Fishing DAS Used May - October Alternative 2	Clock DAS Used May - October Alternative 2	Percent Change in Fishing DAS Used Alternative 2	Fishing DAS Used May - October Alternative 4	Clock DAS Used May - October Alternative 4	Percent Change in Fishing DAS Used Alternative 4
A	6,665	4,422	8,678	-33.7	6,107	6,125	-8.4
B	19,139	9,980	19,547	-47.9	15,094	16,114	-21.1
D	831	610	1,225	-26.7	767	850	-7.8
E	160	101	194	-36.5	132	133	-17.3
F	136	55	122	-59.4	124	124	-8.7
G	813	435	835	-46.4	689	705	-15.3

Table 5.9. Summary of Changes in Fishing DAS and Clock DAS for Alternative 2 and Alternative 4 by Vessel Length Class

Length Class	Fishing DAS Called in May-October FY 2000	Fishing DAS Used May - October Alternative 2	Clock DAS Used May - October Alternative 2	Percent Change in Fishing DAS Used	Fishing DAS Used May - October Alternative 4	Clock DAS Used May - October Alternative 4	Percent Change in Fishing DAS Used Alternative 4
Large	4,286	2,943	5,677	-31.3	3,806	3,821	-11.2
Medium	9,917	5,888	11,579	-40.6	8,557	8,853	-13.7
Small	13,541	6,772	13,345	-50.0	10,540	11,377	-22.2

Table 5.10. Summary of Changes in Fishing DAS and Clock DAS for Alternative 2 and Alternative 4 by Home Port State

Home Port State	Fishing DAS Called in May-October FY 2000	Fishing DAS Used May - October Alternative 2	Clock DAS Used May - October Alternative 2	Percent Change in Fishing DAS Used	Fishing DAS Used May - October Alternative 4	Clock DAS Used May - October Alternative 4	Percent Change in Fishing DAS Used Alternative 4
CT	249	130	356	-47.9	188	294	-24.5
MA	15,070	9,114	17,511	-39.5	12,714	13,379	-15.6
ME	5,848	2,467	5,112	-57.8	4,571	4,595	-21.8
NH	2,690	1,236	2,458	-54.0	2,019	2,132	-24.9
NJ	646	517	987	-20.0	583	643	-9.8
NY	871	662	1,296	-24.0	777	840	-10.8
RI	1,765	1,152	2,226	-34.7	1,587	1,687	-10.1
Other	604	325	655	-46.2	463	481	-23.3

5.1.4 Qualitative Analysis

5.1.4.1 Prohibition on Front – Loading of DAS Clock

Most multispecies vessels currently use the DAS call-in system to report the start and the end of a 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 ten 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, for example, and return to port with 4,000 lb of GOM cod. Although actual time fished 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 multispecies fishing effort, multispecies vessels may voluntarily use a VMS and, in some cases, are required to do so. Vessels that possess a 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 dataset. 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 5.11). 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.

To summarize, the actual biological impacts of a prohibition on front-loading the clock will be determined by behavioral shifts of fishermen. Because of an inability to precisely predict what behavioral shifts will occur, the biological impacts cannot be determined quantitatively. Therefore, a qualitative F reduction of 2 percent will be assigned to this prohibition to account for some reduction from this measure, as is expected to occur.

Table 5.11 - Trips in the GOM by vessels greater than 30ft 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	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	2	1	3	3	4	7	3	6	3	6	1	3	22	<1
>3,600-4,000	5	<1	3	<1	-	-	1	<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	1,699,464	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	1,042,026	38	152,951	35	66,907	13	49,401	12	71,367	15	36,689	10	48,730	18	24,804	13	-	-	24,108	22	-	-	1,516,983	26		

5.1.4.2 Gear Restrictions - Mesh Size Changes

Alternatives 2 and 4 include measures that would change mesh regulations in the GOM 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 Bertalanffy 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 show that changing the minimum mesh size from the current 6-inch diamond mesh to 6.5-inch or 7-inch square mesh should drastically 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 drastically 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 5.12). 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 current 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 will 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.

Table 5.12 - 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

5.1.5 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 5.13), pollock, and GOM haddock (see Table 5.14) are shown below. Selection of plaice with square mesh is roughly the same as with diamond mesh that is ½ inch smaller.

Table 5.13 Theoretical exploitation at age for plaice. Trawl mesh selectivity from DeAlteris and Grogan (1997) using average mesh characteristics.

Age/Length	Theoretical Plaice Probability of Mesh Selection at Age			
	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
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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 suggest 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 5.14).

Table 5.14 – 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 “Gaussian.” 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 5.15. 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 one 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 5.15 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 Bertalanffy growth parameters; annual variation likely to result in different lengths at age during any given year.

5.1.6 Biological Impacts of Recreational Fishing Measures

Alternatives to the recreational fishing measures include changes in current size and bag limits, as well as introduction of new measures, such as a prohibition on fishing in the WGOM Area Closure for both

charter/party vessels and for private boat anglers, and a year-round enrollment program for charter/party operators. Specifically, the following recreational measures were considered:

Alternative 2 -

- A minimum cod size of 24" for private recreational anglers and 22" for charter/party vessels
- A 5-fish bag limit for cod for private recreational anglers
- A prohibition on fishing for all recreational modes inside the WGOM Area Closure
- A year-round enrollment program for charter/party vessels

Alternative 3 -

- A minimum cod size of 23" for private recreational anglers and charter/party vessels
- A 5-fish per person bag limit for cod for private boat anglers and an 8-fish per person bag limit for charter/party anglers
- A prohibition on fishing for all recreational modes inside the WGOM Area Closure
- A year-round enrollment program for charter/party vessels

Alternative 4 (Preferred) -

- A minimum 23" size for Atlantic cod for all modes and all areas
- No change in the private boat bag limit of 10 fish (cod and haddock combined)
- Bag limit of 10 fish (combined cod and haddock) for party/charter mode in the GOM
- Enrollment program for charter/party vessels for the duration of this interim action

For comparative purposes, each of these alternatives was analyzed for a 6-month time period. The effects that these measures may have on recreational cod fishing mortality are described below.

5.1.6.1 Data

To evaluate the potential benefit of a minimum fish size change, the Marine Recreational Fishery Statistics Survey (MRFSS) intercept data were used to construct size and catch per angler distributions of cod mortality (Type A plus B1 catch), by 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 (approximately 40 percent of private boat fishing mortality 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. In addition, the analysis of biological impacts conducted here is limited to GOM cod, since the data are not available to conduct bag and size limit analysis for GB cod. Haddock is not included, but this is less of an issue since haddock still represents a minority share in recreational catch as compared to cod.

5.1.6.2 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 landed, with adjustments made for conformance rates and discard mortality. The former adjustment was based on the observed non-conformance rate (10 percent for charter/party and 40 percent for private boat/shore anglers), while the latter was evaluated using a sensitivity analysis ranging from 0 to 50-percent discard mortality.

A prohibition on charter/party and private recreational fishing in the WGOM Area Closure was included in the analysis by first determining the available information on the location of recreational fishing activity so that the amount of activity in the WGOM Area Closure could be determined. The WGOM Area Closure is approximately 20 miles from shore, and therefore was assumed to be outside the range of the majority of private recreational anglers. Therefore, the conservation effect of the prohibition is most likely to be attributable to its impact on charter/party anglers.

VTRs for the period 1996 through 2000 were examined to determine if charter/party catches of cod came from inside the WGOM Area Closure. The percentage of cod kept that came from the WGOM Area Closure was calculated by comparing the numbers of cod kept from inside the closed area to the numbers of cod that were reported kept from the entire GOM (see Table 5.16). Charter/party cod kept from the WGOM Area Closure is a significant part of total GOM cod kept. While there appears to be a significant decline in the percentage that came from this area in 2000, this decline may be due to problems with the data or a result of an exemption program implemented in that year. Other than fishing year 2000, approximately 50 percent of GOM cod landed by charter/party vessels were harvested from within the WGOM Area Closure. Assuming the charter/party effort cannot be displaced, then an upper bound estimate of the conservation benefit of a prohibition on fishing inside the WGOM Area Closure would be 50 percent.

The effectiveness of a year-round 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 total GOM cod catch. In fishing year 2000, 23 charter/party vessels accounted for 80 percent of GOM cod catch. Of these 23 vessels, 12 have no limited access 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 year-round 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. In this manner, the impact of a closed season for Atlantic cod was included by assuming that any observed catch during the closed season would no longer be caught. In this manner, the

effectiveness of a closed season was assumed to not be diminished by non-compliance with size or bag limits or by discard mortality. Note that the proposed closed season does not include the full 2-month period corresponding to Wave 2 (March and April). The relative split between these 2 months was assumed to be 40 percent in March and 60 percent in April.

Table 5.16 Reported cod kept (number of fish) by party/charter vessels fishing in the GOM and the WGOM Area Closure.

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
GOM	1996		15	497	13,706	25,785	22,607	22,160	21,457	12,804	8,004	936	293	128,264
	1997	20		301	11,370	19,963	14,411	14,075	14,524	8,903	5,043	896	4	89,510
	1998			84	10,238	14,491	15,736	16,346	9,607	8,172	3,374	1,046		79,094
	1999			40	7,390	17,023	13,982	15,305	13,180	10,450	5,985	1,260		84,615
	2000		201	387	7,281	17,178	18,696	15,887	15,543	14,895	6,303	1,463		97,834
WGOM Area Closure	1996			91	7,194	12,906	10,661	10,769	9,797	5,946	5,125	275	293	63,057
	1997			301	8,611	12,934	7,402	7,542	9,441	5,558	3,610	754		56,153
	1998			84	6,737	7,147	8,366	9,539	4,427	2,276	1,661	461		40,698
	1999				4,806	7,816	6,271	7,534	6,462	5,237	3,053	399		41,578
	2000				621	3,516	5,334	4,683	5,268	3,437	1,466	2		24,327
Percentage of WGOM Area Closure Catch v. Total	1996	0	0	0.1	5.6	10.1	8.3	8.4	7.6	4.6	4.0	0.2	0.2	49.2
	1997	0	0.0	0.3	9.6	14.4	8.3	8.4	10.5	6.2	4.0	0.8	0	62.7
	1998	0.0	0.0	0.1	8.5	9	10.6	12.1	5.6	2.9	2.1	0.6	0	51.5
	1999	0	0	0	5.7	9.2	7.4	8.9	7.6	6.2	3.6	0.5	0.0	49.1
	2000	0	0.0	0	0.6	3.6	5.5	4.8	5.4	3.5	1.5	0	0	24.9

Source: Vessel Trip Reports (VTR)

5.1.6.3 Estimated Conservation Benefits

Given the assumptions detailed above, three scenarios were constructed incorporating best, worst, and intermediate levels for each assumption.

Alternative 2

Best Case - Maximum conservation benefit would be achieved if all state and Federal regulations were consistent, compliance with all regulations were 100 percent, discard mortality were zero, and charter/party vessels were unable to redirect effort to areas outside the WGOM Area Closure (estimated to be 50 percent of charter/party harvest). Under these assumptions, the recreational catch would be reduced by 66.7 percent over the duration of the interim action (see Table 5.17).

Table 5.17 Best Case Reduction (Percent) in Recreational GOM Cod Mortality by Wave, Alternative 2

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-57.6	-55.9	-60.7
Private Boat	-81.6	-65.7	-70.5

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 (40 percent private boat and 10 percent charter/party), discard mortality is high (50 percent), and charter/party vessels were able to

redirect most of their effort (90 percent). Under these assumptions, recreational mortality would be reduced by 17.6 percent (see Table 5.18). The relative share of recreational catch reduction was estimated to be similar across recreational fishing modes from May to October.

Table 5.18 Worst Case Reduction (Percent) in Recreational GOM Cod Mortality, Alternative 2.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-15.0	-13.2	-15.6
Private Boat	-28.0	-14.9	-15.5

Intermediate Case - An intermediate scenario was developed with the following assumptions: 1) Discard mortality rate is 25 percent; and 2) non-compliance is improved in the private boat mode (to 10 percent) and in the charter/party mode (to 5 percent). Charter/party effort displacement from the WGOM Area Closure was kept at 90 percent. Under these assumptions the reduction in exploitation for the 6-month period May to October would be 38.3 percent (see Table 5.19).

Table 5.19. Intermediate case reduction (percent) in recreational GOM cod mortality, Alternative 2.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-19.7	-17.5	-23.7
Private Boat	-59.1	-44.4	-47.6

Alternative 3

Best Case - Maximum conservation benefit would be achieved if all state and Federal regulations were consistent, compliance with all regulations were 100 percent, discard mortality were zero, and charter/party vessels were unable to redirect effort to areas outside the WGOM Area Closure (estimated to be 50 percent of charter/party harvest). Under these assumptions, the reduction in mortality for the 6-month period May to October would be 57.4 percent (see Table 5.20).

Table 5.20. Best case reduction (percent) in recreational GOM cod mortality, Alternative 3.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-56.1	-32.1	-42.4
Private Boat	-63.7	-62.5	-65.3

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 (40 percent private boat and 10 percent charter/party), discard mortality is high (50 percent), and charter/party vessels are able to redirect most of their effort (90 percent). Under these assumptions, the reduction in exploitation for the 6-month period May to October would be 23.2 percent (see Table 5.21). The relative share of recreational catch reduction was estimated to be greater for party/charter anglers as compared to private boat anglers. This difference is primarily attributable to the differences in observed compliance rates between these two modes.

Table 5.21 Worst case reduction (percent) in recreational GOM cod mortality, Alternative 3.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-32.7	-23	-27.2
Private Boat	-19.1	-18.8	-19.6

Intermediate Case - An intermediate scenario was developed with the following assumptions: (1) Discard mortality rate is 25 percent; and (2) non-compliance is improved in the private boat mode (to 10 percent) and in the charter/party mode (to 5 percent). Charter/party effort displacement from the WGOM Area Closure was kept at 90 percent. Under these assumptions, the reduction in exploitation for the 6-month period May to October would be 43.0 percent (see Table 5.22).

Table 5.22 Intermediate case reduction (percent) in recreational GOM cod mortality, Alternative 3.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-46.0	-30.6	-37.2
Private Boat	-43.0	-42.2	-44.1

Alternative 4 (Preferred)

Unlike Alternatives 2 and 3, Alternative 4 would not prohibit fishing inside the WGOM Area Closure for private boats or for enrolled charter/party vessels. 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 the interim action, as well. For this reason, conservation benefits for this Alternative were attributable 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 mortality for the 6-month period May to October would be 43.8 percent (see Table 5.23).

Table 5.23. Best case reduction (percent) in recreational GOM cod mortality, Alternative 4.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-50.1	-30.8	-39.0
Private Boat	-45.3	-39.3	-48.9

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 (40 percent private boat and 10 percent charter/party), and discard mortality is high (50 percent). Under these assumptions, the reduction in exploitation for the 6-month period May to October would be 15.7 percent (see Table 5.24). The relative share of recreational catch reduction was estimated to be greater for party/charter anglers as compared to private boat anglers. This difference is primarily attributable to the differences in observed compliance rates between these two modes.

Table 5.24 Worst case reduction (percent) in recreational GOM cod mortality, Alternative 4.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-22.5	-13.9	-17.6
Private Boat	-13.6	-11.8	-14.7

Intermediate Case - An intermediate scenario was developed with the following assumptions: (1) Discard mortality rate is 25 percent; and (2) non-compliance is improved in the private boat mode (to 10 percent) and in the charter/party mode (to 5 percent). Under these assumptions, the reduction in exploitation for the 6-month period May to October would be 30.2 percent (see Table 5.25).

