An Examination of the Potential Impact on All Affected and Interested Parties of Framework 42 to the Northeast Multispecies Fishery Management Plan

A Report to Congress

Pursuant to Title II, Section 215, of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006

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EXECUTIVE SUMMARY

In Title II, Section 215, of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (H.R. 5964), passed in December 2006, Congress required the Secretary of Commerce to present "a unique, thorough examination of the potential impact on all affected and interested parties of Framework 42 to the Northeast Multispecies Fishery Management Plan."

Framework 42, effective since November 2006, is an adjustment to the fishery management plan for the multispecies (groundfish) fishery off the northeastern United States. The plan's most recent major change, Amendment 13, was implemented in 2004. The amendment added measures to end or prevent overfishing on 19 stocks, and to rebuild those that need it by 2014 in most cases, largely through gradual reduction of fishing effort to sustainable levels or levels required to promote rebuilding. Subsequent groundfish plan Framework actions, including Framework 42, have been used to adjust when, where, and/or how fishing occurs in response to realized fishing rates and stock rebuilding success, and to maximize available fishing opportunities.

The potential effects of Framework 42 were last reported in Section 7.2.4 (pages 317-339) and Section 7.2.5 (pages 340-352) of the Environmental Assessment for the action, published in April 2006. Because the Framework has been effective since November 22, 2006, little new data are available for consideration.

Thus, this report relies heavily on the Framework 42 Environmental Assessment, as it is the most robust analysis of the likely effects of Framework 42. It takes as its focus the 11 elements listed in section 215 for which Congress required specific discussion.

SUMMARY OF FINDINGS

(1) Discussion of the economic and social implications for affected parties within the fishery, including potential losses to infrastructure, expected from the imposition of Framework 42

The composition of the groundfish-related fleets, social structures, and shoreside infrastructure varies widely across the Northeast. All estimates of likely effects are necessarily relative rather than absolute. The most reliable measure of impact is the dependence of a business or community on groundfish landings, and the options available to those who must adjust to changes in groundfish availability. Indeed, analyses of similar actions under the groundfish plan have typically proven to overestimate income loss, largely because businesses adjust somewhat in order to minimize losses.

<u>Economic impacts</u>:

Vessel Revenues: Economic impacts are most easily measured by analyzing likely changes in ex-vessel revenues.[1] Small vessels[2] that mostly fish within the boundaries of the 2:1 differential days-at-sea (DAS)[3] counting area in the Gulf of Maine (comprising Cape Cod Bay and adjacent waters) are likely to be the most affected by Framework 42. In these areas, each day-at-sea used is counted as two days used.

Ports. Ports where relative reductions in total dockside sales over fishing year [4] (FY) 2004 were at least 10 percent included the Massachusetts ports of Gloucester and Boston, while ports with anticipated reductions in sales that were between 5 percent and 10 percent included Portland, Chatham, Provincetown, and the South Shore Massachusetts port group, which includes Plymouth, Scituate, Marshfield, and Green Harbor. Estimated reductions in FY 2006 gross revenues in all other ports was less than 5 percent of FY 2004 levels.

Social Impacts: During the development of Amendment 13, five social factors were identified as being of greatest concern: safety, regulatory discarding, disruption of daily life, formation of attitudes toward the legitimacy of proposed actions, and occupational and community infrastructure. In varying degrees, Framework 42 has potentially negative impacts on each of these social factors.

Shoreside Infrastructure: The magnitude of Framework 42 effects on fishing-related shoreside infrastructure likely correlates with how diversified a port is. Although analyses are provided on changes in ex-vessel revenues generated in each port, available data are not sufficient to further identify the mix of shoreside facilities or businesses that may be affected.

(2) Discussion of the estimated average annual income generated by fishermen in New England, separated by state and vessel size, and the estimated annual income expected after the imposition of Framework 42

Average Annual Income: Average annual fishing income[5] for active groundfish vessels[6] during 2000–2005 is presented in Table 2.2 by year, state, and vessel size. Large vessel[7] income declined in 2000 but increased annually through 2005. Fishing income for medium vessels[8] was relatively stable from 2000 to 2004 and increased in 2005. Average small vessel fishing income fell slightly from 2000 to 2001 but subsequently increased in every year thereafter, attaining a time-series high in 2005.

Estimated annual income under Framework 42: Income is expected to decline by 10 percent during FY 2006, from $208 million to $187 million in gross sales. This loss represents less than

[1] Gross income from first sale of landings.
[2] Less than 50 ft in length overall.
[3] The management plan allocates each limited access permit holder a specific number of days-at-sea for pursuing groundfish.
[4] The groundfishing year starts May 1 and ends on April30 of the following year.
[5] Average annual income: the combined value of sales of all species landed.
[6] Active vessel: any vessel that reported landings of any of the 10 regulated large-mesh groundfish species.
[7] More than 70 ft in length overall.
[8] 50 to 70 feet, inclusive, in length overall.

2 percent of region-wide fishing revenues from all species. A comparison of the FY 2004 total average annual fishing income of active groundfish vessels, the expected income reduction owing to Framework 42, and the resulting estimated FY 2006 income by state and vessel size is presented in Table 2.3.

For vessels that rely on groundfish for less than 20 percent of sales, the estimated median change in FY 2006 total fishing revenue is –4 percent, compared to FY 2004 levels. By contrast, the median impact in FY 2006 on vessels that depend on groundfish trip income for 80 percent of total sales was estimated to be a 26 percent reduction in fishing revenue.

In most cases, the proportional reduction in estimated FY 2006 revenues for large vessels was less than that on smaller vessels from the same home-port state.

Small vessels are estimated to have the highest average loss in FY 2006, about –18 percent, with New Hampshire small vessels having the highest loss (–30 percent) and New Jersey vessels the least (–12 percent). Medium vessels are estimated to have an average loss of about –12 percent, with Massachusetts medium vessels having the highest loss (–22 percent) and New Jersey vessels the least (–7 percent). Large vessels are estimated to have the lowest average loss, about –9 percent, with Massachusetts large vessels having the highest loss (–13 percent) and New York and New Jersey vessels the least (–7 percent).

New Hampshire vessels are estimated to have the highest average loss (–28 percent), followed by vessels home-ported in Massachusetts (–20 percent), Maine (–13 percent), Rhode Island (–12 percent), New York (–11 percent), and New Jersey (–8 percent).

The economic analyses do not account for factors that can mitigate income losses, as most of these are not quantifiable. However, similar analyses in the past have tended to overestimate the negative economic impacts, as a variety of mitigating effects have intervened to improve revenues. For example, with few exceptions, average realized groundfish vessel revenue in both 2004 and 2005 was better than predicted by analyses done for Amendment 13. A comparison between the estimated and realized Amendment 13 impacts is provided in Table 2.3.

In some cases, observed groundfish revenues declined, but the losses were offset by increased revenues received from the sale of non-groundfish species. In others, fishing revenues increased owing to increased sales of all species, including groundfish. In other situations, realized income declined, but by substantially less than projected.

(3) Discussion of whether the differential days-at-sea counting imposed by Framework 42 would result in a reduction in the number of small vessels actively participating in the New England Fishery

The number of limited access[9] groundfish vessels that have actively participated in the groundfish fishery has declined each year since 2001 across all vessel size classes. Some of the decline can be attributed to permits retired through a buyout program during 2001 and 2002.

[9] Limited access: in the Northeast, a permit to fish that is associated with one vessel, that is obtained only by qualified applicants within a specific qualifying time period, and that is issued once.

The proportional decline in the total number of participating small vessels (–33 percent) was higher than that of either medium (–19 percent) or large vessels (–19 percent). Given this consistent trend, and that Framework 42 reduces available “A” DAS[10] for all vessels, it is likely that some vessels in each size class will exit the groundfish fishery. It is not possible to predict with certainty how many vessels will do so, or if more of these will be small vessels than those of other size classes. However, if trends persist, proportionally more small vessels will exit the fishery, especially because many small vessels will likely find it more difficult to offset differential DAS counting in the Gulf of Maine.

(4) Discussion of the percentage and approximate number of vessels in the New England fishery, separated by state and vessel type, that are incapable of fishing outside the areas designated in Framework 42 for differential days-at-sea counting

A vessel was deemed operationally incapable of fishing outside the area of differential DAS counting if it had no history of taking a trip of sufficient distance to allow it to fish outside of the area without changing its current home port. The analysis assumed home ports would not be changed.

Under Framework 42, differential counting of days-at-sea applies in two fishing areas, one comprising the inshore Gulf of Maine (GOM) and the other off southern New England. Because the Southern New England area does not extend to the shoreline, any vessel fishing in that area could fish closer to shore without increasing trip distance. For this reason, none of the vessels fishing solely in this area were considered operationally incapable of fishing outside the area. The analysis thus looked for vessels that exclusively fished in the Gulf of Maine differential DAS area and then examined their history of fishing outside the area.

Small and medium-sized vessels from Massachusetts and New Hampshire are the most likely to be incapable of fishing outside of the Gulf of Maine differential DAS area.

In calendar year 2005, 18 percent (187 vessels) of the groundfish fleet fished exclusively in the GOM differential DAS area. Fifty-four percent (101 vessels) of these vessels may be classified as being incapable of fishing outside the area. That is, they have no history of taking a trip of sufficient length to allow them to fish outside the area, given their current home port. These vessels represent 9 percent of all limited access groundfish permit holders.