Table 5.25 Intermediate case reduction (percent) in recreational GOM cod mortality, Alternative 4.

	- Wave 3 - May-Jun	- Wave 4 - July-Aug	- Wave 5 - Sep-Oct
Party/Charter	-35.7	-22.0	-27.8
Private Boat	-30.6	-26.5	-33.0

5.1.7 Combined Biological Impacts

6-Month Analysis

The estimated biological impacts for commercial measures reported in Table 5.2 were based on the relative change in exploitation for the duration of the interim action as compared to the first half of the status quo fishing year. Similarly, the biological impacts of the recreational measures were also developed relative to the first half of the fishing year. This section reports the combined impacts of the recreational and commercial measures. Also, the biological impacts across alternatives are compared for all stocks. Note that the commercial and recreational measures were combined by alternative (i.e. recreational Alternative 2 was combined with commercial Alternative 2, and so on).

The reported biological impacts are based on combining the recreational and commercial catch reductions for GOM cod as they were estimated using the MRFSS data and with the area closure (GAMS) model (see Table 5.26). 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, and gillnet reductions) will provide additional protections beyond those summarized here.

Table 5.26. Summary of Combined Biological Impacts (for both the commercial and recreational sectors) in Terms of Reductions in Catch Relative to May-October Status Quo. by Alternative.

Species/Stock	Alternative 1	Alternative 2	Alternative 3	Alternative 4
GOM Cod	14.7	-49.7	-65.8	-31.3
GB Cod	0.0	-27.3	-7.9	-15.9
GB Haddock	0.0	-25.3	-17.3	-17.4
GOM Haddock	3.4	-43.6	-42.4	-24.2
GB Yellowtail	0.0	-14.2	-0.9	-4.1
SNE Yellowtail	0.0	-19.1	0.9	-5.6
Cape Cod Yellowtail	0.0	-30.7	-53.4	-21.0

Mid-Atlantic Yellowtail	0.0	-16.5	-0.6	-3.5
American Plaice	1.8	-27.9	-45.2	-10.2
Witch Flounder	2.3	-25.3	-40.4	-7.5
SNE Winter Fl.	0.0	-19.4	0.5	-3.4
GOM/GB Winter Fl.	8.7	-52.7	-62.3	-30.2
Redfish	2.3	-28.5	-37.3	-3.4
White Hake	1.8	-22.0	-21.6	-4.9
Pollock	5.0	-30.3	-42.4	-3.1
N. Windowpane	0.1	-73.5	-69.7	-69.2

Across all alternatives, Alternative 3 affords greatest protection to stocks that are predominately in the GOM and affords relatively little protection to GB or SNE stocks. By contrast, Alternative 1 provides no conservation benefit, and allows for increased catches of GOM stocks; cod in particular. Alternatives 2 and 4 both provide some level of protection to all stocks, with Alternative 2 being the more conservative of the two.

In addition to the catch reductions shown in Table 5.26, additional restrictions that were not included in the analytical model (including mesh size increase, gillnet gear reduction, and front-loading prohibition), would contribute to additional reductions in catch. The amount of this reduction, however, cannot be quantified.

3-Month Analysis

The combined biological impacts for commercial and recreational measures, reported above, detail impacts for a 6-month (180-day) period, from May through October, 2002, relative to the first 6-months of the status quo. The combined biological impacts for the 3-month (90-day) effective period of this action, from May through July, 2002, are discussed here, relative to a 3-month status quo (see Table 5.26a). Note that these impacts do not include recreational impacts because the data from which the recreational catch reductions were estimated are based on a 2-month wave and cannot be converted into a 3-month time period.

Under any alternative other than Alternative 1 (No Action), the measures for the first 3 months of the fishing year are the most stringent. For this reason, the biological impacts for the first quarter of the fishing year are larger than that of the cumulative effects over a longer time period. That is, to some extent, reductions in effort in the first quarter can be partially offset by increases in effort in later quarters. In general, the biological impacts are greatest for GOM stocks under Alternative 3, due to the large area closures in the GOM, but the biological impacts stocks in other areas are minimal.

Alternatives 2 and 4 share the same rolling closures and the same restriction in DAS use, but differences in the way in which DAS are counted. With DAS counted at a higher rate under Alternative 2, relatively more vessels have to reduce fishing effort during the first quarter as compared to Alternative 4. Therefore, the biological impacts of Alternative 2 are greater than that of Alternative 4 for the May - July time period.

Table 5.26a. Summary of Combined Biological Impacts (for the commercial sector only) in Terms of Reductions in Commercial Catch Relative to May-July Status Quo, by Alternative.

Species/Stock	Alternative 1	Alternative 2	Alternative 3	Alternative 4
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GOM Cod	8.1	-63.2	-82.4	-46.4
GB Cod	0.0	-48.4	-28.3	-29.2
GB Haddock	0.0	-60.4	-45.7	-46.0
GOM Haddock	1.4	-67.1	-63.6	-56.6
GB Yellowtail	1.2	-32.2	0.0	-5.7
SNE Yellowtail	0.0	-28.7	-2.2	-5.9
Cape Cod Yellowtail	0.0	-54.9	-82.5	-39.8
Mid-Atlantic Yellowtail	0.0	-23.0	0.0	-4.6
American Plaice	4.0	-40.1	-43.3	-16.1
Witch Flounder	3.9	-37.4	-40.9	-11.0
SNE Winter Fl.	0.0	-30.7	-2.2	-5.5
GOM/GB Winter Fl.	9.1	-59.0	-64.5	-45.6
Redfish	2.6	-36.2	-34.7	-2.5
White Hake	0.0	-30.2	-15.7	-4.9
Pollock	1.5	-33.5	-32.3	-2.9
N. Windowpane	2.9	-88.5	-83.7	-84.1

In addition to the catch reductions shown in Table 5.26a, additional restrictions that were not included in the analytical model (including mesh size increase, gillnet gear reduction, and front-loading prohibition), would contribute to additional reductions in catch. The amount of this reduction, however, cannot be quantified.

5.1.8 Cumulative Impacts

Although the measures in this EA are for the fishing year 2002, the interim action for these fisheries could have potential cumulative impacts. The extent of any cumulative impacts from measures established in previous years is largely dependent on how effective those measures were in meeting their intended objectives and the extent to which mitigating measures compensated where objectives were not met. Alternative 2 puts in place further harvest restrictions that would, in effect, compensate for not meeting the objectives in previous years. The impacts of the proposed action (adverse versus beneficial), would provide some positive cumulative effect on rebuilding of cod stocks versus the no action alternative.

The Multispecies Monitoring Committee annually meets to develop the target TACs (see section 3.0) for the upcoming fishing year, and to develop options for the Council consideration on any changes, adjustments, or additions to DAS allocations, closed areas, or on other measures 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 assess regularly the status of the fisheries and to make necessary adjustments to ensure that there is a reasonable expectation of meeting the objectives and targets associated with the FMP. Rebuilding of some stocks under the FMP began in 1996, with Amendment 7 to the FMP. 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. Combined biological impacts for this action are summarized in section 5.1.7 of this EA.

Exceeding a target TAC in a given year is expected to have two impacts. First, an overage of the target TAC in one year should have the cumulative effect of reducing the target TAC in subsequent years. That

is, the over-harvest results in increased restrictions in the following year. Increased harvests in one year are thus “paid back” by decreased harvest opportunities the next year. The decreased harvest opportunities impact fishery participants by decreasing potential revenues for the fishing year in which the target TAC has been reduced. Economic impacts are discussed in section 5.2, and the cumulative impacts are discussed in 5.4.3 of this EA.

The second possible result of exceeding a TAC is that the objectives of the FMP will not be met, and/or that rebuilding will be delayed. The significance of rebuilding delays depends on the magnitude of the excess, and its resultant impact on the stock size and age structure. These impacts could readily be calculated if one knew the fixed amount by which the TAC were going to be exceeded. Similarly, if one knew the distribution of possible outcomes of the management action, where "outcome" is the amount by which the TAC would be exceeded, then one could perform the same calculations using this distribution. However, direct quantification is not feasible the distribution of likely outcomes is poorly known. That is, since it is not possible to quantify the effects of exceeding a TAC precisely, the distribution of possible outcomes of the EA is difficult to estimate.

5.2 Economic Impacts

The following discussion provides an analysis of anticipated economic impacts associated with this interim action, which would have approximately a 6-month duration. It is anticipated that these short-term measures will be replaced with longer-term measures that would be similar to that of this interim action. Thus, economic impacts similar in their magnitude and distributive impacts may be expected to continue to be felt beyond the 6-month duration of the interim action.

Quantitative analysis of the biological effectiveness of the proposed alternatives was accomplished primarily by using an area closure model described in section 5.0. 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 Northeast 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-long 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.

5.2.1 Data

Data for this analysis included landings data from the VTR, price data from dealer records, and NMFS Northeast Regional Office permit data. The permit data for fishing year 2000 were queried to obtain

homeport state and vessel length for all vessels that were included in the area closure model². 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 the states of Connecticut or Delaware. Total trip value was estimated by applying monthly average price, by species, to each trip record.

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. For example, assuming that dogfish 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. Note that 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 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 status quo is constructed by imposing a set of constraints on

²Even 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.

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 status quo.

Given that the area closure model produces a relative measure of change, and that the status quo is dependent on the specified constraints, there is no direct mapping between the modeled status quo and landings data tabulated from either dealer or VTR records. However, in concept, the area closure status quo 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 status quo 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 for the months of May to October.

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. Second, this change was then applied to baseline (i.e., the 1998-2000 average) groundfish revenues to estimate expected groundfish revenue under that option. Third, assuming revenues from other species would not be affected, the estimated groundfish revenue was added to revenues from all other species to calculate a new level of total fishing income. Last, the estimated total income was then 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 status quo 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 these revenues would remain unchanged will tend to 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 no change 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. Note also that 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.

5.2.3 Results

5.2.3.1 Economic Impacts of Commercial Measures

Taking no action (Alternative 1) would leave all current management measures in place, and result in fishing inside the WGOM Area Closure. This change would increase commercial fishing opportunities for vessels that have ready access to the area. This option would not affect the majority of the 1,024 vessels included in the economic analysis, but would provide an increase of 2.1 percent at the 90th percentile (see Table 5.19). The relative increase in May-October fishing revenues would be more than 2.1 percent for all vessels above the 90th percentile.

By contrast, implementing Alternative 2 would result in an estimated loss in May-October fishing revenues of 15.5 percent or greater for all vessels at or below the 25th percentile. Gross revenue for the median vessel would also be reduced, but would decline by less than 1 percent. Ten percent of vessels (102 vessels) would lose 31.0 percent or more of May-October gross income.

Alternative 3 would have greater impacts on vessels that fish predominantly in the GOM than Alternative 2, but would have less impact on vessels that either do not fish at all in the GOM, or that are able to redirect effort to GB or Southern New England. Specifically, the median vessel would be unaffected by Alternative 3, while vessels at or below the 25th percentile would experience a loss in May-October fishing income of 32.5 percent or greater (see Table 5.19).

Alternative 4 would affect fewer vessels than Alternatives 2 or 3, and would also have less impact. At the 10th percentile, estimated loss in gross income would be 20.9 percent, three times lower than that of Alternative 3 and about one-third lower than that of Alternative 2. Similarly, the estimated income losses at the 25th percentile would also be much lower than that of Alternatives 2 or 3.

Table 5.27 Relative reduction in commercial fishing vessel gross revenue.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
10th Percentile	0.0	-31.0	-66.4	-20.9
25th Percentile	0.0	-15.5	-32.5	-4.0
50th Percentile	0.0	-0.4	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	2.1	0.0	0.0	0.0

5.2.3.1.1 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 (4.3 percent at the 90th percentile) than medium vessels (1.3 percent at the 90th percentile), and medium vessels would benefit relatively more than large vessels (see Table 5.28). These results indicate that the WGOM Area Closure is more important as a source of fishing revenues for vessels less than 50 feet than it is for larger vessels.

Under Alternative 2, median May-October fishing revenue would be unchanged for large and small trawlers, but would be reduced by 1.1 percent for medium trawlers (see Table 5.28). The differential impacts would be more stark among vessel size classes at the 10th and 25th percentiles. Specifically, at the 25th percentile, revenues losses for small vessels (19.7 percent) would be more than twice as great as for

large vessels (8.0 percent), and more than twice as great at the 10th percentile (37.1 percent and 17.4 percent for small and large vessels, respectively).

Table 5.28 Proportional change in May-October gross revenues by vessel size (Large = +70'; Medium = 50 to 70', Small = under 50')

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Large (n=208)				
10th Percentile	0.0	-17.4	-19.8	-2.7
25th Percentile	0.0	-8.0	0.0	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0
Medium (n=280)				
10th Percentile	0.0	-26.3	-52.8	-12.2
25th Percentile	0.0	-14.8	-19.5	-1.4
50th Percentile	0.0	-1.1	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	1.3	0.0	0.0	0.0
Small (n=536)				
10th Percentile	0.0	-37.1	-76.9	-29.1
25th Percentile	0.0	-19.7	-47.2	-11.9
50th Percentile	0.0	0.0	-4.7	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	4.3	0.0	0.0	0.0

As was the case for Alternative 2, large vessels would be less impacted by Alternative 3 than either medium or small vessels. Further, the impact on large vessels would be less than, or equivalent to, the impacts of Alternative 2 at all percentiles except the 10th (see Table 5.28). This result is a consequence of the ability of large vessels to seek alternative fishing opportunities outside the GOM. By contrast, small and medium vessels that fish predominantly in the GOM have less ability to fish elsewhere, so the impacts of Alternative 3 would be greater than that of Alternative 2.

The impacts of Alternative 4 would be greatest for small vessels as compared to either medium or large ones. Overall, the estimated changes in gross revenue for medium and large vessels would be much lower than that of Alternatives 2 and 3 at comparable percentiles. Similarly, the Alternative 4 impacts would be lower for small vessels but the difference between the Alternative 2 and 4 impacts would be much less than that for larger vessels. This difference reflects the relatively greater importance of the May-July season (that also contains closures of blocks 124 and 125 in May and blocks 132 and 133 in June) to fishing incomes for small as compared to larger vessels.

5.2.3.1.2 Effects by Gear Groups

Among the gear groups, gillnet gear would benefit most from Alternative 1 (No Action), as revenues would increase 1.6 percent at the 75th percentile and 11.2 percent at the 90th percentile (see Table 5.29). These results indicate that the WGOM Area Closure is more important for fishing revenue for gillnet gear, as compared to other gear types.

Table 5.29 Proportional change in May-October gross revenues by gear group.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Gillnet Gear (n= 227)				
10th Percentile	0.0	-34.8	-71.9	-18.1
25th Percentile	0.0	-17.5	-38.8	-5.4
50th Percentile	0.0	-2.4	-9.6	0.0
75th Percentile	1.6	0.0	0.0	0.0
90th Percentile	11.2	0	0.0	0.0
Hook Gear (n=117)				
10th Percentile	0.0	-9.9	-46.4	-8.9
25th Percentile	0.0	0.0	-0.4	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0
Trawl Gear (n=680)				
10th Percentile	0.0	-31.2	-65.9	-23.1
25th Percentile	0.0	-16.9	-34.5	-4.7
50th Percentile	0.0	-1.3	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.7	0.0	0.0	0.0

Under Alternative 2, the relative distribution of estimated May-October fishing income losses would be similar for gillnet and trawl gear, but would be less severe for hook gear. At the 10th percentile, gillnet losses were estimated to be 34.8 percent and for trawl gear 31.2 percent. At the 25th percentile, estimated trawl gear impacts were 16.9 percent and gillnet gear 17.5 percent. Similarly, revenues for gillnet gear were estimated to be reduced by 2.4 percent for the median gillnet vessel and 1.3 percent for trawl gear. Across gear groups, Alternative 3 would tend to have relatively greatest impact on gillnet gear as compared to either trawl or hook gear, and would have least impact on hook gear. Across all gear groups the estimated impacts of Alternative 4 were lower at all percentiles, where income changes were negative although the impacts on hook gear were similar at the 10th percentile. At the 10th percentile, trawl vessels would be impacted 23.1 percent, gillnet gear 18.1 percent, and hook gear 8.9 percent.

5.2.3.1.3 Effects by Gear/Vessel Size Groups

Alternative 1 (No Action) would have the greatest positive impact on small gillnet vessels. Opening the WGOM Area Closure would result in an estimated 13.2-percent increase in May-October gross revenues

at the 90th percentile (see Table 5.30). This means that the remaining 10 percent of small gillnet vessels would experience an even greater increase in gross fishing income.

Under Alternative 2, small trawl vessels would experience the greatest adverse impact, with 25 percent of all vessels losing nearly 30 percent of gross fishing revenue (see Table 5.30). Further, 10 percent of all small trawl vessels would lose at least 42.3 percent of all May-October fishing income. Among the remaining sectors, the relative distribution of revenue losses were similar for small gillnet and medium trawl vessels. Hook vessels and large trawl vessels were estimated to have generally lower revenue losses as compared to all other gear/vessel size groupings.

Alternative 3 would have greater adverse economic effects for all vessel size/gear grouping at the 10th percentile relative to Alternative 2, with small gillnet and small trawl vessels experiencing revenue losses of 73.3 percent and 79.8 percent, respectively. These vessels are highly dependent on GOM species for fishing income and were not predicted to be able to adapt to the large area closures as readily as larger vessels.

The estimated impacts of Alternative 4 were lower compared to either Alternatives 2 or 3 across all gear and vessel size grouping. However, as noted above, the hook gear impacts were nearly identical to that of Alternative 2. Further, while lower, the impacts on small trawl vessels were similar in magnitude to those of Alternative 2.

5.2.3.1.4 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 multispecies permit applications. Among these GOM border states, New Hampshire vessels would benefit most (5.4 percent at the 90th percentile), followed by Massachusetts (4.5 percent) and Maine (2.8 percent) (see Table 5.31).

Although Alternative 2 contains comparatively more restrictive measures to address GOM stocks, the 25-percent cap on DAS use and 2:1 differential DAS counting from May to July may affect fishing activity throughout the Northeast region. For this reason, the impacts of Alternative 2 would be comparatively more broadly distributed across all states than the impacts of Alternative 3. Considering all states, the relative distribution of impacts would be greatest for New Hampshire vessels, with 50 percent of all New Hampshire vessels having an estimated loss in gross fishing income of 21.4 percent or greater. One-quarter of all New Hampshire vessels would lose at least one-third of vessel income, and 10 percent of vessels would lose 43.6 percent of May-October fishing income. The estimated adverse impacts on Maine and Massachusetts vessels were comparatively lower than they were for New Hampshire vessels, but they would be significant just the same, especially considering the fact that there are twice as many Maine vessels than New Hampshire vessels, and Massachusetts vessels outnumber New Hampshire vessels by more than 8:1. Thus, while New Hampshire vessels fare relatively worse than Maine and Massachusetts vessels, the overall impact on the state of New Hampshire is likely to be less than that on Maine and Massachusetts. Across all of these states, 84 vessels had an estimated loss in May-October income of at least 30 percent or greater.

For most states, Alternative 4 would mitigate most of the economic impact as compared to either Alternatives 2 or 3. However, the expected reduction in fishing income is still largest in New Hampshire and Massachusetts. Further, at least to the 25th percentile, the economic impacts of Alternative 4 are quite similar to that of Alternative 2. The similarity in impact is likely due to importance and disproportionate

impact of the May and June rolling closures on Massachusetts and New Hampshire vessels. These impacts would also be felt most by small vessels, and small trawl vessels in particular.

Table 5.30. Proportional Change in May-October gross revenues by gear group and vessel size (Large = +70'; Medium = 50 to 70', Small = under 50').

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Medium Gillnet (n=29)				
25th Percentile	0.0	-20.7	-38.8	-3.7
50th Percentile	0.0	-1.7	-10.1	0.0
75th Percentile	0.0	0.0	0.0	0.0
Small Gillnet (n=197)				
10th Percentile	0.0	-33.8	-73.3	-18.2
25th Percentile	0.0	-17.2	-38.7	-5.4
50th Percentile	0.0	-2.4	-9.5	0.0
75th Percentile	2.1	0.0	0.0	0.0
90th Percentile	13.2	0	0.0	0.0
Hook Gear (n=117)				
10th Percentile	0.0	-8.3	-46.4	-8.9
25th Percentile	0.0	0.0	-0.4	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0
Large Trawl (n=205)				
10th Percentile	0.0	-17.4	-19.8	-2.7
25th Percentile	0.0	-8	0.0	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0	0.0	0.0
Medium Trawl (n=243)				
10th Percentile	0.0	-25.5	-54.5	-12.3
25th Percentile	0.0	-14.8	-19.1	-1.2
50th Percentile	0.0	-1.4	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	1.0	0.0	0.0	0.0
Small Trawl (n=232)				
10th Percentile	0.0	-42.3	-79.8	-38.6
25th Percentile	0.0	-29.6	-60.2	-23.1

50th Percentile	0.0	-2.8	-21.2	-0.7
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.9	0.0	0.0	0.0

Table 5.31 Proportional change in May-October gross revenues by home port state.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Massachusetts (n=537)				
10th Percentile	0.0	-32.4	-78.1	-27.8
25th Percentile	0.0	-17.4	-41.0	-12.3
50th Percentile	0.0	-3.1	-2.7	-0.2
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	4.5	0.0	0.0	0.0
Maine (n=133)				
10th Percentile	0.0	-38.0	-66.8	-8.1
25th Percentile	0.0	-22.7	-50.6	-0.6
50th Percentile	0.0	-4.0	-22.6	0.0
75th Percentile	0.0	0.0	-1.0	0.0
90th Percentile	2.8	0.0	0.0	0.0
New Hampshire (n=64)				
10th Percentile	0.0	-43.6	-76.4	-40.8
25th Percentile	0.0	-34.0	-65.6	-24.9
50th Percentile	0.0	-21.4	-44.0	-4.4
75th Percentile	1.6	-0.5	-24.3	0.0
90th Percentile	5.4	0.0	0.0	0.0
New Jersey (n=49)				
10th Percentile	0.0	-2.9	0.0	0.0
25th Percentile	0.0	0.0	0.0	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0
New York/Connecticut (117)				
10th Percentile	0.0	-5.4	0.0	-0.3
25th Percentile	0.0	0.0	0.0	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0
All Other (n=40)				
10th Percentile	0.0	-16.8	-3.1	-1.1
25th Percentile	0.0	-1.6	0.0	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0

Rhode Island (n=84)				
10th Percentile	0.0	-12.6	0.0	-3.5
25th Percentile	0.0	-5	0.0	0.0
50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	0.0	0.0	0.0	0.0
90th Percentile	0.0	0.0	0.0	0.0

Alternative 3 relies on expanded area closures in the GOM to reduce fishing mortality on GOM cod and would not implement the DAS constraints under Alternative 2. For this reason, vessels that have a home port in states that do not border the GOM (Rhode Island, Connecticut, New York) would not be affected by Alternative 3 relative to the status quo. For the GOM states (Maine, New Hampshire, Massachusetts), the economic effects are greater at the 25th and 10th percentiles of the distribution of revenue changes than under Alternative 2 and 4, but are less adverse for at the median (50th percentile) level for Massachusetts vessels and for vessels at or above the 75th percentile in Maine. By contrast, New Hampshire vessels would be more adversely affected at all percentiles (except the 90th) than they would be under Alternative 2 and 4. Proportional changes in gross revenue for vessels homported in all GOM states, particularly Maine, would be less under all percentiles under Alternative 4 versus Alternative 2.

5.2.3.1.5 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 at the 75th percentile (see Table 5.32).

Alternative 2 would have the greatest adverse effect on vessels from the New Hampshire Seacoast port group with 50 percent of vessels from this area losing at least 23.9 percent of their May- October fishing income. The relative distribution of adverse effects were similar for the port groups of Gloucester, Provincetown, Upper Mid-Coast Maine, and Portsmouth with estimated losses in fishing business income that exceeded 25.2 percent for 25 percent of all vessels in each port group. However, since Gloucester has a larger number of affected vessels, the total effect on the port of Gloucester as a whole may be greater than the effects on these other ports. Among the remaining port groups, the distribution of adverse economic effects were similar for both Portland and South Shore Massachusetts, while the port groups of Point Judith, Chatham, Eastern Long Island, Boston, and New Bedford were least affected.

For Alternative 3, the adverse economic effects of the alternative were greatest in the New Hampshire Seacoast port group although the revenue losses in the port of Gloucester were the largest among all ports at the 25th percentile (78 percent). This means that approximately 30 Gloucester vessels would lose 78 percent or more of their May-October fishing income. The adverse effects of Alternative 3 were greater than those of Alternative 2 in all of the port groups bordering the GOM.

As noted above, the Alternative 4 impacts were less severe across all port groups as compared to either Alternatives 2 or 3. However, these impacts are notably similar to that of Alternative 2 for the port groups of Gloucester and for the New Hampshire seacoast. These results further reinforce the unique importance of the May and June closures to vessels with home ports in these specific areas.

5.2.3.1.6 Economic Effects of Mesh Changes

Alternative 2 would require replacement of the codend for all vessels fishing with trawl gear in the GOM, and would require replacement of all gillnets fished in the GOM with conforming mesh. 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. Similarly, the total amount of gillnet gear that would have to be replaced is also not known. However, 443 distinct vessels fished with otter trawl gear in the GOM during fishing year 2000 (see Table 6.5 in Section 6.3.3). Of these, 15 used mesh 7 inches or greater, 91 used mesh between 6.5 and 7 inches, 309 used mesh less than 6.5-inches, and 28 vessels did not report mesh size on their logbook. Based on these data, only 15 vessels would not be affected, since they already are fishing with conforming mesh, and at least 309 vessels would be affected since they did not report using conforming mesh any time during fishing year 2000. The relative mix of diamond mesh or square mesh for the remaining vessels is not known. Assuming that the median cost to replace a codend is \$1,250, the total cost to the trawl gear sector would range from a minimum of \$386,000 (based on 309 vessels) to a maximum of \$535,000 (based on 428 vessels).

The cost to replace gillnet gear is much more difficult to estimate, since gillnet vessels may have a variety of mesh sizes that are typically used to target different species. Logbook data provide some indication of the number of vessels that may fish with different mesh sizes but cannot be used to determine the total amount of gear used by the sector as a whole. During fishing year 2000, 89 vessels used gillnet gear in excess of 7 inches in the GOM, while 107 vessels used gillnet gear less than 7 inches (see Table 6.5). Note that these vessel estimates are not mutually exclusive, so the number of affected vessels cannot be determined with any degree of certainty. Given the inability to either estimate the number of vessels or affected gear, no estimate of the total cost to replace gillnet gear was attempted.

Compared to trip gillnet vessels, the replacement costs for day boat gillnets may be mitigated somewhat by the proposed limits on numbers of stand-up and tie-down nets. Any such cost savings may be more than offset by reductions in production for these vessels. Therefore, the combined effect of the mesh change and the limits on numbers of nets may disproportionately disadvantage day boat gillnet vessels.

Table 5.32 Proportional change in gross annual revenues by port group.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4.		Alt. 1	Alt. 2	Alt. 3	Alt. 4.
Boston (n=19)	0.0	-10.8	-19.8	-2.8	Portland (n=54)				
25th Percentile	0.0	-4.4	-10.9	0.0	25th Percentile	0.0	-18.6	-56.2	0.0
50th Percentile	0.0	0.0	0.0	0.0	50th Percentile	0.0	-9.9	-29.9	0.0
75th Percentile					75th Percentile	1.5	0.0	-9.5	0.0
Chatham/Harwich (n=56)					Portsmouth (n=33)				
25th Percentile	0.0	-11.7	0.0	0.0	25th Percentile	0.0	-29.4	-52.8	-10.2
50th Percentile	0.0	0.0	0.0	0.0	50th Percentile	0.0	-14.8	-37.7	0.0
75th Percentile	0.0	0.0	0.0	0.0	75th Percentile	1.6	0	-8.5	0.0
E. Long Island (n=47)					Provincetown (n=21)				
25th Percentile	0.0	0.0	0.0	0.0	25th Percentile	0.0	-25.2	-59.6	-12.2
50th Percentile	0.0	0.0	0.0	0.0	50th Percentile	0.0	-14.8	-46.0	-7.0
75th Percentile	0.0	0.0	0.0	0.0	75th Percentile	0.0	-2.7	-21.3	-0.9
Gloucester (n=119)					S. Shore Massachusetts (n=56)				
25th Percentile	0.0	-25.4	-78.0	-21.2	25th Percentile	0.0	-21.2	-48.6	-22.8
50th Percentile	0.0	-10.2	-36.0	-5.2	50th Percentile	0.0	-2.0	-10.8	-5.0
75th Percentile	4.5	-0.4	-9.7	0.0	75th Percentile	0.3	0.0	0.0	0.0
New Bedford (n=105)					Upper Mid-Coast Maine (n=21)				
25th Percentile	0.0	-11.9	0.0	-0.7	25th Percentile	0.0	-27.1	-30.9	-0.4
50th Percentile	0.0	-1.1	0.0	0.0	50th Percentile	0.0	-9.5	-22.6	0.0
75th Percentile	0.0	0.0	0.0	0.0	75th Percentile	0.0	0.0	-2.8	0.0
NH Seacoast (n=34)					Other (n=405)				
25th Percentile	0.0	-40.3	-73.4	-35.8	25th Percentile	0.0	-8.1	-17.3	-0.8
50th Percentile	0.0	-23.9	-52.0	-17.8	50th Percentile	0.0	0.0	0.0	0.0
75th Percentile	2.1	-11	-39.5	-2.7	75th Percentile	0.0	0.0	0.0	0.0
Point Judith (n=54)									
25th Percentile	0.0	-3.8	0.0	0.0					
50th Percentile	0.0	0.0	0.0	0.0					
75th Percentile	0.0	0.0	0.0	0.0					

5.2.3.2 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, bag limit, closed season, and the prohibition on recreational fishing in the WGOM Area Closure would affect all recreational anglers. The year-round exemption letter would have a direct affect on charter/party operators.

5.2.3.2.1 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 increased size limit, and area closures may be expected to substantially reduce keep opportunities for anglers that target cod and would, therefore, result in a correspondingly large reduction in recreational fishing value. This reduced value may be partially offset by substitution of alternative target species, such as haddock, 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 GOM cod 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.

5.2.3.2.2 Charter/Party Impacts

Charter/party operators would be directly affected by 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 (except the WGOM Area Closure under

Alternatives 2 and 3). 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.

Both Alternatives 3 and 4 would introduce a bag limit on charter/party anglers. 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.

5.2.3.3 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.