Of the 187 vessels, 143 were Massachusetts vessels, 31 New Hampshire, and 13 Maine. Of the 101 vessels that do not have the operational range to fish outside of the differential DAS counting area without changing their chosen home port or base of operation, 80 are Massachusetts vessels, 19 New Hampshire, and two Maine.

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[10] Each vessel’s DAS allotment is further divided into categories A, B, and C. A DAS can be used to target any regulated groundfish stock, subject to the restrictions on gear, areas, and landing limits. B DAS are used to target only groundfish stocks that are not overfished and that are not subject to overfishing. At present, C DAS may not be used in the fishery.

Table 4.8 provides the complete breakdown of the results of this analysis by year, state, and size class.

(5) Discussion of the percentage of the annual groundfish catch in the New England fishery that is harvested by small vessels

The report examines landings rather than catch, as the former is a more robust number. The share of the region's aggregate groundfish species[11] landed by small vessels was highest in 2000 at 26 percent, but ranged from 22 percent to 25 percent in subsequent years through 2005. The percentage of aggregate groundfish landed by medium-sized vessels has been declining over time, from 30 percent in 2000 to 25 percent in 2005. By contrast, the share of aggregate groundfish landed by large vessels has increased, from a low of 44 percent in 2000 to more than 50 percent in both 2004 and 2005.

Small vessels have accounted for at least 70 percent of Gulf of Maine cod landings in every calendar year since 2001, and for an increasing proportion of annual Cape Cod/Gulf of Maine yellowtail flounder landings, accounting for nearly half the landings in 2005. Both of these stocks require substantial reductions in landings; indeed Framework 42's differential DAS counting areas were developed to protect these stocks. In comparison, during the same time periods, large vessels landed at most 7 percent of total Gulf of Maine cod and a declining proportion of Cape Cod/Gulf of Maine yellowtail flounder, accounting for just 12 percent of the landings in 2005.

(6) Discussion of the current monetary value of groundfish permits in the New England fishery and the actual impact that the potential imposition of Framework 42 is having on such value

In the Northeast Region, owners acquire limited access permits through one or more transactions involving the transfer of a vessel with its permits. The value or sale price paid for these transfers is not collected or recorded by NOAA's National Marine Fisheries Service. Therefore, no data are available on which a quantitative estimate of the market value of a groundfish permit could be derived. Because Framework 42 affects fishing opportunities for all vessels—particularly those unable to adjust fishing practices to offset the effects of the differential DAS area in the Gulf of Maine—the potential impacts on market value of a fishing business are larger for some vessels than others.

Section (7) Discussion of whether permitting days-at-sea to be leased is altering the market value for groundfish permits or days-at-sea in New England

The value of a fishing business is affected by its stream of future income. In the absence of leasing, the marginal contribution of groundfish to the fishing business is constrained by an individual's DAS allocation. Leasing provides an opportunity for mutually beneficial gains between renter and owner: the renter is able to increase potential income received from groundfish, and the owner of the DAS receives higher income than otherwise could have been

[11] Cod, haddock, pollock, redfish, white hake, yellowtail flounder, witch flounder, windowpane flounder, American plaice, and winter flounder.

earned. In this respect, days-at-sea leasing may be propping up market values of groundfish vessels or permits.

(8) Discussion of whether there is a substantially high probability that the biomass targets used as a basis for Amendment 13 remain achievable

All biomass targets in Amendment 13 have at least a 50 percent chance of being attained. as long as the states of the populations as projected for 2003 and the fishing mortality (F) targets laid out in the plan are achieved. Projections are based on averages of growth, recruitment and mortality processes, and measures of their uncertainty. Ultimately, the "achievability" of a suite of biomass targets depends on the combined effects of sound fisheries management, moderate levels of recruitment, and average rates of growth. For the most part, biomass targets are based on analyses of heavily exploited stocks that would have produced much larger biomasses and yields had the fishing mortality rates been lower.

The probability of attaining a biomass target is always changing with the duration of the forecast period. As the endpoint of a forecast period approaches, the probability of achieving the target depends less on assumptions and more on the actual levels of F, recruitment, and growth that have occurred since the start of the forecast period.

Also, retrospective patterns have been observed in a number of groundfish stock assessments. The most common pattern has been an overestimate of stock abundance and an underestimate of fishing mortality in the terminal year of the assessment. As additional years of data are added, typically stock abundance is updated to lower values and fishing mortality rates are updated to higher values, although the opposite has been observed as well. If management regulations for rebuilding do not account for the effect of retrospective patterns on estimates of initial population size, then rebuilding will be slower than projected if the stock abundance is updated to lower values, or faster than projected if the stock abundance is updated to higher values.

(9) Discussion that identifies the year in which the biomass targets used as a basis for Amendment 13 were last evident or achieved, and the evidence used to determine such a date

For nine of 19 stocks, the proposed biomass reference points have not been observed since the advent of modern monitoring programs in the early 1960s. However, the fact that some of the biomass targets have not been observed over the recent period should not be construed as evidence that such targets are unattainable, either singly or in aggregate. Observed stock size, particularly during the last quarter of the 20^{th} century when fishing rates were extremely high, is not a good indicator of the stock productivity that existed prior to periods of intense fishing, nor is it an indicator that productivity cannot be achieved after exploitation rates are reduced to sustainable levels.

Most of the groundfish stocks were heavily fished throughout the 20^{th} century, with many reaching historically low levels in the 1980s and 1990s. The fishery has been characterized not only by increasingly efficient targeting of market-sized fish, but also by bycatch of immature fish, sometimes in great number. This has compromised the ability of the stocks to replenish lost adults and has also affected growth and reproductive rates in some stocks.

Still, some of the Amendment 13 biomass targets are within the range of previously observed levels. Two stocks with the longest assessment time periods illustrate that biomass has been close to the current biomass target in the past. Georges Bank haddock was at 71 percent of the biomass target in 1966, and Georges Bank winter flounder was at 89 percent of its biomass target in 1970.

Nonetheless, in view of uncertainties about the actual productivity of recovering stocks, an adaptive approach to biomass management was adopted for groundfish rebuilding. This has meant reducing fishing mortality (or in some cases maintaining current rates) so that recruitments at higher spawning stock biomasses can be observed and evaluated. This will allow direct examination of recruitment associated with maximum sustainable yield and thus the appropriateness of recruitment levels used to set biomass reference points.

(10) Discussion of any separate or non-fishing factors, including environmental factors that may be leading to a slower rebuilding of groundfish than previously anticipated

There is some evidence that non-fishing factors may confound the full attainment of the target biomass level for some species. Environmental factors in particular can affect the growth and maturation rate of fish, both directly and indirectly. A slower growth rate may delay maturation, which translates to a slower-than-expected increase in the spawning stock biomass.

A thorough analysis is presently under way of the trends in average size at age for a variety of Northeast groundfish. Results of these investigations will be peer-reviewed at a scientific meeting scheduled for August 2008. Preliminary results suggest that reductions in average size at age have occurred for some, but not for all species. For example, Georges Bank haddock is known to exhibit density-dependent growth,[12] particularly following large recruitment events. The very strong 1963 haddock year class exhibited a decreased growth rate and, most recently, the very strong 2003 year class has exhibited a growth rate even lower than that of the 1963 year class. Georges Bank cod, on the other hand, exhibited a decline in growth rates from the mid-1980s until 1995 despite a declining trend in stock biomass. Gulf of Maine cod does not show any persistent trend.

At this time it is not possible to assign causes to the observed trends in average size. Trends in average weight at age can also be the result of biological and environmental factors operating simultaneously. Long-term genetic effects of size-selective fishing have also been posited as the reason for smaller average size at age. However, evidence for such changes and their timing must be consistent with known genetic and life-history theory. The present evidence for broad-scale genotypic changes in the stocks is weak. The trends among species are not consistent, and not all of the species are affected in the same way.

(11) Discussion of the potential harm to the non-fishing environment and ecosystem from the reduction in fishing resulting from Framework 42 and the potential redevelopment of the coastal land for other purposes, including potential for increases in non-point source of pollution and other impacts

[12] At high population levels, growth of individuals is slower; at low population levels, growth is faster.

Analyses conducted for Framework 42 concluded that there would be no adverse impact on essential fish habitat from a reduction in fishing. Thus, the likely harm to the marine environment would be associated with possible changes in waterfront land and water uses that might result from Framework 42. For this reason, we focused on the second part of the requested discussion.

Reduced revenues derived from groundfish sales that cannot be compensated for by other species or other fisheries will increase economic hardships in ports that have already been affected by declining groundfish landings and days-at-sea. These ports are also affected by nationwide trends toward greater use of waterfront property and waterways for recreational boating, residential development, and tourism; commercial fishing is one more competitor for this increasingly scarce asset.

The growth in recreational boating has the greatest potential to displace commercial fishing activity shoreside and to affect marine environments. In Gloucester and southern and mid-coastal Maine, recreational boat use has increased, generating demand for new and expanded marina facilities in harbors that support commercial fishing. Very little docking or mooring space is available in these ports, and often commercial vessels have priority for use. If Framework 42 prompts more boats to leave the fishery, or to relocate to other ports where vessel services and markets are more available, dock space may open up for recreational vessels.