5.2.3.4 Impacts of Alternatives

Since this is an interim action lasting only about 6 months, and there is a lack of data on most of the fish marketing chain, it is difficult to predict the likely impacts on processors, wholesalers and dealers. However, the likely ordering of alternatives in qualitative terms, from least to greatest impact is possible.

Alternative 1 (No Action)

This option would allow the WGOM Area Closure to open on May 1, 2002, and would leave all other measures the same. This alternative would likely have a positive impact on dealers, wholesalers and processors because more product would be available due to an approximately 15-percent increase in exploitation (see Table 5.1), which corresponds to a similar increase in catch. There would be less need to source product from the West Coast and Canada, which could lead to a reduction in processing costs.

Alternative 2

This option would likely have a negative impact on dealers, wholesalers and processors compared to Alternative 1. Results show a decline in exploitation (and catch) (see Table 5.2) for all groundfish species, which translates into less product being available. This would increase the need to import fresh fish into the region from other parts of the country and from Canada. Costs for processors would likely increase under this alternative.

Alternative 3

This option would likely have a negative impact on dealers, wholesalers and processors compared to the Alternative 1. The infrastructure north of Boston through Maine would likely be severely impacted because the majority of the fishing grounds in the GOM would be closed. Infrastructure from central Massachusetts south through Rhode Island would likely be better off than under the Alternative 2 because most of the fishing grounds in this geographic area would remain open. Under the Alternative 2, there would be less product flow because of fishing restrictions that are currently in place region-wide.

Alternative 4 (Preferred)

This option would also likely have a negative impact on dealers, wholesalers and processors compared to Alternative 1. However, the impact on fresh fish supplies would be less compared to Alternatives 2 or 3. The infrastructure north of Boston through Maine would likely be relatively more impacted than elsewhere but the impacts may be limited because the impacts on Maine vessels were predicted to be much lower than those of Alternatives 2 or 3. Infrastructure from central Massachusetts south through Rhode Island would likely be better off than under Alternative 2 because most of the fishing grounds in this geographic area would remain open.

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.

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.” 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 four alternatives (including no action) 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. 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 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

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 (i.e., EGOM 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 EGOM Area Closure would represent an approximately 50-percent 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.

The prohibition on front-loading of the DAS clock would deal primarily with DAS accounting procedures and offers no real change in the allocation of DAS to any vessel. 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 includes measures to restrict DAS use. Specifically, during each quarter (May-July and Aug-Oct), a vessel fishing for groundfish in the GOM may use no more than 25 percent of its allocated DAS; and DAS used during those quarters will be counted at a differential rate (2:1). During May-July, a vessel fishing for groundfish in areas other than GOM will also be restricted to using no more than 25 percent of its allocated DAS, and those DAS will be counted at a 2:1 rate. This measure may have the effect of reducing DAS use overall, if vessels continue to fish at current levels of effort during this time. If vessels choose to not fish during this time, then they will not face any decrease in their available DAS. Also, vessels that currently use less than their full allocation of DAS may be able to continue to fish at current effort levels, even with the differential DAS counting. Direct DAS 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). Overall, the differential DAS counting mechanism will have indirect benefits to EFH.

This alternative includes a measure to limit Day boat gillnet vessels to 50 stand-up and 100 tie-down gillnets. 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.

Overall, the measures proposed in this alternative are expected to result in a reduction in the potential adverse effects to any EFH associated with the fishing activities managed under the FMP.

5.3.2.3 Alternative 3

This alternative would close a large portion of the GOM, specifically statistical block areas 121-125, 129-133 and 136-140, i.e., all areas west of 68°30' W. long. and south of 43°30' N. lat. within the GOM (see Figure 5). This area would be closed for the duration of this interim action and would remain closed through implementation of a follow-up Secretarial amendment, until such time that the Council changed this measure. The reductions in fishing mortality associated with this alternative would all be derived from this closure. Only vessels fishing gear that is currently allowed in the WGOM Area Closure would be allowed to fish in the extensive closure.

Similar to protections afforded by the WGOM Area Closure, the area closure under Alternative 3 would provide significant incidental benefits and protections for EFH in the GOM (as discussed in section 5.5.2.2), since it would encompass the entire area of the WGOM Area Closure and close extensive additional area as well.

5.3.2.4 Alternative 4 (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 currently 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 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 contained under this alternative. 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.

The prohibition on front-loading of the DAS clock would deal primarily with DAS accounting procedures and offers no real change in the allocation of DAS to any vessel. 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. 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 includes measures to restrict DAS use. Specifically, in May-July a vessel fishing for groundfish may use no more than 25 percent of its allocated DAS, and in August-October, a vessel fishing for groundfish in the GOM would also be restricted to the 25 percent DAS usage provision. This measure may have the effect of reducing DAS use. DAS restrictions that result in overall reductions of fishing effort may result in indirect benefits to EFH.

This alternative includes a measure to limit Day boat gillnet vessels to 50 stand-up and 100 tie-down gillnets. 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.

Overall, the measures proposed in this alternative are expected to result in a benefit to EFH by maintaining the WGOM Area Closure 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 8). 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.

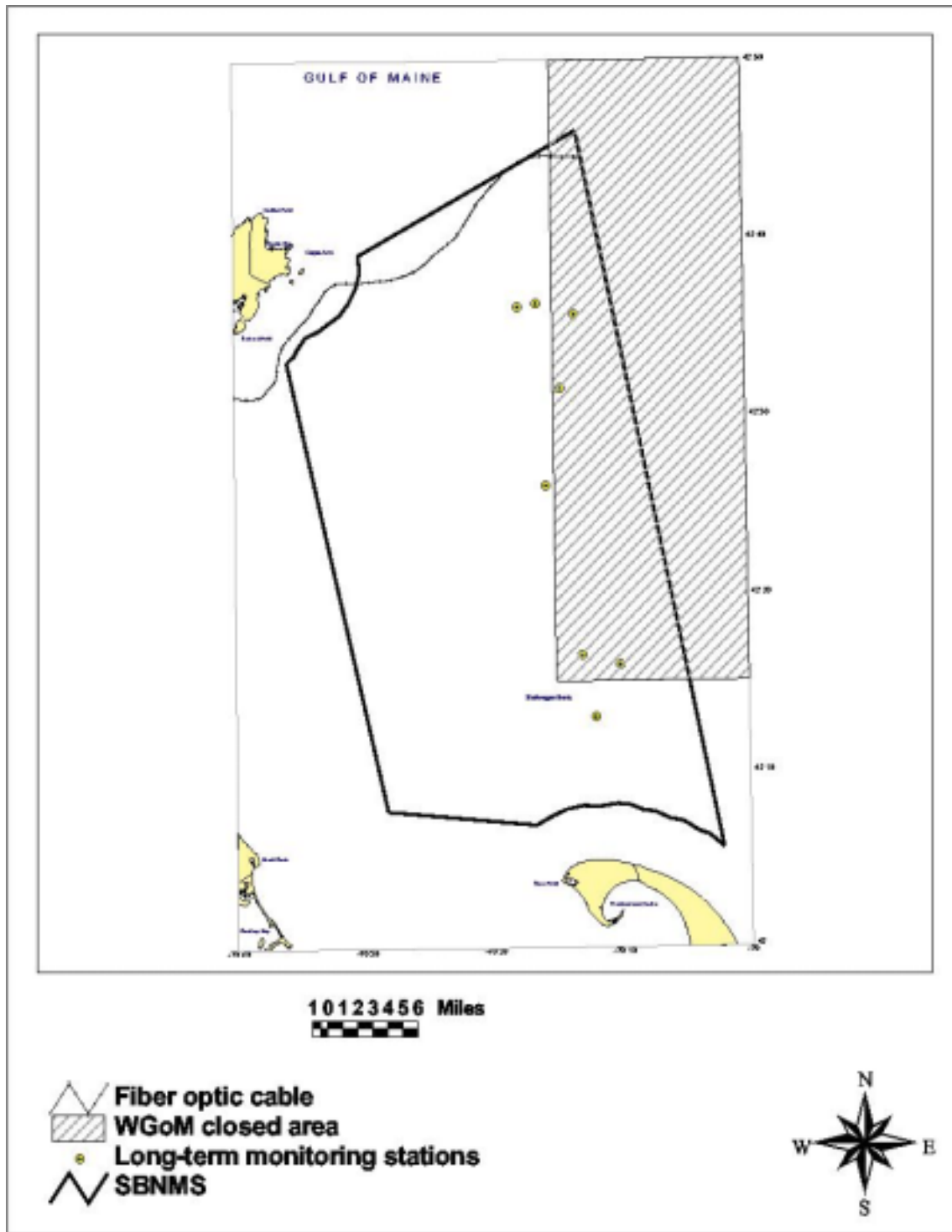


Figure 8. Map depicting SBNMS boundary, truncated WGoM Area Closure, fiber optic cable route through SBNMS, and long-term Seafloor Habitat Recovery Monitoring stations.

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 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 close the seasonal Cashes Ledge Area Closure for the duration of this action. 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 this measure. If the fishing effort within the proposed year-round closed area is not displaced to other areas or seasons, the closure could 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.

The prohibition on front-loading of the DAS clock would deal primarily with DAS accounting procedures and offers no real change in the allocation of DAS to any vessel. DAS 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).

The measure to limit multispecies Day gillnet vessels to 50 stand-up and 100 tie-down gillnets and monkfish Day gillnet vessels to 150 nets, 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 remaining measures under the Preferred alternative, (e.g., recreational fishing measures) would not have an adverse effect on EFH.

Overall, the measures under 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 Executive Order (E.O.) 12866 Significance - Regulatory Impact Review

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 that follows focuses on the expected magnitude and duration of the economic impacts of the proposed interim action consistent with the first criterion for significance. Note, that the first criterion may be met if the \$100 million threshold is met or if the action would have a material adverse affect on the economy. Given available data, it seems unlikely that the 6-month duration of 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. Even so, the proposed action will have some adverse material affect on participants in both the commercial and recreational fishing sectors, and will have an adverse impact on seafood wholesalers, processors, and retailers. 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.

The background to this interim rule is presented in detail in Section 1.1 of this EA. The purpose and need for this interim action are presented in Section 2.0 Purpose and Need for Action. Section 3.0 Alternatives, provides a description of each alternative considered, including the "no action" alternative. A description of the commercial and recreational fisheries is presented in Amendments 5, 7, and 9 to the FMP, and is incorporated here by reference.

Taking no action would have short run economic benefits as access to the WGOM Area Closure would be made available. This action would provide no protection to fishery resources in the GOM or other areas and would not be consistent with conservation objectives. Among the remaining alternatives, the Preferred Alternative (Alternative 4) 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 and would not be economically significant for purposes of the E.O. 12866.

5.4.1 Direct Effects

The proposed interim action is intended to be implemented on May 1, 2002, and to be replaced by another interim action in August, 2002. The latter action would then be continued until replaced by regulatory action to implement Amendment 13 to the FMP. The potential economic effects that could be quantified were discussed in Section 5.2. Even though the intended duration of this action is only 3 months, these economic effects were based on a 6-month duration, consistent with the usual 180-day duration for interim actions, as well as to provide comparability across considered alternatives. Based on these analyses, the interim action would result in approximately a 10% loss in revenues paid to commercial groundfish fishermen. These adverse effects are likely to be biased downward, because the model used to estimate the impacts of the management action did not include potential changes in fishing income earned from species other than regulated groundfish that would normally be caught and sold along with groundfish. The estimated impacts may be further biased downward since they could not take into account all of the features (i.e., mesh changes, prohibition on front-loading, and Day boat gillnet limits) of the proposed action.

Compared to the interim action, the No-Action alternative, Alternative 1, would result in increased fishing incomes relative to status quo conditions. However, Alternative 1 (No-Action) would also result in increased fishing mortality on groundfish stocks. Alternative 3 would have had the greatest adverse impact and the distributive effects would have been concentrated in the states of Maine, New Hampshire and Massachusetts. Since Alternative 3 was based principally on large closures in the GOM, it would have provided a high level of protection to fishery resources in the GOM, but would have afforded little protection to groundfish stocks in other areas. Alternatives 2 and 4 would both provide broad protection to groundfish stocks throughout the Northeast region, with Alternative 2 generally being the more conservative of the two. However, the economic and social costs of associated with Alternative 2 were considerably greater than that of Alternative 4. Since the principal objective for this Interim Action is to reduce fishing mortality on all groundfish stocks while Amendment 13 is being developed, either Alternative 2 or 4 would meet this objective. Given that Alternative 4 meets the regulatory objective while mitigating, to the extent practicable, economic and social costs to fishing businesses and fishing communities, it is the Preferred Alternative.

Although price effects were not quantified, it is likely that the supply changes that would result from Alternatives 2 and 3 would cause ex-vessel prices to increase. At least some portion of any price increase would be passed on to consumers, meaning that there would be some unquantifiable loss in consumer's surplus. The extent of this loss would be offset by the ability of wholesale and retail markets to source seafood from alternative suppliers outside the Northeast region. Since much of the Northeast groundfish supplies enter the market as fresh product, certain segments of final demand for seafood (retail fish markets and/or restaurants specializing in local seafood) may be disproportionately affected.

Change in producer's surplus was not quantified and is difficult to assess. Changes in profitability are not necessarily proportional to losses in gross revenues. The impact of an equivalent proportional reduction in revenues on profitability for vessels with relatively high costs would be very different from that of vessels with lower costs. Although ex-vessel prices are likely to increase as market supplies fall, it is unlikely that such price changes would be sufficient to offset reductions in total output. Therefore, producer surplus is certain to be reduced under any of the considered alternatives. The reduction in profitability may differ

among gear sectors, as hook vessels would not be required to make any gear modifications, whereas trawl vessels and gillnet vessels would be required to replace at least some portion of their gear to come into compliance with the larger mesh requirements for the GOM. At least in the short term, profitability for gillnet vessels would be most affected, as the cost to replace all of their nets would be much greater than replacement costs for trawl gear. Among gillnet vessels, Day boat vessels may be disproportionately affected, as the number of nets that they may use will be reduced while gillnet trip boats will not be changed.

In addition to direct effects on commercial fishing, the interim action would also directly affect individuals engaged in recreational fishing or providing passenger services to anglers that catch cod in the GOM. On average, recreational anglers took 313,000 trips where cod was caught in the GOM 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 GOM cod will be constrained or curtailed altogether. Among the considered recreational alternatives, the Preferred Alternative (Alternative 4) would have least impact on recreational anglers.

The reduction in keep opportunities would have an adverse impact on consumer's surplus for recreational anglers. Insufficient data are available to estimate these impacts, but they may be substantial, as cod represents the most prominent of the groundfish species targeted in the GOM. The magnitude of impact would be mitigated by the extent to which recreational anglers switch among alternative species. The ability to substitute other species for cod may be limited on a seasonal basis since, as a cold-water species, cod is available at times of the year when other popular recreational species (striped bass, bluefish, etc.) are not.

5.4.2 Indirect Effects

The proposed regulatory measures would have direct effects on fishing vessels, recreational anglers and providers of charter/party 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 and across considered alternatives. Among the considered alternatives, the Preferred Alternative (Alternative 4) would result in the least disruption in seafood supplies. Nevertheless, dealers will still need 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 vary depending 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 have been anecdotal reports of processing bottlenecks, as fresh-fish processors have 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 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 GOM (Gloucester and ports in the New Hampshire seacoast area, in particular).

Employment Impacts - The interim action is likely to affect jobs in several different economic sectors. The anticipated effects on commercial and charter/party 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 Impacts

Cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The measures and alternatives proposed—especially as they occur in the context of the cumulative effects and impacts that many fishermen and communities have already endured through Amendments 5 and 7 to the FMP—will have a significant impact on the revenues and flexibility of fishing operations and shoreside facilities, such that many of the operations on the edge could likely go out of business, with the ensuing social and economic costs that such disruption entails. Most vessels that are currently regulated under the FMP also hold permits issued under other FMPs and would be affected not only by the interim action, but also 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 monkfish. Both dogfish and monkfish were important fisheries that were available to many vessels as alternatives to reliance on groundfish. With increased regulations to protect these two resources, there are fewer alternatives to which to turn. Many vessels may have increased their reliance on groundfish as a result. In addition to dogfish and monkfish, the Atlantic States Marine Fisheries Commission 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 Western North Atlantic right whales.

Just as a variety of actions taken in other fisheries have affected 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. Perhaps the most impacted fishery would be the monkfish fishery, since changes in DAS counting under Alternative 2 would leave some vessels with no residual groundfish DAS to use in combination with monkfish DAS to target monkfish.

Under either any of the alternatives, the 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. 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 on 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.

Finally, this interim action is just the first in a series of steps proposed by NMFS to the Court, on behalf of the Secretary, on April 16, 2002, to bring the FMP into full compliance with the SFA, the Magnuson-Stevens Act and all other applicable law as quickly as possible. This interim action under authority of section 305(c) of the Magnuson-Stevens Act, would be followed up by subsequent interim action for August, 2002. Finally, Amendment 13, to be completed by NMFS and the Council on an accelerated schedule, would bring the FMP into full compliance with all provisions of the SFA, the Magnuson-Stevens Act, and other applicable law. Amendment 13 will be implemented by August 2003. Combined impacts of these upcoming actions are expected to be significant. NMFS and the Council will assess those impacts through a Supplemental Environmental Impact Statement and/or additional EAs, as appropriate.

5.4.4 Small Entity Effects

Because virtually all of the entities affected by this action are small entities, the analysis of the economic impacts in this document necessarily includes analysis of impacts on small entities (see Section 5.2 for detailed discussion). The economic analysis showed that Alternative 2 would affect at least 50 percent of all vessels that participate in the Northeast groundfish fishery. These effects range from a 0.4-percent reduction gross fishing income at the 50th percentile, to 31.0 percent (or more) at the 10th percentile. Alternative 3 would affect fewer vessels but would have much greater adverse economic impact on vessels that would be affected. Vessels at or below the 25th percentile would lose at least one-third of fishing income and would lose two-thirds or more of fishing incomes at the 10th percentile. Among the considered alternatives, under the Preferred Alternative (Alternative 4) the number of affected vessels and the magnitude of impact would be much lower than under either Alternatives 2 or 3. Fishing income losses would still be significant (20.9 percent or more) for 10% of groundfish vessels, but would be much lower (4.0 percent at the 25th percentile) for the remaining vessels as compared to Alternatives 2 and 3.

Of the considered alternatives, Alternative 2 and 4 are similar in terms of the types of regulatory measures that were considered. However, Alternative 4 (Preferred) would be less burdensome to small fishing entities than Alternative 2 (See Table 5.33). Table 5.33 provides a qualitative assessment of the difference in regulatory burden that would be placed upon small fishing entities on a measure-by-measure basis. In relative terms, the economic burden would be equivalent for the WGOM and rolling closures, the prohibition on front-loading DAS, and the cap on DAS use during the duration of this interim action. On nearly every other measure, Alternative 4 would reduce the regulatory burden, relative to Alternative 2, by either eliminating the measure from consideration or reducing the level of burden. Elimination of the 2:1 DAS in the GOM is an example of the former, while changing the counting of DAS from 24 to 15 hours is an example of the latter.

The estimated losses are stated in gross income, which does not take into account how the proposed action may affect business profit. The actual impact on any given vessel will depend on whether there are any cost savings associated with foregoing some fishing trips or the financial condition of the business, particularly with respect to fixed costs. Vessels with high fixed costs are likely to be more adversely

affected by a smaller change in gross fishing revenue than vessels with much lower fixed costs. Absent information on fishing firm finances, it is not possible to determine how many vessels would cease to operate under any one of the considered alternatives. Nevertheless, the interim action will have broad impacts that will be felt not only by commercial fishing vessels, but by charter/party operators, dealers, processors, and fishing industry suppliers, as well.

Table 5.33 Summary of Relative Difference Between Economic Effects of Regulatory Measures for Alternative 2 and Alternative 4.

Alternative 2 Measures	Difference	Alternative 4 Measures
May - July count DAS 2:1	(-)	Status Quo
August - October count DAS 2:1 in GOM	(-)	Status Quo
May - July 25% cap on DAS use all areas	(=)	May - July 25% cap on DAS use all areas
August - October 25% cap on DAS use in GOM	(-)	Status Quo
Count DAS as a minimum of 24 hours	(-)	Count DAS as a minimum of 15 hours
Prohibit front loading	(=)	Prohibit front loading
Eliminate large mesh permit	(-)	Status Quo
Close WGOM Area Closure	(=)	Close WGOM Area Closure
Close blocks 128, 129, 130	(-)	Close Cashes Ledge Area Closure
Close blocks 124, 125 in May	(=)	Close blocks 124, 125 in May
Close blocks 132, 133 in June	(=)	Close blocks 132, 133 in June
Require 6.5" diamond or 7" square mesh codends for trawls in the GOM	(-)	Require 6.5" diamond or 6.5" square mesh codends for trawls in the GOM
Require 7" gillnet mesh in GOM	(-)	Require 6.5" gillnet mesh for Trip vessels in GOM
Reduce Day boat gillnet allowance to 50 roundfish and 100 flatfish nets (7" mesh) all areas	(-)	Reduce Day boat gillnet allowance to 50 roundfish (6.5" mesh) and 100 flatfish nets (7" mesh) all areas
(-) denotes lowered economic burden of Alternative 4 relative to Alternative 2 (=) denotes equivalent economic burden of Alternative 4 relative to Alternative 2 (+) denotes greater economic burden of Alternative 4 relative to Alternative 2		

5.4.5 Long-Term Economic Effects

The preceding discussion of impacts was based on the short time horizon covering the May-July period over 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.

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.

6.2 Alternative 1 (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).

Analysis indicates that the status quo management measures for GOM and GB cod will not meet the objectives specified in Amendment 7. 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. Under the status quo, landings are expected to decline within a few years, consequently reducing revenues from groundfishing and causing long-term related problems in fishing communities.

Long-term projections of cod landings under the status quo versus under a fishing mortality rate consistent with Amendment 7 objectives have suggested that landings would be much higher under the Amendment 7 target fishing mortality rate. While landings are likely to decrease in the short-term, the larger landings over the long-term would result in more revenues than if the status quo is maintained. The social impacts

of a long-term scenario with increasing revenues are more positive than maintaining the status quo and allowing landings to fall.

The long-term social impacts of maintaining the status quo also relate to 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 Alternative 2

6.3.1 Area Closures

- Add to existing rolling closures: blocks 124 & 125 during May and 132 & 133 during June,
- Close blocks 128, 129 and 130 for the duration of the interim action

During 1994-2000, those vessels that fished in the proposed closed areas depended on those areas for between 19.0 and 30.2 percent of their annual groundfish catch (in terms of landed lb), 13.2 and 65.7 percent of their annual scallop catch (although with very small total landings), and 14.8 and 20.2 percent of their annual catch of all other species combined; the number of vessels catching groundfish varied between 206 and 324 vessels (see Table 6.1). The brunt of impacts from the proposed closure would be felt hardest in the ports of Massachusetts, New Hampshire, and Maine (see Table 6.2), in particular some of the smaller ports, and on smaller vessels (see Table 6.3). 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 6.1. Landings* (in thousands of lb) and areal dependence for calendar years 1994-2000, under Alternative 2 .

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 other species	
									vessels landing scallops	vessels landing other species
Proposed Closed Area	1994	3,573	5.2	1185	27	65.7	17	206	12	206
	1995	5,208	5.0	2568	20.6	19.3	15.1	324	3	336
	1996	5,172	0.5	2254	19.0	23.0	14.8	300	9	314
	1997	4,412	5.3	2,889	20.3	16.3	17.2	247	12	286
	1998	4,295	3.1	1,588	20	13.2	17.2	264	11	272
	1999	4,107	6.8	2,374	30.2	25.7	20.2	286	16	301
	2000	2,616	0.7	2,079	22.6	52.0	17.4	228	12	204
Rest of Northeast	1994	63495	10,891.4	128,571	96.3	98.8	98.2	1325	363	1665
	1995	84,191	16,760.7	179,478	96.4	99.9	97.9	1682	476	2165
	1996	98,667	16,895.6	207,650	96.8	99.6	98.1	1639	494	2158
	1997	96,396	13,459.2	209,326	96.8	99.6	97.9	1471	494	2046
	1998	95,281	11,741.1	238,087	97.0	99.7	98.0	1,506	462	2081
	1999	90,367	21,853.4	230,890	95.0	99.5	97.4	1,495	452	2161
	2000	102,955	31,730.3	237,358	97.0	99.1	98.4	1,469	500	2101

* Source: VTR

Table 6.2. Ports in year 2000 most affected by the proposed closed areas (p.c.a.) under Alternative 2 (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	c.r.	11,479	184	1.0	1.8
Newburyport MA	10	3	10	69,749	25.3	23	5,867	116	1.0	1.5
Portsmouth NH	19	1	18	355,091	17.6	c.r.	212,777	848	2.6	2.9
Beverly MA	3	n/a	3	24,818	16.6	n/a	1,496	64	1.1	2.3
Marshfield MA	4	n/a	3	27,387	15.3	n/a	2,357	75	1.8	2.0
Hampton NH	4	n/a	3	28,449	12.3	n/a	4,081	49	1.0	2.0
Marblehead MA	3	n/a	2	31,159	11.1	n/a	c.r.	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	n/a	7	47,677	10.1	n/a	8,669	70	1.0	1.3
Gloucester MA	85	3	75	958,200	6.4	297	1,306,331	1,897	1.5	2.2
Portland ME	29	n/a	30	540,026	4.7	n/a	407,174	1,024	4.3	3.0

* Source: VTR. 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. (These ports account for 93 percent of the groundfish landings in the p.c.a.).

Table 6.3. Distribution of impacts from dependence on proposed closed areas (p.c.a.) under Alternative 2 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	1,048	161	9	135	1,511,545	7.3	517	406,148	3,098	1.4	2.0
Medium	258	55	3	55	951,463	3.0	162	372,715	1,866	2.5	2.4
Large	33	12	n/a	14	152,552	0.3	n/a	1,300,361	326	2.9	3.1

* Source: VTR 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 DAS Restrictions

- During each quarter (May-July and Aug-Oct), a vessel fishing for groundfish in the GOM may use no more than 25 percent of its allocated DAS; DAS during those quarters will be counted at a 2:1 rate;
- During May-July, a vessel fishing for groundfish in areas other than GOM will also be restricted to using no more than 25 percent of its allocated DAS, and those DAS will be counted at a 2:1 rate;
- “Front-loading” of the DAS clock will be prohibited; and
- All vessel will be subject to a minimum of 24 hours for each multispecies fishing trip

See Section 6.5, Comparison of Alternatives and Discussion of Impacts, below.

6.3.3 Gear Changes

- Eliminate Large-Mesh vessel permit category;
- Require 6.5-inch diamond or 7-inch square mesh codend for trawl vessels, and 7-inch mesh for gillnet vessels throughout GOM; and
- Vessels with a Day-gillnet category permit are restricted to using only 50 stand-up or 100 tie-down gillnets

Eliminate Large-Mesh Permit Category

As shown in the human environment section, there were only 31 vessels permitted in the Large-Mesh category (Individual and Fleet DAS categories combined) in fishing year 2000, out of a total 3901 permitted groundfish vessels. Of the 31 Large-Mesh permit category vessels, 24 showed at least some groundfish landings in 2000. The ports most affected, in terms of both total volume and dependence on large-mesh landings, are Portsmouth, NH, and Scituate, MA (see Table 6.4). However, these landings will be affected by the new DAS limits for Large-Mesh category vessels only to the extent that they are constraining on vessels' DAS usage.

Table 6.4. Groundfish landings from large-mesh permitted vessels, by port of landing (year 2000).

Port of Landing	Groundfish (in pounds) caught by large-mesh permitted vessels	Number of vessels in the large-mesh permit category landing in port	Percent of groundfish landed by large-mesh vessels out of all groundfish landed in port
Chatham MA	cr	1	*
Seabrook NH	cr	1	*
Plymouth MA	cr	2	*
Portsmouth NH	244,576	4	12
Scituate MA	266,078	4	22.9

* Shows only those ports that had total groundfish landings (from all gears and all areas) of greater than 100,000 lb AND had greater than 2 percent of groundfish landings caught by vessels permitted in the Large-Mesh category (fleet or individual DAS vessels). Cannot report (cr) confidential information when less than three entities; * refers to less than 10 percent. Source: VTR and permit records.

Trawl mesh change

The mesh size change would affect the over 300 trawl vessels that use smaller-sized mesh, and an unknown number of the 106 trawl vessels using 6.5-inch or greater sized mesh already, since logbooks do not differentiate between diamond or square mesh. Additionally, the new regulations could affect the more than 100 gillnet vessels that use mesh smaller than 7-inch (see Table 6.5). 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 Maine, Massachusetts, and New Hampshire (see Table 6.6). This table should be taken to imply that a significant portion of the active groundfish fleet in these ports will have to invest in new gear. The measure restricting Day-gillnetters to 50 stand-up or 100 tie-down nets appears to affect about 49 vessels; these vessels, on an average trip, catch more than double the amount that those already fishing under the limit (see Table 6.7). Such a measure would mainly affect the landing ports of Maine, Massachusetts, and New Hampshire (see Table 6.8).

Table 6.5. Mesh size used by vessels in the GOM (year 2000).

Size of Mesh (Bottom Otter Trawl only)	Number of Distinct Trips	Number of Distinct Vessels	Groundfish (in pounds)
Greater than or equal to 7"	31	15	124786
Between 6.5" and 7"	1808	91	3242703
Smaller than 6.5"	7772	309	16401409
Unknown	41	28	103646

Size of Mesh (Sink Gill Net only)	Number of Distinct Trips	Number of Distinct Vessels	Groundfish (in pounds)
Greater than or equal to 7"	3256	89	2635421
Smaller than 7"	2342	107	5543744
Unknown	20	10	51742

*Source: VTR. Looks only at size of mesh, logbooks do not tell whether the gear used is diamond or square mesh.

Table 6.6. Mesh size use by vessels in the GOM, by port of landing* (year 2000).