Several other impacts to marine environments in New England harbors could result from a partial displacement of commercial fishing infrastructure. None of these potential impacts are new—they already exist in ports and harbors that service the groundfish industry. Some impacts are potentially more severe if there is a significant increase in recreational boating and an expansion of existing marina facilities in or near inner harbor areas, or if shoreside facilities in deep-water ports are expanded to accommodate more non-fishing commercial vessels. However, the quality of shoreline habitats, water and sediment in urbanized inner harbors is already degraded. Some sources of pollution will remain even if there is a reduction in commercial fishing infrastructure. Therefore, it is very unlikely that conversion of land or water uses associated with the groundfish industry to other commercial or recreational uses will cause any measurable change in marine environmental quality in these ports.

INTRODUCTION

Title II, Section 215, of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (H.R. 5964), entitled “New England Groundfish Fishery,” requires the Secretary of Commerce to “conduct a unique, thorough examination of the potential impact on all affected and interested parties of Framework 42 to the Northeast Multispecies Fishery Management Plan.”[1] Further, the Secretary is required to “report the Secretary’s findings under subsection (a) …and include in the report a detailed discussion of each of the following:

(1) The economic and social implications for affected parties within the fishery, including potential losses to infrastructure, expected from the imposition of Framework 42.
(2) The estimated average annual income generated by fishermen in New England, separated by State and vessel size, and the estimated annual income expected after the imposition of Framework 42.
(3) Whether the differential days-at-sea counting imposed by Framework 42 would result in a reduction in the number of small vessels actively participating in the New England fishery.
(4) The percentage and approximate number of vessels in the New England fishery, separated by State and vessel type, that are incapable of fishing outside the areas designated in Framework 42 for differential days-at-sea counting.
(5) The percentage of the annual groundfish catch in the New England fishery that is harvested by small vessels.
(6) The current monetary value of groundfish permits in the New England fishery and the actual impact that the potential imposition of Framework 42 is having on such value.
(7) Whether permitting days-at-sea to be leased is altering the market value for groundfish permits or days-at-sea in New England.
(8) Whether there is a substantially high probability that the biomass targets used as a basis for Amendment 13 remain achievable.[2]
(9) An identification of the year in which the biomass targets used as a basis for Amendment 13 were last evident or achieved, and the evidence used to determine such date.
(10) Any separate or non-fishing factors, including environmental factors, that may be leading to a slower rebuilding of groundfish than previously anticipated.
(11) The potential harm to the non-fishing environment and ecosystem from the reduction in fishing resulting from Framework 42 and the potential redevelopment of the coastal land for other purposes, including potential for increases in non-point source of pollution and other impacts.

The following report addresses these requirements.

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[1] Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery, Framework Adjustment 42; Monkfish Fishery, Framework Adjustment 3, October 23, 2006.

[2] Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) Provisions; Fisheries of the Northeastern United States; Northeast (NE) Multispecies Fishery, Amendment 13; Final Rule. May 1, 2004.

BACKGROUND

Framework 42 Development

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act. The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for 12 groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, ocean pout) off the New England and Mid-Atlantic coasts. The FMP has been updated through a series of amendments and framework adjustments. The most recent multispecies amendment, published as Amendment 13, was approved by NOAA's National Marine Fisheries Service in March 2004 and became effective on May 1, 2004. This amendment adopted a broad suite of management measures in order to achieve fishing mortality targets and to meet other requirements of the Magnuson-Stevens Act.

For several groundfish stocks, the mortality targets adopted by Amendment 13 represented substantial reductions from existing levels. For other stocks, the mortality targets were the same or higher than existing levels, and mortality could remain the same or even increase. Because most fishing trips in this fishery catch a wide range of species, it is impossible to design measures that will selectively change mortality for an individual species. The management measures adopted by the amendment to reduce mortality where necessary are also expected to reduce fishing mortality unnecessarily on other, healthy stocks. As a result of these lower fishing mortality rates, yield from healthy stocks is sacrificed and the management plan may not provide optimum yield (that is, the amount of fish that will provide the greatest overall benefit to the nation). Amendment 13 created opportunities to target these healthy stocks.

The FMP restricts the number of days that vessels can fish by allocating each limited access permit holder a specific number of days-at-sea (DAS). Amendment 13 further defined three categories of DAS. The DAS categories are:

- Category A: These DAS can be used to target any regulated groundfish stock, subject to the restrictions on gear, areas, and landing limits that are defined by the FMP.
- Category B: These DAS are used to target only healthy groundfish stocks—that is, stocks that are not overfished and that are not subject to overfishing. Programs to use Category B DAS prescribe specific conditions for their use. B DAS are classified as regular or reserve. B (reserve) DAS may only be used in approved special access programs.
- Category C: These DAS cannot be used, but remain associated with a permit. As stocks rebuild, in the future some of these DAS may be re-allocated into other categories and may be used.

Since the implementation of Amendment 13, three framework adjustment actions were adopted. These frameworks created opportunities to use Category B DAS. Some of the adopted programs are pilot programs that may end after fishing year (FY) 2006 (May 1, 2006 through April 30, 2007).

Amendment 13 adopted a schedule for periodic reviews of groundfish stock status and opportunities to adjust the FMP to make certain that fishing mortality targets are achieved. The first such plan adjustment was scheduled for implementation by May 1, 2006. In order to provide information on stock status for that action, groundfish stock assessments were performed in August 2005. Of 19 managed groundfish stocks, the assessments found that fishing mortality for 7 stocks exceeded Amendment 13 targets. Framework 42 is the adjustment that was designed to reduce mortality on these stocks so that rebuilding will continue. In addition, the framework modifies several other programs to meet the objectives of the Magnuson-Stevens Act.

Because of delays in developing this framework adjustment, the proposed management measures were not implemented on May 1, 2006. As a result, the Secretary of Commerce announced plans to implement emergency measures that took effect on May 1, 2006 and remained in effect until Framework 42 was implemented on November 22, 2006.

Framework 42 Specific Measures

Framework 42 includes a broad range of measures designed to achieve mortality targets, provide opportunities to target healthy stocks, mitigate (to the extent possible) the economic impacts of the measures, and improve administration of the fishery. Details of the measures are summarized below. The measures include but are not limited to:

Commercial Measures

- A change in the ratio of Category A and B DAS that reduces the number of Category A DAS available to the fishery by 8.3 percent.
- Establishment of areas in the Gulf of Maine (GOM) and southern New England (SNE) where DAS are counted at the rate of 2:1. In the GOM, a vessel is charged this rate for the entire trip if it catches fish from this area at any time. In SNE a vessel is charged at the differential rate only for time spent in the area.
- Adoption of a trip limit for Georges Bank (GB) yellowtail flounder and Georges Bank winter flounder and of changes to the trip limits for Cape Cod/Gulf of Maine (CC/GOM) and southern New England/Mid-Atlantic (SNE/MA) yellowtail flounder.
- Provision to allow the Regional Administrator to adjust trip limits, including specific guidance to adjust the GB yellowtail flounder trip limit.

Recreational Measures

- In order to reduce fishing mortality of GOM cod, the minimum size for cod is increased to 24 inches, and possession of cod from the GOM is prohibited from November 1 through March 31.

Special Management Programs

- Category B (regular) DAS Program: The program is extended, but the total number of DAS that can be used in the program is reduced to 3,500. Trawl vessels are required to use a haddock separator trawl. Incidental catch Total Allowable Catches (TACs) are adopted for GB yellowtail and winter flounder. Trip limits are adopted that will prevent targeting GB yellowtail, GB winter flounder, and monkfish.
- Closed Area I Hook Gear Haddock Special Access Program (SAP): A process is established to automatically adjust the haddock TAC for this SAP based on changes in exploitable biomass of the haddock stock.
- Eastern U.S./Canada Haddock SAP: This SAP is extended through fishing year 2008. The opening date for the SAP is changed from May 1 to August 1. A process is also defined for the Regional Administrator to approve additional gear that can be used in this SAP.
- Standard Requirements for Special Management Programs: Standard reporting and other requirements are adopted for all SAPs and the Category B (regular) DAS program in order to simplify compliance and the implementation of future programs.

Fixed Gear Sector

- A second sector (GB Cod Fixed Gear Sector) is established that will be assigned a hard quota for GB cod. Participants must agree to use sink gillnets, jig, handline, or non-automated demersal longline gear.

DAS Leasing

- The DAS leasing program is extended with no changes.

DAS Transfer Program

- The permanent exchange of DAS through the DAS Transfer Program is made more favorable through modifications to this program. This includes technical changes intended to clarify the transfer of permit and fishing history, elimination of the requirement that the vessel selling DAS exit all fisheries, and a prohibition to prevent hook category vessels from transferring DAS to vessels that are not required to use hook gear.

Vessel Monitoring System (VMS)

- All limited access DAS groundfish vessels are required to install a VMS in order to fish for groundfish while on a DAS. A vessel is allowed to renew its groundfish permit without installing a VMS but is not allowed to fish for groundfish during the fishing year without a VMS.

Haddock Separator Trawl Incentive Standards

- In order to encourage the proper use of the haddock separator trawl, vessels required to use the trawl will be subject to landing no more than 500 pounds of flounders (all species, combined), monkfish (whole live weight), and skates, and will be prohibited from landing lobsters.

Haddock Trip Limit

- The haddock trip limit is removed, but the Regional Administrator retains authority to implement a trip limit if necessary to prevent exceeding the haddock TAC.

The remainder of this report focuses on the specific issues identified in the legislation for further discussion.

DISCUSSION

Section (1). Discussion of the economic and social implications for affected parties within the fishery, including potential losses to infrastructure, expected from the imposition of Framework 42

The potential economic and social impacts on parties directly affected by Framework 42 were discussed in Section 7.2.4 (pages 317–339) and Section 7.2.5 (pages 340–352) of the Environmental Assessment for Framework 42.[3] The following provides a summary of those findings.

The total value of all species landed by vessels with a limited access days-at-sea (DAS) permit was $208 million during fishing year 2004. The framework action is expected to result in a 10 percent reduction in fishing revenue for an aggregate impact of $21 million in gross sales during fishing year 2006. This loss represents less than 2% percent of total region-wide fishing revenues from all species, but would be substantially greater in ports that are highly dependent on groundfish.

Estimated reduction in groundfish revenue alone ranged from a low of 13 percent in Portland, Maine, to a high of 43 percent in the "Other NH Coast" port group (includes the ports of Rye, Seabrook, Hampton, Hampton Beach, Hampton Falls, and Newington). Even though the Other NH coast port group had the highest estimated reduction in groundfish sales, the impact on the port as a whole would only be a 3.4 percent reduction compared to fishing year FY 2004 sales because the port group had low dependence on groundfish for total sales.

By contrast, the estimated impact on groundfish revenue was lowest in the port of Portland (about one-third that of the Other NH Coast port group) but, with a much higher dependence on groundfish, the impact on combined sales was more than twice as great. Estimated losses in the ports of Boston, Portland, Portsmouth, Gloucester, South Shore of Massachusetts, and Chatham all ranged from 7 to 15 percent compared to total port revenues in FY 2004.

Framework 42 is expected to have a proportionally larger impact on groundfish vessels less than 50 feet in length overall (LOA). Vessels using hook gear were estimated to experience comparatively lower impacts on total fishing revenue than were both gillnet and trawl vessels, which had similar estimates.

Overall, the clearest measure of impact is any given vessel's dependence on groundfish for total fishing income. The median impact on vessels that rely on groundfish for less than 20 percent of sales would be only a 4 percent reduction in sales. By contrast, the median impact on vessels that depend on groundfish trip income for 80 percent of total sales was estimated to be a 26 percent reduction in fishing revenue.

Among several other measures, Framework 42 implements differential DAS counting at a rate of 2:1 in several inshore blocks in the Gulf of Maine. These areas are typically fished by smaller groundfish vessels using either gillnet or trawl gear, many of which have high dependence on

[3] Available online here: http://www.nefmc.org/nemulti/frame/frame_42.html

groundfish for total fishing revenue. Further, many of these vessels do not typically fish for groundfish elsewhere and have limited range to avoid the 2:1 DAS counting.

These vessels also account for the majority of the Gulf of Maine cod catch and a substantial amount of the Cape Cod yellowtail flounder, stocks that both require substantial reductions in landings. For this reason, impacts on the fleet of vessels operating in the inshore Gulf of Maine are expected to be higher than impacts on vessels fishing elsewhere in the Gulf of Maine or on Georges Bank. In fact, when compared to a reduction that would be proportional to each vessel's share of landings of every stock of concern, estimated reductions under the Framework Action exceed this proportion for both the inshore Gulf of Maine dependent fleet (for purposes of analysis defined as having spent at least 75 percent fishing time in the inshore area) and for all other vessels. Note that the magnitude of impact is still greater for the inshore-dependent fleet, but, depending on the criterion used, this fleet may or may not be said to be disproportionately affected.

The principal point here is that achieving the biological objectives in a multispecies fishery having different conservation needs in overlapping stock areas means that economic yield will be sacrificed to achieve biological requirements of the weakest stock. This problem is exacerbated by the fact that effort controls (DAS, trip limits, closed areas, and gear modifications) lack the precision to match individual vessel performance with conservation objectives.

During the development of Amendment 13, five social factors were identified as being of greatest concern: safety, regulatory discarding, disruption of daily life, formation of attitudes toward the legitimacy of proposed actions, and occupational and community infrastructure. In varying degrees, Framework 42 impacts each of these social factors.

The differential DAS area in the Gulf of Maine may create incentives to avoid fishing in this area. Vessels that have been highly dependent on these areas tend to be smaller and have limited range. Some of these vessels may be expected to try fishing farther from shore, where it may be more difficult to return to port in the event of deteriorating weather conditions. Vessels most likely to be affected are small vessels operating from Massachusetts ports bordering Cape Cod Bay and northward to New Hampshire. The differential DAS counting in the southern New England area seems less likely to create an incentive for risk-taking, because the area is offshore and vessels would still be able to avoid the area by fishing closer to shore.

Framework 42 introduced new trip limits for several species and retained existing trip limits for others. Of these, the limit for Georges Bank yellowtail flounder was developed based on input from fishermen who target that stock, and may therefore be deemed acceptable by fishermen. However, input was not accepted from the same group of fishermen about recommendations for Georges Bank winter flounder, and that trip limit is not likely to be viewed favorably. Framework 42 implemented the same trip limits for both southern New England and Cape Cod/Gulf of Maine yellowtail flounder. This change eliminated the need for separate sign-in programs but also lowers the trip limit for both stocks. For the first time under the plan, there is a white hake trip limit. Overall, these new trip limits are likely to result in higher levels of regulatory discarding and potentially adverse social impacts.

Disruption in daily living was defined in Amendment 13 as “changes in the routine living and work activities of affected fishery participants, including the potential for alteration in social and work patterns to adapt to new management measures.” Of the measures implemented through Framework 42, the DAS reductions and the differential DAS are the most likely to result in disruption of daily living. Fishermen may alter fishing strategies by fishing in alternative, and potentially unfamiliar, areas and may seek out alternative fisheries. For some fishermen, avoiding the differential DAS area in the Gulf of Maine may only be possible by relocation to a different port. Not only would the normal or usual work activities for these vessels be disrupted, so too would family and other social obligations. As noted previously, these social impacts are most likely to be greater for owners and crews of small vessels with Gulf of Maine home ports in Massachusetts and New Hampshire than for those in other ports.

Overlaying the differing perceptions of management success is the requirement to simultaneously meet all biological objectives. This requirement is particularly difficult to achieve where stock areas overlap and rebuilding needs differ. In the Northeast multispecies fishery, this circumstance means that management decisions and the design of regulations are being driven by the needs of the weakest stock. Indeed, Framework 42 was developed in part to address the need to meet rebuilding objectives for Cape Cod/Gulf of Maine and southern New England yellowtail flounder. Many fishermen have argued that the so-called “weak stock exception” to the National Standard 1 guidelines should have been invoked, at least for Cape Cod Gulf of Maine yellowtail flounder. The argument is based on the observation that even if rebuilt, the stock contributes little to overall fishing revenues, and achieving the biological objectives under current conditions results in unacceptably foregone fishing opportunities on larger, healthier stocks.

Framework 42 has drawn the largest negative response from fishermen most affected by the differential DAS counting area in the Gulf of Maine. Fishermen working in this area predominantly operate small dayboats. They have fewer opportunities to fish elsewhere and have been limited by seasonal closures and low trip limits since the late 1990s. Many in this fleet argue they are being unfairly constrained because of the relatively small number of boats with high landings of cod and/or yellowtail flounder. Still others have suggested that Framework 42 will do little to conserve cod, holding that affected vessels will increase effort on cod because it is relatively high in value and can be easily caught with a minimum of used fishing time. These fishermen see the Framework as doing little more than cutting fishing revenues without the corresponding benefit to conservation of Gulf of Maine cod.

The social impact factor of changes in occupational opportunities and community infrastructure is defined as the degree to which opportunities within the fishing and fishing-related occupations will be affected by management action. The extent to which occupational opportunities are affected by Framework 42 is uncertain. Past analyses of fishery management actions have tended to overestimate the adverse economic effects, because a variety of mitigating effects (for example, changing prices, alternative fisheries, and DAS leasing) have not been taken into account. However, since 2001 the number of vessels participating in the groundfish fishery has been declining, and some level of attrition may be expected to result from Framework 42.

Since 2001 the number of vessels participating in the groundfish fishery has declined by 26 percent overall. The number of vessels larger than 70 feet LOA and the number of vessels 50 to 70 feet has declined by 19 percent, and the number of vessels smaller than 50 feet LOA has declined by one-third. Note that in the multispecies fishery, as well as in most fisheries in the Northeast region, crew and hired captains are considered sole proprietors for income tax reporting purposes. According to non-employer statistics available from the U.S. Census Bureau, the number of sole proprietorships in coastal counties from Maine to Rhode Island in the fishing sector (NAICS code 1141)[4] has declined by only about 5 percent from 2001 to 2004 (the most recent year available). These data indicate that the number of people engaged in a fishing occupation has declined, but not by as much as would be suggested by looking at groundfish vessel participation alone.