Port of Landing	Bottom Otter Trawl (BOT) less than 6.5"			Bottom Otter Trawl (BOT) between 6.5 and 7"		
	No. of Vessels	Groundfish (in lbs.) caught by this mesh	Percent of groundfish caught by this mesh size, out of all groundfish landed in port	No. of Vessels	Groundfish (in lbs.) caught by this mesh	Percent of groundfish caught by this mesh size, out of all groundfish landed in port
Bar Harbor ME	4	141,500	98.3	na	na	na
Barnstable MA	na	na	na	3	26,275	9.7
Boothbay Harbor	6	117,383	83.2	1	cr	cr
Boston MA	9	258,966	9.0	6	136,591	4.7
Cape Porpoise	2	cr	cr	na	na	na
Chilmark MA	na	na	na	1	cr	cr
Gloucester MA	78	4,194,069	27.5	25	909,044	6.0
Green Harbor	7	63,139	33.2	3	50,675	26.7
Hampton NH	4	139,040	51.3	1	cr	cr
Marshfield MA	3	40,031	20.7	1	cr	cr
Nantucket MA	na	na	na	1	cr	cr
Newburyport MA	9	231,024	76.5	na	na	na
Plymouth MA	5	59,172	13.5	5	73,421	16.7
Port Clyde ME	14	801,872	89.2	2	cr	cr
Portland ME	78	6,166,658	52.1	13	319,399	2.7
Portsmouth NH	18	190,932	9.4	na	na	na
Provincetown	23	1,284,094	58.0	13	392,104	17.7
Rockland ME	6	208,122	99.4	na	na	na
Rockport MA	7	152,567	55.6	4	104,746	38.2
Rye NH	6	224,495	40.5	na	na	na
Sandwich MA	3	5,077	2.0	5	203,476	80.9
Scituate MA	5	129,812	11.2	3	276,925	23.9
Seabrook NH	16	716,115	71.7	1	cr	cr
Shinnecock NY	6	508	0.0	na	na	na
South Bristol ME	10	495,438	89.4	1	cr	cr
	Gillnet less than 7"					
Port of Landing	No. of Vessels	Groundfish (in lbs.) caught by this mesh	Percent of groundfish caught by this mesh size, out of all groundfish landed in port			
Beverly MA	1	cr	cr			
Cape Porpoise	3	129,351	88.1			
Gloucester MA	34	1,490,620	9.8			
Hampton	1	cr	cr			
Marblehead MA	3	216,821	77.1			
Plymouth MA	2	cr	cr			
Portland ME	21	1,680,723	14.2			
Portsmouth NH	15	1,288,883	63.2			
Rye NH	2	cr	cr			
Scituate MA	14	175,970	15.2			
Seabrook NH	3	116,163	11.6			
South Bristol ME	1	cr	cr			

* Source: VTR. Only shows those ports that had total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND had greater than 2 percent of groundfish landings caught by regulated meshsizes in the GOM. Cannot report (cr) confidential information when less than three entities.

Table 6.7. Gillnet usage in the GOM by day-trip gillnetters (FY 2000).

Gillnet*	Number of Nets	Number of trips	Number of vessels	Average crew size	Average trip catch of groundfish	Average trip catch of flounders	Total catch of groundfish	Total catch of flounders
Stand-up	Greater than 50 (Illegal under proposed rule)	822	49	2.7	1,741	64	1,430,953	52,790
Stand-up	Less than or equal to 50 (legal under proposed rule)	2,327	68	2.2	815	46	1,895,455	106,256
Tie-Down	Less than or equal to 100 (legal under proposed rule)	650	33	2.5	304	748	197,458	486,042

*Source: 2000 and 2001 VTR. 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 seven vessels, 4,964 lb of groundfish and 4,964 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 6.8. Trips with greater than 50 standup gillnets by port of landing* (FY 2000).

Port of Landing	No. of Trips	No. of Vessels	Groundfish caught by trips with gt. 50 stand-up nets	Percent of all groundfish landed in port	Flounders caught by trips with gt. 50 standup nets	Percent of all flounders landed in port	Average crew size
Gloucester MA	384	22	548,087	2.5	26,800	0.6	2.7
Portsmouth NH	180	7	526,970	13.6	1,746	1.1	2.9
Scituate MA	99	6	139,256	11.4	17,925	1.7	2.9
Seabrook NH	20	4	22,135	1.5	100	0.0	2.3
Rye NH	14	3	16,066	1.3	70	0.0	2.3
Portland ME	60	2	cr	*	cr	*	2.0
Saco ME	11	2	cr	**	cr	*	2.0
Beverly MA	24	1	cr	*	cr	*	2.1
Marblehead MA	3	1	cr	*	cr	*	3.0
New Bedford MA	1	1	cr	*	cr	*	2.0
Point Pleasant NJ	1	1	cr	*	cr	*	1.0
Sebasco Estates ME	20	1	cr	***	cr	***	2.4
York ME	5	1	cr	**	cr	*	3.2

* Source: VTR. cannot report (cr) confidential information when less than three entities. * refers to less than 10 percent ; ** refers to between 10 and 50 percent; *** greater than 50 and less than or equal to 100 percent.

6.3.4 Recreational and Charter/Party Vessel Restrictions

- 24" minimum size for cod for recreational and 22" minimum size for charter/party boats;
- Year-round exemption letter requirement to fish in closed areas for charter/party boats; and
- Year-round prohibition from fishing in WGOM Area Closure for recreational and charter/party boats

Twenty-six charter/party vessels fished in the WGOM Area Closure during year 2000 (see Table 6.9): These vessels are concentrated in the southern Maine, the Hampton-Seabrook region of New Hampshire, and a number of ports in Massachusetts. For many of these ports, charter/party vessels may only number one or two. It is unknown what effect a prohibition on fishing in the WGOM Area Closure may have on all the ancillary businesses that support recreational fishing, such as bait and tackle shops, restaurants, etc. The closed season on GOM cod, expected to be implemented under a Secretarial amendment following this action, appears, according to vessel logbook data, to have very little effect on charter/party vessels; in

the year 2000, the prohibition would have affected just four vessels, none of which can be reported by port to protect confidentiality. However, it should be noted that the logbooks and the MRFSS (Marine Recreational Fisheries Statistical Survey) show completely opposite landing and effort patterns, which are difficult to interpret without a fuller audit of the logbook data.

Table 6.9 Charter/party boat fishing activity in the WGOM Area Closure by port of landing, 1998-2000.

Port of Landing	1998		1999		2000	
	Fish (numbers) caught in WGOM	Percent of fish caught in WGOM out of all recreationally caught fish brought into port	Fish (numbers) caught in WGOM	Percent of fish caught in WGOM out of all recreationally caught fish brought into port	Fish (numbers) caught in WGOM	Percent of fish caught in WGOM out of all recreationally caught fish brought into port
Gloucester MA	7,041	38.9	6,617	38.7	2,233	71.7
Hampton NH	^^	*	2,371	19.2	6,016	37.3
Kennebunkport ME	^^	***	na	na	na	na
Lynn MA	na	na	^^	*	^^	**
Newburyport MA	9,877	33.2	^^	*	^^	*
Ogunquit ME	^^	**	^^	**	^^	**
Perkins Cove ME	^	*	^	*	^^	***
Plymouth MA	^^	*	^^	*	^	*
Salisbury MA	^^	**	^^	**	13,027	63.4
Seabrook NH	na	na	na	na	^^	0

*Source: VTR. NB: only shows those ports that recorded at least 200 fish caught by recreational fishers in at least one of the years 1998-2000. The table cannot report confidential information when there are less than three entities involved. * refers to less than 25 percent, ** refers to 25-50 percent, and *** refers to greater than 50 percent; ^ refers to less than 200 fish, and ^^ refers to greater than or equal to 200 fish.

6.4 Alternative 3

- Closure of blocks 121-125, 129-133 and 136-140.

During 1994 - 2000, those vessels that fished in the proposed closed area depended on that area for between 52.3 and 64.5 percent of their annual groundfish catch (in terms of landed pounds), 48.6 and 64.3 percent of their annual scallop catch, and 46.4 and 59.7 percent of their annual catch of all other species combined. The number of vessels catching groundfish varied between 483 and 654 (see Table 6.10). The brunt of impacts from the proposed closure would be felt hardest in the ports of Massachusetts, New Hampshire, and Maine (see Table 6.11), in particular some of the smaller ports, and on smaller vessels (see Table 6.12). 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 6.10. Landings (in thousands of lb) and areal dependence for calendar years 1994-2000, under Alternative 3.

Area	Year	Groundfish landings	Scallops landings	Landings of other species	Ave. areal dependence for groundfish	Ave. areal dependence for scallops	Ave. areal dependence for other species	No. vessels		
								landing groundfish	landing scallops	landing other species
Proposed Closed Area	1994	15,294	62.7	13,386	63.8	63.9	59.7	483	47	546
	1995	19,679	359.9	20,489	62.0	51.9	53.3	654	69	786
	1996	22,747	406.9	19,839	61.3	48.6	51.6	609	96	733
	1997	20,124	839.2	28,321	63.0	58.2	57.6	553	126	685
	1998	16,732	182.3	25,300	62.8	59.5	55.7	515	77	584
	1999	14,441	182.9	30,609	64.5	64.3	55.2	527	70	637
Rest of Northeast	2000	14,061	121.1	25,391	52.3	61.6	46.4	500	63	520
	1994	51,774	10,833.9	116,370	83.1	97.1	86.2	1,228	346	1,554

1995	69,720	16,405.8	161,558	82.3	97.3	85.6	1,556	451	2,041
1996	81,092	16,489.2	190,064	82.6	96.1	86.2	1,536	466	2,060
1997	80,684	12,625.3	183,894	82.0	92.1	85.4	1,373	456	1,937
1998	82,843	11,561.8	214,375	83.0	95.0	88.1	1,433	437	1,999
1999	80,032	21,677.4	202,655	83.3	95.7	87.8	1,399	427	2,065
2000	91,510	31,609.8	214,046	86.2	96.1	90.7	1,408	482	2,046

Source: VTR.

Table 6.11. Ports in year 2000 most affected by the proposed closed areas (p.c.a.) in Alternative 3 (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
Saco ME	4	n/a	5	56,014	94.1	n/a	3,595	237	1.6	2.2
York ME	4	n/a	4	55,416	83.2	n/a	101,291	218	1.5	2.1
Newburyport MA	14	6	12	222,248	80.7	3,270	57,434	770	1.0	1.6
Hampton NH	8	1	10	184,039	79.6	c.r.	49,893	451	1.1	2.0
Rockport MA	9	1	10	183,342	68.9	c.r.	27,962	511	1.1	1.6
Rye NH	12	n/a	14	318,496	67.4	n/a	724,547	947	1.0	1.6
Marshfield MA	10	n/a	7	113,937	63.5	n/a	6,599	277	1.6	1.9
Cape Porpoise ME	5	n/a	6	89,046	60.9	n/a	13,499	158	1.2	2.5
Provincetown MA	30	12	33	1,344,217	60.9	10,006	768,893	1,919	1.2	2.4
Marblehead MA	4	n/a	3	154,709	55.0	n/a	54,968	511	1.0	2.2
South Bristol ME	9	n/a	9	253,868	47.2	n/a	96,446	433	3.1	2.0
Scituate MA	31	1	29	529,831	46.1	c.r.	349,062	1,648	1.3	2.3
Boothbay Harbor ME	6	n/a	5	56,929	44.2	n/a	18,134	111	1.7	1.8
Seabrook NH	25	7	25	405,555	41.6	879	172,159	1,193	1.0	1.5
Green Harbor MA	17	1	10	65,295	40.4	c.r.	2,218	216	1.7	1.4
Portsmouth NH	32	3	36	746,877	37.1	572	4,110,132	2,381	1.5	2.6
Plymouth MA	15	4	19	142,575	33.9	26,539	84,011	444	1.7	1.9
Gloucester MA	152	12	156	4,475,186	29.9	18,259	5,649,410	10,389	1.3	2.1
Beverly MA	5	n/a	4	40,745	27.3	n/a	9,825	155	1.0	2.2
Boston MA	17	3	16	680,294	23.7	177	283,126	1,241	4.7	3.0
Portland ME	73	n/a	77	2,690,873	23.4	n/a	12,243,698	4,557	3.0	2.8
Sandwich MA	7	7	10	44,254	17.6	42,229	41,108	265	1.2	1.4
Port Clyde ME	9	n/a	9	155,871	17.5	n/a	92,528	340	2.6	2.0
New Bedford MA	26	6	22	672,107	2.5	10,495	173,456	992	4.0	2.8

Source: VTR * Shows only those ports with at least three vessels who either showed 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 6.12. Distribution of impacts from dependence on proposed closed areas (p.c.a.) in Alternative 3 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	7,531	335	37	348	6,366,412	30.7	83,666	4,726,411	18,368	1.3	1.9
Medium	2,141	118	22	120	5,952,862	18.8	18,371	2,807,985	9,503	1.8	2.3
Large	362	44	2	48	1,720,090	3.2	17,516	17,809,113	3,856	3.0	3.5

* Source: VTR 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.

6.5 Alternative 4 (Preferred)

6.5.1 Area 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 (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.

Table 6.13. Landings* (in thousands of lb) and areal dependence for calendar years 1994-2000, under Alternative 4.

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 other species	
									scallops	other species
Proposed Closed Area	1994	428	0.4	385	26.7	76.1	11.5	120	9	117
	1995	972	0.0	1,021	18.1	22.1	12.3	206	2	209
	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 Northeast	1994	66,640	10,896	129,371	98.1	98.9	99.4	1,325	364	1,666
	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: VTR

Table 6.14. Ports in year 2000 most affected by the proposed closed areas (p.c.a.) under Alternative 4 (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
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 MA	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 MA	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
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* Source: VTR. 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 6.15. Distribution of impacts from dependence on proposed closed areas (p.c.a.) under Alternative 4 (Preferred) 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 p.c.a.	Groundfish from 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	8,320	0.0	0	1,192	20	1.0	2.0

* Source: VTR 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.

6.5.2 DAS Restrictions

See Section 6.6, Comparison of Alternatives and Discussion of Impacts, below.

6.5.3. Gear changes

The mesh size change would affect the over 300 trawl vessels that use smaller-sized mesh. Additionally, the new regulations could affect the more than 70 gillnet vessels that use mesh smaller than 6.5-inch (see Table 6.16). 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 Maine, Massachusetts, and New Hampshire (see Table 6.17). This table should be taken to imply that a significant portion of the active groundfish fleet in these ports will have to invest in new gear. The measure restricting Day gillnetters to 50 stand-up, 100 tie-down, or 150 monkfish nets, all with minimum mesh sizes, appears to affect about 106, 36, and 59 vessels, respectively; these vessels, on an average trip, catch more than double the amount than those already fishing under the limit for stand-up nets, though the results are mixed for the other gear-users (see Table 6.18). Such a measure would mainly affect the landing ports of Maine, Massachusetts, and New Hampshire, though impacts occur throughout the Northeast (see Tables 6.19-21).

Table 6.16. Mesh size used by vessels fishing under a multispecies DAS in the GOM (year 2000).

Size of Mesh (Bottom Otter Trawl only)	Number of Distinct Trips	Number of Distinct Vessels	Groundfish (in pounds)
Greater than or equal to 6.5"	1,836	101	3,358,719
Smaller than 6.5"	7,746	301	16,370,144
Unknown	40	27	98,143

Size of Mesh (Sink Gill Net, and Trip Gill Net vessels only)	Number of Distinct Trips	Number of Distinct Vessels	Groundfish (in pounds)
Greater than or equal to 6.5"	4,591	108	4,510,266
Smaller than 6.5"	1,007	71	3,626,004
Unknown	20	10	51,742

*Source: VTR.

Table 6.17. Mesh size use by vessels in the GOM, by port of landing* (year 2000).

Port of Landing	Bottom Otter Trawl (BOT) less than 6.5"			Trip Sink Gill Net (TGT) between less than 6.5"		
	No. of Vessels	Groundfish (in lbs.) caught by this mesh	Percent of groundfish caught by this mesh size, out of all groundfish landed in port	No. of Vessels	Groundfish (in lbs.) caught by this mesh	Percent of groundfish caught by this mesh size, out of all groundfish landed in port

Bar Harbor ME	4	141,500	98.3				
Beverly MA				1	cr		cr
Boothbay Harbor ME	5	117,383	83.2				
Boston MA	9	258,966	9.0				
Cape Porpoise ME	2	cr	cr	3	129,351		88.1
Gloucester MA	78	4,194,069	27.5	28	1,167,823		7.7
Green Harbor MA	6	53,576	28.2				
Hampton NH	4	139,040	51.3				
Marshfield MA	3	40,031	20.7				
Newburyport MA	9	231,024	76.5				
Plymouth MA	5	59,172	13.5				
Port Clyde ME	14	801,872	89.2				
Portland ME	77	6,145,756	51.9	16	941,013		8.0
Portsmouth NH	18	190,932	9.4	12	1,142,580		56.0
Provincetown MA	23	1,284,094	58.0				
Rockland ME	6	208,122	99.4				
Rockport MA	7	152,567	55.6				
Rye NH	6	224,495	40.5				
Sandwich MA	3	5,077	2.0				
Scituate MA	5	129,812	11.2	6	44,748		3.9
Seabrook NH	15	715,315	71.6				
South Bristol ME	10	495,438	89.4	1	cr		cr

* Source: VTR. Only shows those ports that had total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND had greater than 2 percent of groundfish landings caught by regulated meshsizes in the GOM. Cannot report (cr) confidential information when less than three entities.

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

Gillnet*	Net numbers and mesh Size	Number of trips	Number of vessels	Average crew size	Average trip catch of groundfish	Average trip catch of flounders	Total catch of groundfish	Total catch of flounders
Stand-up (or roundfish) nets	Greater than 50 nets or mesh less than 6.5" (illegal under alternative)	2,531	106	2.7	2042.2	45.4	5,168,906	114,883
Stand-up (or roundfish) nets	Less than or equal to 50 nets with mesh greater than or equal to 6.5" (legal under alternative)	4,307	123	2.3	1155.9	32.2	4,978,256	138,661
Tie-Down (or flatfish) nets	Greater than 100 nets or mesh less than 7" (illegal under alternative)	458	36	2.4	184.3	506.9	84,396	232,173
Tie-Down (or flatfish) nets	Less than or equal to 100 nets with mesh greater than or equal to 7.0" (legal under alternative)	424	39	2.3	289.7	672.6	122,820	285,203
Monkfish nets	Greater than 150 nets or mesh less than 10" (illegal under alternative)	1,326	59	2.6	512.7 (monkfish only)	.	679,831 (monkfish only)	.
Monkfish nets	Less than or equal to 150 nets and mesh greater than or equal to 10" (legal under alternative)	3,069	71	2.4	1279.8 (monkfish only)	.	3,927,628 (monkfish only)	.

*Source: 2000 and 2001 VTR. 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, 11 trips (representing 8 vessels, 6239 lb of groundfish and 6239 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. Dayboat gillnet trips with greater than 50 standup gillnets (or over minimum 6.5" mesh) by port of landing* (year 2000).

Port of Landing	No. of Trips	No. of Vessels	Groundfish caught by trips with gt. 50 stand-up nets	Percent of all groundfish landed in port	Average crew size
Barnegat NJ	7	3	9,909	2.9	2.3

Cape Porpoise ME	5	1	cr	cr	2.0
Chatham MA	756	24	2,006,102	41.9	3.0
Chincoteague VA	23	4	30,027	12.7	2.1
Fairhaven MA	10	3	15,261	6.4	3.0
Fall River MA	28	1	cr	cr	4.0
Gloucester MA	701	28	1,114,504	6.4	2.6
Little Compton RI	51	5	63,494	13.8	2.7
Long Beach NJ	50	7	58,462	4.9	1.8
Ocean City MD	23	1	cr	cr	2.1
Point Pleasant NJ	96	6	172,408	11.0	2.9
Portsmouth NH	219	8	546,760	17.2	2.7
Rye NH	19	2	cr	cr	2.2
Scituate MA	170	7	220,773	26.1	2.9
Seabrook NH	25	4	24,481	2.9	2.2
Wanchese NC	9	4	10,948	10.0	2.1
Westport MA	41	3	131,489	45.7	3.5

* Source: VTR. Only shows those ports that had total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND had greater than 2 percent of groundfish landings caught by regulated meshsizes. Cannot report (cr) confidential information when less than three entities.

Table 6.20. Dayboat Gillnet Trips with greater than 100 tiedown gillnets (or over minimum 7" mesh) by port of landing* (year 2000).

Port of Landing	No. of Trips	No. of Vessels	Total Flounder caught by trips with gt. 50 stand-up nets	Percent of all flounders landed in port	Average crew size
Marblehead MA	137	3	120,581	81.2	2.7
Scituate MA	114	4	63,157	10.7	2.8

* Source: VTR. Only shows those ports that had total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND had greater than 2 percent of groundfish landings caught by regulated meshsizes. Cannot report (cr) confidential information when less than three entities.

Table 6.21. Dayboat Gillnet Trips with greater than 150 monkfish nets (or over minimum 10" mesh) by port of landing* (year 2000).

Port of Landing	No. of Trips	No. of Vessels	Monkfish caught by trips with gt. 50 stand-up nets	Percent of all monkfish landed in port	Average crew size
Chatham MA	347	11	68,859	14.6	3.1
Gloucester MA	370	12	281,819	12.6	2.2
Little Compton RI	59	6	30,242	8.0	1.8
Newport RI	6	1	cr	cr	3.0
Ocean City MD	2	1	cr	cr	2.0
Portsmouth NH	77	4	52,279	4.7	2.9
Rye NH	131	2	cr	cr	2.1
Scituate MA	129	4	60,003	17.2	2.9
Wanchese NC	4	1	cr	cr	2.0

* Source: VTR. Only shows those ports that had total groundfish landings (from all gears and all areas) of greater than 100,000 pounds AND had greater than 2 percent of groundfish landings caught by regulated meshsizes. Cannot report (cr) confidential information when less than three entities.

6.5.4. Recreational and Charter/Party Vessel Restrictions

See Section 6.6 Comparison of Alternatives and Discussion of Impacts.

6.6 Comparison of Alternatives and Discussion of Impacts

Both Alternative 2 and Alternative 3 would have significant to severe short-term impacts on the Northeast groundfish industry, with particular segments and communities within that industry bearing a disproportionate share of the impacts. Alternative 4 would likely have fewer and less severe impacts overall, though some ports and other groups of fishermen can expect impacts similar to Alternative 2. 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 measures and alternatives considered—particularly Alternatives 2 and 3, especially as they occur in the context of the cumulative effects and impacts that many fishermen and communities have already endured through Amendments 5 and 7 to the FMP will have a significant impact on the revenues and flexibility of fishing operations and shoreside facilities, to the extent that many of the operations on the edge could likely go out of business, with the ensuing social and economic costs that such disruption entails.

The use of spatially based measures, such as closed areas, which are prominent in the alternatives, 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 a 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 6.22).

Table 6.22. 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 percent of their annual groundfish catch in one statistical area	89.4	90.3	91.1	91.1	90.9	93.0
Percent of vessels landings at least 75 percent of their annual groundfish catch in one statistical area	72.9	74.0	74.7	73.4	71.4	74.9

Source: VTR

Breaking this down spatially, 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 6.23). For example, the two most important areas for groundfish dependence are statistical areas 513 and 514 (two areas that comprise a significant portion of the GOM, as well as the additional rolling area closures) (see Figure 9). 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. And 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 operations, 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 stay away from shore for significantly longer periods, including the disruptions resulting from longer periods at home, as well (NEFMC 2000; Olson and Clay, in press; Pollnac and Littlefield 1983). The proposed closure areas may also differentially affect onshore facilities, employment patterns, and community revenues, if they significantly shift fishing and landing patterns.

As discussed in the previous sections, the proposed closure areas under Alternatives 2 through 4 could have significant impacts, with the impacts from Alternative 4 less severe and from Alternative 3 more severe than under Alternative 4. Comparing Tables 6.1, 6.10 and 6.13 shows that more than two or three times as many vessels would likely be affected by Alternative 3 (between 120 and 206 have a history of fishing in the Alternative 4 closed area and between 206 and 324 in Alternative 2 closure areas, compared to 483-654 in Alternative 3 area closures); and more than twice the annual groundfish catch of these vessels may be affected, depending on the extent to which they are able to fish different species or find new areas in which to fish (16-32 percent of the annual groundfish catch for affected vessels came from the proposed closed area in Alternative 4, and 19-30 percent of the annual groundfish catch for affected

vessels came from the proposed closed area in Alternative 2, compared with 52-65 percent from the closed area in Alternative 3).

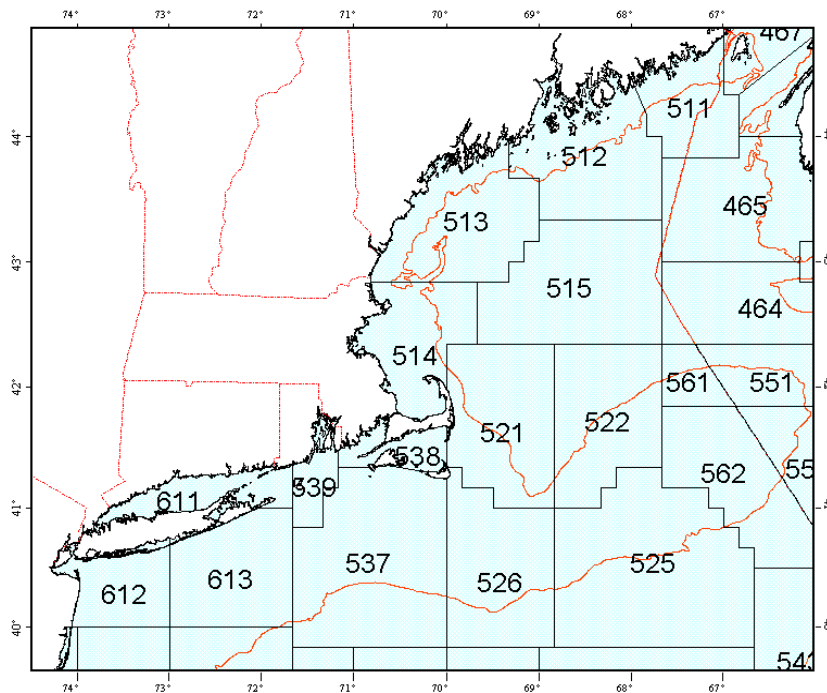


Figure 9. NMFS Statistical Areas.

In all three alternatives, the impacts would fall harder on the smaller vessels (those under 50 ft) that have less mobility than the larger boats, but again Alternative 3 would be considerably harsher in its impacts than all the other alternatives. In year 2000, 335 small vessels had a history of fishing in the area proposed for closure under Alternative 3, realizing about 31 percent of their annual catch from the closed area, compared with 161 small vessels realizing 7 percent of their annual catch from the areas proposed for closure under Alternative 2 and 141 small vessels realizing 4 percent of their annual catch from the areas proposed for closure under Alternative 4. Similarly, the number of ports affected—and the significance of the impacts—would be considerably greater under Alternative 3 than under either Alternative 2 or 4. Despite the difference in the proposed areal closures, a number of ports would be equally affected by Alternatives 2 and 4, particularly the smaller ports in Massachusetts and New Hampshire. The section below on National Standard 8 explores these differences in greater detail. Moreover, the impacts of the area closure would affect not only groundfish fishermen, but also any other fishermen using gears that would be prohibited. Here again, Alternative 3 would have a much greater impact on other fishermen, and on the flexibility of fishermen to move between different fisheries, than the other alternatives. This difference presumes that, under Alternatives 2 and 4, the exempted gears that are currently allowed in rolling closures and the year-round closed areas (one important difference is that gear such as scallop dredges are allowed in the rolling closures), remain exempt. With scallop gear prohibited from the area that would be closed under Alternative 3, a significant number of mainly small vessels (see Table 6.12), which may depend on scallops for a significant portion of their yearly income, would no longer be able to scallop in the areas upon which they depend most heavily for scalloping (see Table 6.10).

Table 6.23. Fishing characteristics for groundfish, by statistical area, 1995 – 2000.*

Area	1995			1996			1997			1998			1999			2000			6 yr ave.
	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	
514	70.3	21,772	486	70.7	27,926	446	70.2	29,818	415	77.4	28,850	403	75.6	22,682	347	75.2	29,587	387	73.2
513	69.2	30,700	367	69.4	40,422	317	65.7	28,755	278	66.4	24,073	253	67.4	19,204	220	72.0	30,968	250	68.4
612	63.2	14,437	110	64.5	12,360	90	63.6	21,531	102	55.9	16,141	90	71.1	18,450	98	75.0	19,147	92	65.6
521	60.5	28,178	419	63.0	31,404	423	65.6	40,430	390	62.1	36,018	403	61.0	44,403	404	62.7	46,849	400	62.5
611	54.1	8,171	55	57.8	8,620	65	60.9	13,405	45	55.9	10,388	65	61.8	10,261	63	65.0	9,916	54	59.2
539	61.5	12,109	164	54.7	12,998	143	51.7	17,108	122	51.4	24,663	137	51.5	21,605	130	53.3	28,460	109	54.0
613	41.2	22,263	191	42.4	12,402	172	40.8	24,757	199	39.9	16,080	172	43.8	18,008	151	43.4	21,593	138	41.9
515	36.0	56,042	168	38.7	63,878	168	42.7	61,877	158	44.0	68,550	140	40.8	53,470	139	40.2	62,021	126	40.4
537	41.4	36,473	250	42.7	46,932	246	41.6	54,466	188	37.2	53,417	189	36.8	48,609	190	37.3	72,257	151	39.5

512	32.1	21,470	108	43.5	19,533	93	45.2	25,274	72	40.9	20,062	79	34.6	15,076	75	33.9	18,278	71	38.4
538	35.2	2,549	67	33.8	2,620	60	34.5	3,580	47	37.1	5,122	42	40.1	3,131	34	33.0	4,165	40	35.6
511	36.3	24,385	41	34.1	36,690	33	38.8	20,209	19	38.0	29,796	21	40.3	14,091	17	25.8	15,092	18	35.5
622	28.2	2,617	40	31.3	2,053	38	35.6	8,689	22	45.0	5,590	26	23.1	2,381	33	45.2	2,733	15	34.7
522	35.8	45,012	194	29.4	59,932	184	36.6	64,704	187	31.1	62,418	197	37.6	70,030	230	37.8	60,536	233	34.7
625	27.6	3,872	6	34.0	5,116	9	29.6	182	4	32.4	540	4	38.9	8,285	9	35.5	5,866	18	33.0
542	17.9	2,603	8	47.3	2,394	9	44.7	50,946	5	c.r.	c.r.	2	20.1	10,401	5	25.6	6,462	6	31.9
562	20.0	21,761	55	23.8	47,666	68	23.9	43,569	54	23.8	38,156	55	48.3	13,774	174	46.2	25,968	136	31.0
525	23.0	36,649	115	26.1	41,263	144	29.8	50,396	124	36.2	65,936	143	25.5	68,499	122	33.9	102,869	125	29.1
526	25.6	13,195	113	25.1	17,207	104	27.2	16,035	62	29.0	18,682	86	29.4	27,235	103	34.5	39,414	76	28.5
615	27.0	5,319	57	26.9	6,964	51	22.5	4,736	55	23.6	2,768	42	29.3	1,980	49	31.3	1,703	42	26.8
616	32.5	32,042	156	32.6	53,800	146	27.6	47,306	127	23.4	41,633	130	21.1	35,118	103	18.2	17,876	96	25.9
465	27.4	12,874	10	41.6	11,269	8	c.r.	c.r.	1	10.7	8,627	7	8.3	4,218	7	c.r.	c.r.	2	25.5
561	21.2	24,036	77	18.1	25,333	68	20.4	24,423	60	26.4	40,615	85	24.9	42,962	86	23.2	46,186	78	22.4
464	14.0	19,718	16	8.7	7,285	4	c.r.	c.r.	1	19.1	29,962	5	10.3	9,714	6	41.3	19,159	3	18.2
552	c.r.	c.r.	1	3.3	4,674	4	14.8	30,705	3	c.r.	c.r.	2	37.1	9,780	14	43.1	17,659	8	17.3
520	9.9	30,181	11	17.9	21,979	25	19.7	28,088	16	13.0	18,059	25	18.0	37,468	15	15.4	17,162	10	15.7
500	10.0	16,575	16	14.4	19,133	24	18.6	15,557	35	15.3	22,952	40	8.8	13,240	20	19.1	28,511	10	14.4
543	2.1	18,743	3	8.9	28,384	7	10.5	94,838	4	c.r.	c.r.	2	c.r.	c.r.	2	c.r.	c.r.	2	14.0
510	18.0	7,898	3	13.3	12,884	17	15.7	20,886	16	4.0	5,402	5	4.4	13,568	9	8.4	3,495	6	10.6
524	19.8	135,898	3	5.5	5,328	5	c.r.	c.r.	2	15.0	198	3	6.0	9,706	6	3.9	2,622	7	9.7
637	c.r.	c.r.	1	0.0	0	0	c.r.	c.r.	1	c.r.	c.r.	1	c.r.	c.r.	1	3.8	20,153	6	6.7
533	7.7	19,664	3	2.9	6,589	5	1.9	3,380	4	8.7	25,067	7	8.0	5,707	5	0.0	0	0	4.9