The impact of Framework 42 on fishing-related shoreside infrastructure is uncertain, but likely correlates with how diversified each port is with respect to the mix of species and vessels operating out of those ports. For example, Portland was estimated to experience a 13 percent reduction in groundfish revenues entering the port, which represents a 7.5 percent reduction in the total value of all species landed in Portland. By contrast, the estimated reduction in groundfish revenue entering Maine ports other than Portland was higher than that of Portland, but because these ports rely more heavily on species other than groundfish (principally lobster), the impact on the value of total landings in these ports was less than 1 percent. Ports where the reduction in total value of all landings was predicted to be 10 percent or more include Portsmouth, Gloucester, and Boston. Ports with estimated reductions of between 5 and 10 percent in total revenues included Portland, Chatham, Provincetown, and the port group of South Shore Massachusetts. Although the impact on shoreside infrastructure in these ports is likely to be greater than elsewhere, available data are not sufficient to identify the mix of shoreside facilities or businesses that may be affected in any one of these ports.

[4] U.S. Census Bureau North American Industry Classification System code.

Section 2. Discussion of the estimated average annual income generated by fishermen in New England, separated by state and vessel size, and the estimated annual income expected after the imposition of Framework 42

Primarily because of significant differences among vessels in terms of the importance of groundfish in total fishing sales, Framework 42 will have different impacts across vessels of varying sizes, gear types, home ports, or home states. Analyses show that negative impacts on vessels with a home port of Maine, New Hampshire, and Massachusetts would be greater than on those home-ported in other states. Among these three New England states, the action would affect proportionally more New Hampshire vessels, but the expected impact on the most affected class of vessels (i.e., the 10 percent of vessels most affected) was the same for similarly affected vessels in Massachusetts and for New Hampshire. Impacts on vessels with a Maine home port would be considered substantial, but were less than impacts on New Hampshire or Massachusetts vessels.

Average annual income by limited access groundfish vessels was estimated by merging identified limited access multispecies permit holders with dealer reports for calendar years 2000 through 2005. Annual income was defined as the value of sales of all groundfish species as well as combined sales from all other species. Estimates of average annual income were computed for all vessels that participated in the groundfish fishery by home-port state and vessel size. Participation in the groundfish fishery or an "active vessel" was defined as any vessel that reported landings of any of the 10 regulated large mesh groundfish species. Note that because the State of Connecticut provides only summary information without identifying individual vessels, the estimated average revenue for Connecticut home-ported vessels is likely to be unreliable and is not reported.

Average Fishing Income

Average annual fishing income for large vessels declined from $525,000 in 2000 to $511,000 in 2001 but has increased in every year since 2001 and was $705,000 in 2005 (Table 2.1). Fishing income for medium vessels ranged between $240,000 and $231,000 from 2000 to 2004 but increased to $290,000 in 2005. Average small vessel fishing income fell about $5,000 from 2000 to 2001. However, average annual fishing income generated by small vessels has increased in every year since 2001 and increased to a time-series high of $118,000 in 2005.

Maine – In 2001, average fishing income was $665,000 for large vessels with a Maine home port. With the imposition of interim measures affecting groundfish activity throughout the Northeast region, average large vessel income fell in both 2002 and 2003. However, average fishing income for Maine large vessels increased to $595,000 in 2004 and increased to $832,000 in 2005. Average annual income for medium-sized vessels in Maine was about $305,000 in both 2000 and 2001. Average annual fishing income dropped to $289,000 in 2002 and increased slightly in 2003 before dropping again to $262,000 in 2004. In 2005, average annual fishing income for medium-sized vessels from Maine increased by just over $40,000 to $303,000, approximately the same as that of pre-Amendment 13 levels. Small-vessel average fishing income was $91,000 in 2000. Average income fell to $79,000 for small vessels in 2001 but has

Table 2.1. Average Annual Income Generated by Active Limited Access Groundfish Vessels by Home-port State and Vessel Size (Calendar Years 2000 to 2005)

Home-port State	2000	2001	2002	2003	2004	2005
			All Vessels			
MA	194,646	188,170	200,759	195,142	210,974	282,842
ME	204,414	182,590	187,053	191,838	203,200	240,531
NH	138,108	142,210	129,887	121,861	128,992	163,358
NJ	235,179	214,057	222,687	198,422	257,447	325,483
NY	205,036	191,595	214,769	198,928	213,152	259,119
RI	332,303	294,253	307,899	323,128	347,530	379,140
Other	346,782	281,221	258,707	336,275	444,588	457,135
			Large Vessels[1,2]			
MA	569,476	577,479	571,050	565,925	578,943	726,323
ME	576,741	665,402	553,161	512,097	595,300	832,068
NJ	349,542	348,912	347,904	351,191	498,608	664,468
NY	440,507	414,750	459,430	522,483	550,506	619,428
RI	599,547	523,562	530,214	578,494	617,316	678,992
Other	442,950	363,545	472,795	437,490	569,083	625,078
All Large	524,757	510,952	527,621	534,971	582,099	704,965
			Medium Vessels[1]			
MA	234,801	229,936	228,791	209,904	209,230	269,382
ME	305,620	304,658	288,983	292,684	261,708	302,680
NH	163,824	199,695	126,644	129,152	131,959	200,063
NJ	203,336	156,619	207,845	207,925	233,846	321,894
NY	227,220	235,820	240,192	199,285	247,000	275,729
RI	263,773	252,652	268,910	307,742	308,469	346,327
Other	193,149	173,431	194,981	175,973	229,335	226,307
All Medium	240,284	234,383	238,610	231,360	237,056	290,000
			Small Vessels[1,3]			
MA	72,569	66,826	76,616	79,769	81,378	114,392
ME	91,258	79,280	88,157	90,838	97,867	123,629
NH	118,830	113,431	107,894	99,837	99,835	128,608
NJ	152,660	150,972	141,777	123,837	117,287	189,329
NY	56,313	57,177	62,456	51,566	49,190	89,208
RI	111,248	109,833	92,968	79,836	77,118	99,413
All Small	81,974	76,656	83,042	82,917	84,153	118,370

1 Data not reported for Connecticut vessels to protect confidentiality of reporting units.
2 Data not reported for New Hampshire large vessels to protect confidentiality of reporting units.
3 Data not reported for small vessels from other states to protect confidentiality of reporting units.

increased in each subsequent year, reaching pre-Amendment 13 levels by 2003 and exceeding pre-Amendment 13 levels in both 2004 and 2005.

New Hampshire – Large-vessel average revenue for New Hampshire cannot be reported here since there was only one vessel in this category for each year we considered, making that information confidential. Average fishing income generated by medium-sized New Hampshire vessels was approximately $200,000 in 2001. Annual income dropped 37% from 2001 to 2002, and although average fishing income increased by modest amounts in both 2003 and 2004, it still remained well below pre-Amendment 13 levels. However, average fishing income to medium-sized New Hampshire home-ported vessels increased substantially in 2005 to $200,000, a level equivalent to that of pre-Amendment 13 incomes. Average annual New Hampshire small vessel fishing income declined three consecutive years from $119,000 in 2000 before leveling off at just below $100,000 in 2003 and 2004. However, as was the case for medium-sized New Hampshire vessels, 2005 fishing income generated by small vessels exceeded pre-Amendment 13 levels.

Massachusetts – Average fishing income generated by large vessels with a Massachusetts home port was $577,000 in 2001. Average large vessel income declined modestly in 2002 and 2003 before recovering to pre-Amendment 13 levels in 2004 and to a level substantially above that of pre-Amendment 13 levels in 2005. Average fishing income for medium vessels from Massachusetts home ports was $235,000 in 2000. Average income was about $4,000 lower in both 2001 and 2002 before falling to just over $209,000 in 2003. Average income remained at $209,000 in 2004 but rose to $269,000 in 2005, an increase of more than $30,000 over pre-Amendment 13 levels. For small vessels, average annual income fell from $73,000 in 2000 to $67,000 in 2001, but average fishing income has increased in every year since 2001. In fact, by 2002 small vessel average fishing income was slightly above that of pre-Amendment 13 values and was $114,000 in 2005.

Rhode Island – Fishing income generated by large vessels with a Rhode Island home port averaged nearly $600,000 in 2000. Average fishing income declined to $524,000 in 2001 followed by steady increases in average income to $679,000 in 2005. Similarly, average income for medium-sized vessels fell from $264,000 in 2000 to $253,000 in 2001. However, average medium-sized vessel fishing income recovered to $268,910 in 2002, and has continued to increase in consecutive years to $346,000 in 2005. By contrast, small vessel average income declined in every year from $111,000 in 2000 to $77,000 in 2004 before increasing to $99,000 in 2005, still at least $10,000 below average earnings prior to 2002.

New York - Large vessels with a New York home port that participated in the groundfish fishery averaged $441,000 in 2000. Average income declined in 2001 by about $26,000 but by 2002, returned to levels above that of calendar year 2000 and has increased ever since to $619,000 in 2005. Average fishing income generated by medium-sized New York vessels was $227,000 in 2000. Average medium vessel income increased in both 2002 and 2003 but declined to $199,000 in 2003, and since 2003, it has increased by $48,000 in 2004 and another $29,000 in 2005. New York small vessel average income was $56,000 in 2000 and increased in 2001 and 2002 to $63,000. In 2003 small-vessel fishing income declined to $52,000 and declined even further to $49,000 in 2004. However, in 2005 small-vessel income generated by New York home-ported vessels increased to $89,000, about $17,000 more than the previous high in 2002.

New Jersey – Average fishing income for large vessels with a New Jersey home port was nearly constant from 2000 to 2002 at about $348,000. Average annual income increased slightly in 2003 to $351,000 before substantial increases in both 2004 and 2005 to $664,000. Medium vessel average income fell by nearly $50,000 between 2000 and 2001 to $157,000. However, average annual income was back above $200,000 in 2002 and 2003 and increased in both 2004 and 2005 to $234,000 and $322,000, respectively. Average annual income received by small vessels with a New Jersey home port declined steadily in four consecutive years from $153,000 in 2000 to $117,000 in 2004. However, average annual income in 2005 increased to $189,000 in 2005.

Estimated Impact of Framework 42 on Average Fishing Income

The assessment of economic impacts of Framework 42 was based on applying estimated relative changes in overall fishing income to observed 2004 revenues, because calendar year 2005 data were not available. For large vessels, the estimated impacts ranged from a 13 percent reduction for vessels with a Massachusetts home port to a 7 percent reduction for vessels in New York and New Jersey (Table 2.2). That is, average income for Massachusetts home-ported vessels would fall from $579,000 to $504,000; a reduction of $75,000. Average total income for large vessels with a Maine home port would fall by $72,000, from $595,000 to $523,000. Average fishing income for large vessels from Rhode Island home ports would decline 10 percent, from $617,000 to $556,000, while average income for New York and New Jersey vessels would fall by $39,000 and $35,000, respectively.

In most cases the proportional impact on medium-sized vessels exceeded that of large vessels from the same home-port state. For example, medium-sized Massachusetts vessels were estimated to generate 22 percent less income under Framework 42, an average reduction of $46,000. The proportional reduction in average medium-sized vessel income was also higher than that for large vessels in New York and Rhode Island, while impacts on medium-sized Maine vessels was only one percentage point below that of large Maine vessels. The relative impact on medium and large New Jersey vessels was identical. The impact on medium-sized New Hampshire vessels was estimated to be a 20 percent loss in average income, from $132,000 to $106,000.

On average, Massachusetts small vessels were estimated to lose 21 percent of total fishing income, resulting in a $17,000 reduction in revenue from $81,000 to $64,000. Small vessels with a Maine home port were estimated to lose 15 percent of total fishing income ($15,000). The estimated average impact was highest for small New Hampshire vessels. These New Hampshire vessels were estimated to generate 30 percent less income, for an average loss of $30,000. In Rhode Island, small vessels were estimated to generate $11,000 less in 2006 compared to the 2004 baseline. Average adverse impact on New York vessels was estimated to be $6,000, while the average reduction in fishing income for small New Jersey vessels was estimated to be $14,000.

Table 2.2. Estimated Change in Total Revenue Under Framework 42

Home-port State	2004 Average Revenue	Estimated Framework 42 Reduction in Revenue	Estimated Fishing Revenue in 2006
		All Vessels	
MA	210,974	-20%	168,779
ME	203,200	-13%	176,784
NH	128,992	-28%	92,874
NJ	257,447	-8%	236,851
NY	213,152	-11%	189,705
RI	347,530	-12%	305,826
Other	444,588	-7%	413,467
		Large Vessels[1,2]	
MA	578,943	-13%	503,681
ME	595,300	-12%	523,864
NJ	498,608	-7%	463,705
NY	550,506	-7%	511,971
RI	617,316	-10%	555,584
Other	569,083	-6%	534,938
		Medium Vessels[1]	
MA	209,230	-22%	163,199
ME	261,708	-11%	232,920
NH	131,959	-20%	105,567
NJ	233,846	-7%	217,477
NY	247,000	-11%	219,830
RI	308,469	-13%	268,368
Other	229,335	-3%	222,455
		Small Vessels[1,3]	
MA	81,378	-21%	64,288
ME	97,867	-15%	83,187
NH	99,835	-30%	69,885
NJ	117,287	-12%	103,213
NY	49,190	-13%	42,795
RI	77,118	-14%	66,321

1 Data not reported for Connecticut vessels to protect confidentiality of reporting units.
2 Data not reported for New Hampshire large vessels to protect confidentiality of reporting units.
3 Data not reported for small vessels from other states to protect confidentiality of reporting units.

As noted in the discussion of impacts in both the Amendment 13 Environmental Impact Statement (EIS) and the Framework 42 Environmental Assessment, the economic analysis did not take into account the potential mitigating impacts of improved productivity associated with resource growth, increased fish prices, and/or the potential to offset groundfish losses by increasing effort in other fisheries. The economic analysis also did not account for the potential mitigating effects of leasing, credit for steaming time, regular B DAS, or Special Access Programs. Even though the ability or propensity for different vessel owners to avail themselves of these offsets may differ, the fact that they were omitted means that, on average, the economic analysis is likely to overestimate the negative impact of management action. A comparison between the estimated Amendment 13 impacts and the realized changes in fishing revenue provides some insights into the potential directionality and magnitude of the deviation between observed and estimated impacts (Table 2.3).

Table 2.3 Comparison Between Predicted Revenue Changes for Amendment 13 and Realized Impacts

Home-port State	2001 Average Revenue	A13 Predicted	2004 Average Revenue	Realized Change	2001 Groundfish Revenue	2004 Groundfish Revenue	Realized Change in Groundfish Revenue
All Vessels							
MA	188,170	-18%	210,974	12%	112,678	120,785	7%
ME	182,590	-23%	203,200	11%	120,961	134,119	11%
NH	142,210	-14%	128,992	-9%	72,244	70,236	-3%
NJ	214,057	-9%	257,447	20%	42,319	81,021	91%
NY	191,595	-14%	213,152	11%	51,568	61,969	20%
RI	294,253	-17%	347,530	19%	108,921	115,835	6%
Other	281,221	-11%	444,588	58%	100,319	154,724	54%
Large Vessels[1,2]							
MA	571,050	-34%	578,943	1%	337,850	310,837	-8%
ME	553,161	-37%	595,300	8%	429,502	409,207	-5%
NJ	347,904	-9%	498,608	43%	65,253	119,267	83%
NY	459,430	-13%	550,506	20%	95,446	113,026	18%
RI	530,214	-18%	617,316	16%	177,748	180,579	2%
Other	472,795	-13%	569,083	20%	120,405	166,038	38%
Medium Vessels[1]							
MA	229,936	-29%	209,230	-9%	129,218	129,998	1%
ME	304,658	-30%	261,708	-14%	195,200	164,346	-16%
NH	199,695	-32%	131,959	-34%	156,916	100,987	-36%
NJ	156,619	-9%	233,846	49%	57,223	113,657	99%
NY	235,820	-20%	247,000	5%	72,507	84,306	16%
RI	252,652	-19%	308,469	22%	117,842	131,267	11%
Other	173,431	-4%	229,335	32%	99,945	160,604	61%
Small Vessels[1,3]							
MA	66,826	-7%	81,378	22%	44,985	50,420	12%
ME	79,280	-16%	97,867	23%	56,290	66,517	18%
NH	113,431	-11%	99,835	-12%	57,157	62,244	9%
NJ	150,972	-9%	117,287	-22%	13,357	20,498	53%
NY	57,177	-10%	49,190	-14%	17,750	22,401	26%
RI	109,833	-6%	77,118	-30%	21,027	21,671	3%

1 Data not reported for Connecticut vessels to protect confidentiality of reporting units.
2 Data not reported for New Hampshire large vessels to protect confidentiality of reporting units.
3 Data not reported for small vessels from other states to protect confidentiality of reporting units.

With a few exceptions, average realized vessel performance in 2004 was better than predicted for year 1 of Amendment 13, and average vessel returns in 2005 were even higher. Realized revenues in 2004 and 2005 benefited from a combination of factors, including higher prices received and, for many vessels, higher income from the sale of non-groundfish species. The additional contribution associated with Amendment 13 offsets such as DAS leasing, B DAS, and credit for steaming time is uncertain. Whether realized income generated by commercial fishing vessels under Framework 42 would also be more favorable than predicted is not known at this time.

Compared to Amendment 13, the predicted impact of Framework 42 on average fishing income was lower for both large and medium-sized vessels but higher for small vessels, particularly in Massachusetts and New Hampshire. These impacts are due primarily to the differential DAS counting area in the Gulf of Maine, which may be more difficult to compensate for through higher prices, and affected vessels may find it more difficult to increase effort in other non-groundfish fisheries.

Section (3). Discussion of whether the differential days-at-sea counting imposed by Framework 42 would result in a reduction in the number of small vessels actively participating in the New England Fishery

Currently, data are insufficient to project with certainty how many vessels might leave the fishery and whether they will be predominantly small vessels. However, recent (2001–2005) numbers and types of vessels participating in the groundfish fishery can be examined, and those trends may provide an idea of what is likely to occur under Framework 42.