* Source: VTR. NB: shows only 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, Alternatives 2 and 4 contain a number of other measures that, combined, would impact the groundfish industry, and particular segments therein. As the economic impact analyses indicated for Alternative 2, DAS changes would affect fishermen across the board, but would particularly impact, in terms of total DAS usage, those vessels that currently fish their maximum DAS, mostly large and medium vessels, and vessels in the Individual and Fleet permit categories (categories A and B, respectively). 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. However, possible social impacts could stem not only from financial causes; also at issue are the impacts that could result if the 2:1 differential DAS counting measure under Alternative 2 shifted effort into other seasons. During May-July, when DAS would be counted 2:1 in all fishing areas, vessels could change their fishing practices to minimize steaming time and DAS usage, thus increasing conflicts between inshore and offshore groups. If the 2:1 counting in the GOM and/or the restriction on DAS use during May through July resulted in redirecting effort towards fishing in winter, vessel safety also could be at increased risk. Without the 2:1 counting, Alternative 4 would have fewer impacts overall, but the restrictions on DAS use during heavy fishing months could also affect safety if that measure also resulted in redirecting effort towards winter fishing. 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.)

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 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 (see Table 6.6). Moreover, in Alternative 2 a number of the ports that see less of their groundfish landed by vessels that fish with the smaller mesh nets (e.g., Scituate, Portsmouth, see Table 6.6) may still see changes in landings due to the elimination of the Large-Mesh permit category, which received higher DAS allocations (see Table 6.4). The reduction in gillnet aggregate nets would also affect the incomes of a number of vessels, but in terms of volume and dependence on landings from those trips, the effects would be felt strongest in Scituate, MA, and Portsmouth, NH (see Tables 6.7 and 6.8). The significance of this measure is intensified by the proposed closed area, which economic analyses have indicated would most negatively impact small trawl vessels, and then small gillnet vessels. Alternative 4 would, in part, have potentially fewer effects, since the measure regulates only vessels using a multispecies DAS, and the mesh size affects fewer Trip gillnet fishermen. However, Day gillnet fishermen would be more affected by Alternative 4 than by Alternative 2, since the measure applies throughout the area, not just in the GOM, and contains mesh size regulations in addition to restricting the number of nets.

For the recreational fishery, the measures under Alternative 2 that would close the WGOM Area Closure to the recreational fishery could have a significant effect on a number of vessels that land in southern Maine and New Hampshire, as well as a number of ports in Massachusetts. 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 area closures, and the likelihood that fewer fish could be retained due to the larger size limit. Nonetheless, the regulations, coupled with the requirement to declare into either recreational or commercial fishing in the for the duration of the interim action, would limit the flexibility of charter/party boat operations in the GOM. The decreased bag limit for cod under Alternatives 2 and 4 may have the effect of decreasing passenger demand (as indicated in the economic impact analysis). To what extent this increases or decreases the impacts on charter/party boat fishermen, or disproportionately affects some fishermen, is difficult to predict.

6.7 National Standard 8

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 that might fit the Census Bureau's definition of a "place." Thus, while communities based on gear or target species will be discussed within the 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 the purposes of 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 (See Table 6.24). 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).

Table 6.24. Comparative fishing dependence indices for the 11 sub-NRRs of New England.

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

Taking into account the importance of fishery resources to fishing communities

Alternatives 2 and 4 would impact fewer communities less severely than Alternative 3, though the impacts would still be significant. Many ports would be similarly affected by Alternatives 2 and 4, particularly the ports in the North Shore area of Massachusetts and the New Hampshire coast; Maine ports would be less affected by Alternative 4's closures than by Alternative 2 or 3. In terms of National Standard 8, some of the communities most affected by the proposed regulations do not fit a strict interpretation of the criteria for substantial dependence on fishing. For example, Rockport, MA, is the port most affected by the closed area measures in both Alternative 2 and 4, with almost 38 percent of its groundfish landings coming from these proposed closed area, but the MARFIN report states that “[its] proximity to Gloucester and its fishing industry infrastructure makes it easier for Rockport to maintain a viable, if modest, fleet” (Hall-Arber, *et al.*, 2001). And yet, a number of the small North Shore and South Shore fishing ports, and ports in Maine—Newburyport, Marshfield, Marblehead, Beverly, Saco, York, and Cape Porpoise—would be collectively affected by the closed area measures under Alternatives 2 and 4, 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 (Ibid.), is unknown, as is also the vulnerability of these networks to regulations such as the ones proposed. The fact that these are small-boat, day-trip ports, though, as discussed below, suggest that they are highly vulnerable to the near shore closed areas proposed. Moreover, other measures such as the gear changes would also affect these ports—namely Scituate, and Plymouth, MA (see Tables 6.4, 6.6, 6.8, 6.17, 6.19-21).

In addition to Massachusetts ports, New Hampshire ports would also be affected by the closed area measures in Alternatives 2-4, in terms of both volume and dependence. Portsmouth, NH, is one of the ports most affected by Alternatives 2 and 3 (less so by Alternative 4), along with Hampton, Rye, and

Seabrook. These ports would be additionally impacted by the proposed gear changes, particularly Portsmouth and Seabrook, to a lesser extent (see Tables 6.4, 6.6, 6.8, 6.17, 6.19-21). 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 Hampton/Seabrook] as fishing enclaves. Their linkages with regional networks have compensated for the diminished economic status in their own particular places and spaces” (Ibid.).

It is expected that the larger ports, such as Gloucester, MA, and Portland, ME, would be less affected by Alternative 2 or 4, but would see a significant portion of their groundfish landings and vessels impacted by Alternative 3; however, it should also be noted that these ports, as others in the groundfish industry, have already been affected by the rolling closures, which eliminated many of these fishermen’s traditional fishing grounds, and the cumulative effects of these closures may put many fishermen increasingly on the edge of financial solvency. It is expected that New Bedford, MA, would be little affected by Alternative 3, since only 2.5 percent of its groundfish landings come from the proposed closed areas, and it is primarily dependent upon scallops. In terms of sheer volume, Gloucester, MA, and Portland, ME, are important groundfish ports; 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). So too, “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” (Ibid.). The proposed gear changes would also affect larger groundfish ports like Chatham, MA; 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 port of Provincetown, and to a lesser extent Sandwich, would be impacted by Alternative 3. “Although fishing represents an historical activity [in Sandwich], it has always been part of a mixed economy including tourism, agriculture, and transport” (Hall-Arber, *et al.*, 2001). 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 from Alternative 3, since Provincetown sees over 60 percent of its groundfish catch coming from that proposed closed area. This 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 6.16).

Table 6.25. Comparison between the proposed closed areas’ impacts on groundfishing.

Port Landed	Alternative 2			Alternative 3			Alternative 4		
	No. vessels landing groundfish	Ground-fish landings from p.c.a.	Groundfish dependence on p.c.a.	No. vessels landing groundfish	Groundfish landings from p.c.a.	Groundfish dependence on p.c.a.	No. vessels landing groundfish	Ground-fish landings from p.c.a.	Groundfish dependence on p.c.a.
Saco, ME				4	56014	94.1			
York ,ME				4	55,416	83.2			
Newburyport, MA	10	69,749	25.3	14	222,248	80.7	10	69,749	25.3
Hampton, NH	4	28,449	12.3	8	184,039	79.6	4	28,449	12.3

Rockport, MA	8	100,868	37.9	9	183,342	68.9	8	100,868	37.9
Rye, NH	6	47,677	10.1	12	318,496	67.4	6	47,677	10.1
Marshfield, MA	4	27,387	15.3	10	113,937	63.5	4	23,997	13.4
Cape Porpoise, ME				5	89,046	60.9			
Provincetown, MA				30	1,344,217	60.9	10	55,114	2.5
Marblehead, MA	3	31,159	11.1	4	154,709	55.0	3	31,159	11.1
South Bristol, ME				9	253,868	47.2			
Scituate, MA				31	529,831	46.1	12	90,202	7.9
Boothbay Harbor,				6	56,929	44.2			
Seabrook, NH	16	103,218	10.6	25	405,555	41.6	16	103,218	10.6
Green Harbor, MA				17	65,295	40.4	5	7,145	4.4
Portsmouth, NH	19	355,091	17.6	32	746,877	37.1	11	30,932	1.5
Plymouth, MA				15	142,575	33.9	4	9,475	2.3
Gloucester, MA	85	958,200	6.4	152	4,475,186	29.9	73	456,706	3.1
Beverly, MA	3	24,818	16.6	5	40,745	27.3	3	24,818	16.6
Boston, MA				17	680,294	23.7			
Portland, ME	29	540,026	4.7	73	2,690,873	23.4			
Sandwich, MA				7	44,254	17.6			
Port Clyde, ME				9	155,871	17.5			
New Bedford, MA				26	672,107	2.5			

In terms of the other ports affected by Alternative 3, South Bristol, which could see 47 percent of its groundfish landings affected by Alternative 3, “fulfills the definition of a fishing community on the basis of central place theory” (Hall-Arber, *et al.*, 2001); Boothbay Harbor, which could see 44 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.). Scituate, which could see 46 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 40 percent of its groundfish landings affected and neighboring Marshfield, which could see 64 percent of its groundfish landings affected, “has 75-100 [fishing vessels] including 15 charterboats. All are small boats, less than 45 ft long, as the channel into Green Harbor is very narrow” (Ibid.). While Plymouth could see 34 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 24 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.).

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

The proposed closed areas in Alternatives 2, 3 and 4, because of their proximity to shore and because of their 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. Given the need to protect GOM cod, 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 does not propose measures that require review under PRA. This action contains no changes to the existing reporting requirements previously approved under OMB Control Nos. 0648-0202 (Vessel permits), 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

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.*

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. Interim measures addressing overfishing may be implemented even if they are not sufficient, in and of themselves, to stop overfishing. This action is an important first-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, and each for stock exists reference points (such as biomass and F targets and thresholds) specific to that stock. Although the interim measures are intended to focus reductions in fishing mortality on GOM cod, because that is one of the most overfished stocks, the measures 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. 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 will be more severe for those vessels fishing in the GOM, particularly small vessels. 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). 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. 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 was chosen to 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. Other alternatives considered would have either imposed unnecessary costs on some sectors of the industry. Alternative 3, while it is less costly than Alternatives 2 and 4 to enforce, would prohibit groundfish fishing in a large area of GOM and provide industry with no flexibility, which has high costs to the industry. Alternative 4 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 6.7 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.*

This interim action will put in place restrictive measures to reduce fishing effort and fishing mortality on groundfish stocks in the Northeast and to reduce bycatch in the groundfish fishery. Through simultaneous non-regulatory action, NMFS will substantially increase at-sea observer coverage to better monitor and

assess bycatch. The interim action will become effective on May 1, 2002, which is the start of the next fishing year. Although the interim measures are intended to focus reductions in fishing mortality on GOM cod, because that is one of the most overfished stocks, the measures in the interim action will reduce fishing mortality on other stocks, as well. In most areas where the fishery operates, several stocks of groundfish occur together, along with other non-groundfish species, such as skates, spiny dogfish, and monkfish. Area closures, effort restrictions, modifications to the DAS clock, and gear restrictions that are targeted on cod thus also reduce fishing effort on these other stocks. For many of the other species, the expected reductions are substantial. This approach is consistent with the FMP, given the interrelated nature of the multispecies complex. In addition, the increase in the codend diamond mesh requirements for trawl vessels and the increase in gillnet mesh will allow for increased escapement of undersized fish, thereby minimizing bycatch and contributing to increased spawning potential. The impacts of the mesh change can be found in section 5.1.4.2.

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

The conservation and management measures proposed here, to the extent practicable, promote the safety of human life at sea. The Preferred alternative does not include the differential DAS counting measure, which could shift effort into other seasons and areas. If the 2:1 DAS counting in the GOM resulted in redirected effort towards fishing in winter and spring, vessel safety also could be at increased risk. However, the Multispecies Monitoring Committee reported that most vessels, particularly smaller vessels under the Fleet DAS allocation, do not use a majority of the DAS and are thus not currently constrained by their allocation (MMC, 2001). Therefore and without the differential days, it is possible that little redirection would occur.

7.3.2 Required provisions

This interim action is consistent with the required provisions of section 303(a) of the Magnuson-Stevens Act. In describing and assessing this interim action and its likely effects, NMFS consulted with participants in the fisheries and fishing communities both affected by the action and adjacent to the areas affected by this action by way of consultations at meetings of the Mid-Atlantic Fishery Management Council (March 13-14, 2002) and presentations at the Maine Fisherman's Forum (March 1, 2002).

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 first step in a three-step process 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 other steps of this process will analyze impacts through a supplemental EIS. 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?*

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 of commercial and recreational 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. 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 limitations on DAS counting) and gear modifications (gillnet 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.

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, while DAS would be restricted during the time of year when many smaller vessels are able to fish (May-October in the GOM), 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 5.1.3.2.1 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.

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.

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. Under this action, the 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, in time for the start of the new fishing year on May 1, 2002. Action by that date is critical to ensure that WGOM Area Closure, set to re-open May 1, 2002, remains closed. This closure is a critical component of the measures needed to control F on GOM cod. In addition, this action would restrict severely DAS usage, particularly in the GOM, and would add new GOM seasonal and year-round closures, as well as implement new gear restrictions. These measures would clearly have the greatest impact on those vessels that traditionally fish for groundfish in the GOM.

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 additional restrictions on the recreational fishery.

Some fishermen may be disappointed that the WGOM Area Closure will not re-open on May 1, 2002, as scheduled, because they desire to enter these areas to fish on high densities of cod in the area. However, they still have the opportunity to fish outside the closed areas during open periods and under restricted DAS. The majority of the industry appears to support the WGOM Area Closure's extension, however.

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 restrictions, 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

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