The number of limited access permit holders that have participated in the groundfish fishery has been declining over time. For example, 1,673 valid limited access permits were issued in 2001, of which 1,102 participated in the groundfish fishery, and an additional 135 were active in some other fishery but did not land any groundfish (Table 3.1). By 2005, the number of limited access permits that were issued had been reduced to 1,413, the number of active groundfish vessels had declined by 298 permit holders, and the total number of limited access vessels that participated in any fishery was down to 1,008. A substantial portion of this change was due to the removal of 245 permits through the buyout of latent permits completed by 2002. Taking the effect of the permit buyout into account, 26 fewer valid permits were issued in 2005 compared to 2002, but the number of active permits in either the groundfish fishery or any fishery was still down by 197 and 121 vessels, respectively.

Table 3.1. Summary of Limited Access Permits and Vessel Activity 2000 to 2005

Year	Active Vessels	Active Groundfish Vessels	Inactive Permits	Total Permits Issued
2000	1195	1043	474	1669
2001	1237	1102	436	1673
2002	1129	1001	310	1439
2003	1114	976	313	1427
2004	1046	878	427	1473
2005	1008	804	405	1413
Attrition Before Permit Buyout	-229	-298		-260
Attrition After Permit Buyout	-121	-197		-26

The downward trend in annual groundfish fishery participation since 2001 is evident across vessels of differing classes (Figure 3.1). The number of large vessels participating in the groundfish fishery declined in 2002 by about 6 percent, and declined again by just over 8 percent in 2003. From 2003 to 2004, the number of large vessels remained constant but declined again by 7 percent from 2004 to 2005. The number of medium-sized vessels participating in the groundfish fishery declined in each year from 2001 to 2005, but with the exception of 2004, the annual percent change in participation exceeded that of large vessels. Thus, even though the total number of medium-sized vessels not participating in the groundfish fishery was larger than the number of large vessels that left the fishery in each year, the rate of decline in large-vessel participation was higher than that of medium-sized vessels. The number of small vessels that have participated in the groundfish fishery was one-third smaller in 2005 than in 2001. With the exception of 2003, when the number of participating vessels was the same as in 2002, both the total number and the annual change in participation was higher than for either medium or large vessels.

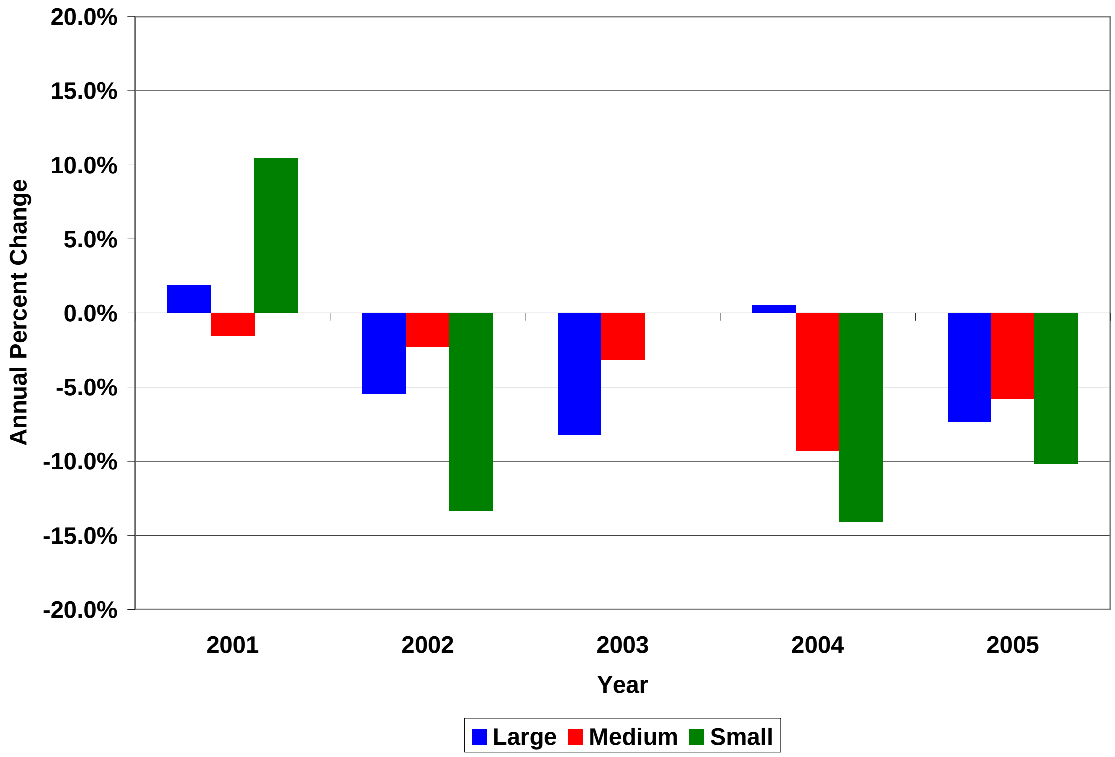

Figure 3.1 Annual Percent Change in Active Groundfish Vessels by Vessel Size

The total number of limited access groundfish vessels that have actively participated in the groundfish fishery has been declining each year since 2001 (Table 3.2). This decline was evident in all vessel size classes although the proportional decline in the total number of participating small vessels (–23 percent) was higher than that of either medium (–19 percent) or large vessels (also –19 percent).

Comparing the number of participating vessels across home-port states indicates a few instances where the number of active groundfish boats has increased, but in the majority of instances active participation has declined.

Maine **-** The number of active large groundfish vessels with a reported home port in Maine ranged between 10 and 12 from 2000 to 2004 but fell to 7 in 2005. Similarly, the number of active small groundfish vessels declined from 81 vessels in 2001 to 52 vessels in 2005. By contrast, the number of medium-sized vessels was stable, ranging between 29 and 33 vessels from 2001 to 2005.

Table 3.2. Annual Number of Active Limited Access Vessels With Groundfish Income by Home-port State and Vessel Size (Calendar Years 2000 – 2005)						
Home-port State	2000	2001	2002	2003	2004	2005
			All Vessels			
CT[1]	3	8	10	5	5	12
MA	572	603	542	521	469	400
ME	114	120	112	116	97	90
NH	60	57	57	52	53	48
NJ	51	58	47	58	52	58
NY	116	121	106	100	79	76
RI	86	90	84	90	91	89
Other	41	45	43	34	32	31
Total Active Vessels	1,043	1,102	1,001	976	878	804
			Large Vessels			
CT[1]	1	3	4	1	2	4
MA	102	104	101	95	98	92
ME	12	10	10	12	10	7
NH	2	1	1	1	1	1
NJ	17	18	13	12	13	10
NY	28	28	25	20	14	14
RI	28	27	26	27	32	30
Other	25	28	27	22	21	19
Total Large Vessels	215	219	207	190	191	177
			Medium Vessels			
CT	2	1	2	1	1	3
MA	118	123	114	107	94	76
ME	33	29	32	33	32	31
NH	9	7	7	5	6	5
NJ	17	17	17	19	20	25
NY	38	35	35	36	30	30
RI	35	38	38	37	32	31
Other	13	11	10	9	9	10
Total Medium Vessels	265	261	255	247	224	211
			Small Vessels			
CT	0	4	4	3	2	5
MA	352	376	327	319	277	232
ME	69	81	70	71	55	52
NH	49	49	49	46	46	42
NJ	17	23	17	27	19	23
NY	50	58	46	44	35	32
RI	23	25	20	26	27	28
Other	3	6	6	3	2	2
Total Small Vessels	563	622	539	539	463	416

1 Connecticut data not representative because of state reporting protocol that does not identify unique vessels.

New Hampshire **-** There was only one large vessel with a reported New Hampshire home port in each year from 2001 to 2005. The number of medium sized vessels declined from 7 vessels in 2001 to 5 vessels in 2005, and the number of small vessels declined from 49 to 42 vessels over the same time period. This reduction in small New Hampshire vessels was lower in relative terms (14 percent) than was the case for either Maine or Massachusetts.

Massachusetts **-** In Massachusetts the number of vessels reporting landing groundfish has declined in all size classes. The number of large vessels with a Massachusetts home port declined 11 percent, from 104 vessels in 2001 to 92 vessels in 2005. The number of medium-sized vessels declined by 47 from 2001 to 2005, while the number of small vessels declined by 144 operating units reporting groundfish landings. Note that the proportional reduction in small and medium-sized vessels was nearly identical at 38 percent.

Rhode Island **-** The number of large vessels with a Rhode Island home port that participated in the groundfish fishery had declined to 30 in 2005 from 32 in 2004 but still represented more vessels than in any year from 2000 to 2003. The number of medium-sized vessels participating in the groundfish fishery declined 18 percent between 2001 and 2005, from 38 to 31 vessels. By contrast, the number of small vessels with a Rhode Island home port has increased in each year since 2002, from 20 to 28 vessels in 2005.

New York **–** The number of large vessels home-ported in New York that landed groundfish declined by 50 percent from 2001 (28 vessels) to 2005 (14 vessels). The number of medium-sized vessels has also declined, from 38 in 2000 to 30 vessels in 2004 and 2005. Likewise the number of small New York vessels that participated in the groundfish fishery has been reduced by about 45 percent, from 56 vessels in 2001 to 32 vessels in 2005.

New Jersey **–** The number of large vessels participating in the groundfish fishery with a New Jersey home port has declined from a high of 18 vessels in 2001 to 10 vessels in 2005. By contrast, the number of medium-sized New Jersey vessels that participated in the groundfish fishery in 2005 (25) was higher than in any year from 2001 to 2004. The number of New Jersey small vessels landing groundfish has fluctuated, reaching a high of 27 in 2003 followed by a reduction to 19 vessels in 2004 and an increase to 23 in 2005.

Given the persistent trend in groundfish participation and the fact that Framework 42 reduces DAS for all vessels regardless of size, it is likely that some vessels in each size class would no longer participate in the groundfish fishery. Given available data, the number of vessels that may choose to exit the fishery, and whether more small vessels will exit than other size classes, is uncertain. However, if trends continue, it appears likely that proportionally more small vessels would exit the fishery than vessels in other size classes, particularly because it is likely that small vessels would find it more difficult to offset the effects of the differential DAS counting in the Gulf of Maine.

Section (4). Discussion of the percentage and approximate number of vessels in the New England fishery, separated by state and vessel type, that are incapable of fishing outside the areas designated in Framework 42 for differential days-at-sea counting

Fishing vessels are inherently mobile. Fishing trip distance may be readily altered and vessels may change home ports and corresponding fishing locations. Such changes are not without costs, however, both from a monetary and social point of view. Changing fishing ports may require uprooting families, the formation of new business relationships, or even fishing in unfamiliar areas or bottom conditions. For these reasons, this analysis assumes that vessels will not change home ports when specifying the conditions under which a vessel is considered incapable of fishing outside of the differential DAS counting area. That is, a vessel is deemed operationally incapable of fishing outside of the area if the vessel has no history of taking a trip of sufficient distance to allow it to fish outside of the area without changing its current home port. The analysis is conducted on vessels fishing in calendar years 2002–2005, thereby presenting an overview of the importance of the area to fishing operations in recent history.

A map of the differential DAS counting area appears in Figure 4.1. There are two parts of the area, one comprising the inshore Gulf of Maine (GOM) area and the other in southern New England (SNE).

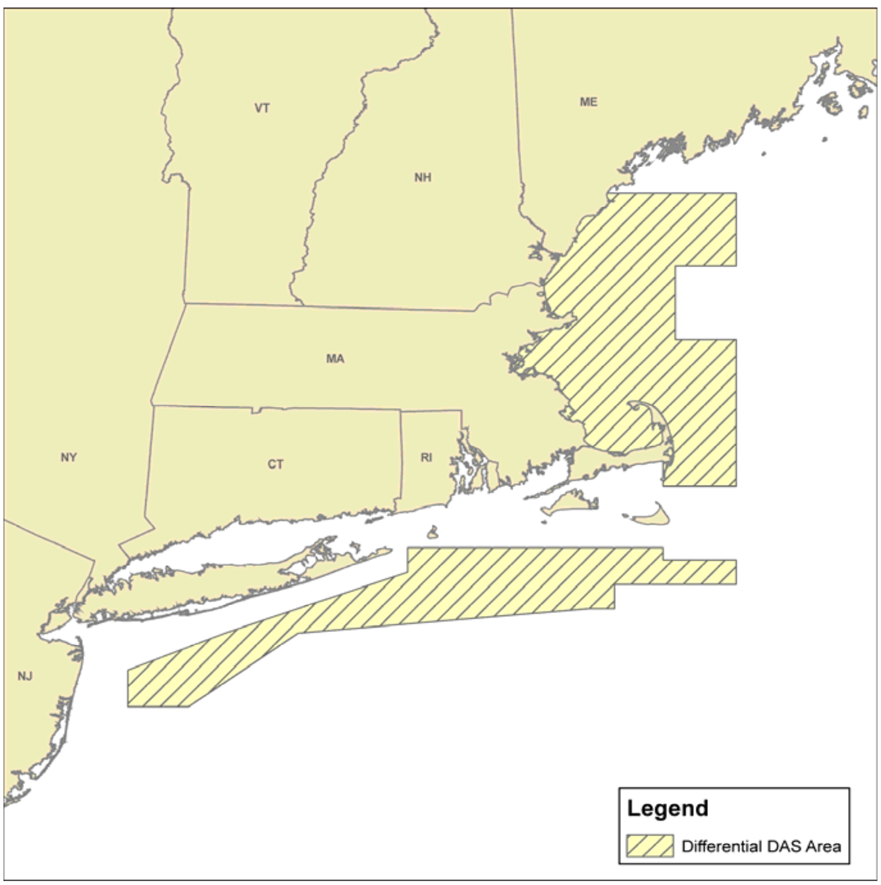

Figure 4.1 Differential DAS counting areas

Because the SNE area does not extend to the shoreline, any vessel fishing in that area could fish closer to shore without altering their trip distance. For this reason, none of the vessels fishing solely in that area can be considered operationally incapable of fishing outside the area. The GOM area, however, does extend to the coast, and thus some vessels fishing in that area may be incapable of fishing outside of the area, using the definition adopted above. This analysis, therefore, focuses on the GOM area and determines the number and percentage of vessels that are incapable of fishing outside the GOM portion of the differential DAS area.

To conduct the analysis, vessels that may be affected and their recent fishing patterns were identified. Limited access groundfish DAS permit holders were determined by using National Marine Fisheries Service (NMFS) permit records, and the fishing trip locations of these vessels were obtained from vessel trip reports. Table 4.1 identifies by calendar year the number of limited access DAS groundfish permit holders that fished entirely within the GOM differential DAS area, entirely outside of the area, or both inside and outside of the area. The percentage of total limited access groundfish vessels in each category is also reported. The percentage of vessels choosing to fish only inside the differential DAS area was stable over the period, reflecting roughly 20 percent of active limited access groundfish permit holders.

Table 4.1. Potentially Affected Groundfish Vessels by Year

Year	Fished Only Inside of GOM Differential DAS Area	Fished Only Outside of GOM Differential DAS Area	Fished Inside and Outside of GOM Differential DAS Area	Total Limited Access Groundfish Vessels
2002	233 (19%)	566 (45%)	446 (36%)	1245
2003	238 (20%)	560 (46%)	411 (34%)	1209
2004	218 (19%)	536 (46%)	400 (35%)	1154
2005	188 (18%)	517 (49%)	348 (33%)	1053

Table 4.2 summarizes the same information by year and size class. These results indicate that smaller boats are more likely to have fished only inside the differential DAS area. This is not surprising, since the smaller size of these vessels is a limiting factor in the distance of their trips.

Table 4.2. Potentially Affected Groundfish Vessels by Year and Size Class

Year	Length	Fished Only Inside of GOM Differential DAS Area	Fished Only Outside of GOM Differential DAS Area	Fished Inside and Outside of GOM Differential DAS Area	Total Limited Access Groundfish Vessels
2002	<50	199 (28%)	250 (35%)	271 (38%)	720
	50-70	32 (11%)	147 (51%)	109 (38%)	288
	>70	2 (1%)	169 (71%)	66 (28%)	237
2003	<50	198 (28%)	256 (37%)	246 (35%)	700
	50-70	36 (13%)	147 (52%)	98 (35%)	281
	>70	4 (2%)	157 (69%)	67 (29%)	228
2004	<50	185 (28%)	228 (35%)	244 (37%)	657
	50-70	31 (12%)	140 (52%)	98 (36%)	269
	>70	2 (1%)	168 (74%)	58 (25%)	228
2005	<50	158 (27%)	218 (37%)	207 (36%)	583
	50-70	25 (10%)	136 (54%)	91 (36%)	252
	>70	5 (2%)	163 (75%)	50 (23%)	218

Table 4.3. Potentially Affected Groundfish Vessels by Year and Home-port State

Year	Home-Port State	Fished Only Inside of GOM Differential DAS Area		Fished Only Outside of GOM Differential DAS Area		Fished Inside and Outside of GOM Differential DAS Area		Total Limited Access Groundfish Vessels
2002	CT	0	(0%)	15	(94%)	1	(6%)	16
	DE	0	(0%)	1	(33%)	2	(67%)	3
	MA	181	(27%)	185	(28%)	304	(45%)	670
	MD	0	(0%)	4	(80%)	1	(20%)	5
	ME	17	(11%)	50	(32%)	89	(57%)	156
	NC	0	(0%)	21	(91%)	2	(9%)	23
	NH	35	(56%)	1	(2%)	27	(43%)	63
	NJ	0	(0%)	72	(97%)	2	(3%)	74
	NY	0	(0%)	118	(94%)	7	(6%)	125
	RI	0	(0%)	89	(92%)	8	(8%)	97
	VA	0	(0%)	10	(77%)	3	(23%)	13
2003	CT	0	(0%)	14	(93%)	1	(7%)	15
	DE	0	(0%)	1	(33%)	2	(67%)	3
	MA	191	(29%)	184	(28%)	274	(42%)	649
	MD	0	(0%)	5	(100%)	0	(0%)	5
	ME	13	(8%)	50	(32%)	91	(59%)	154
	NC	0	(0%)	21	(100%)	0	(0%)	21
	NH	33	(57%)	2	(3%)	23	(40%)	58
	NJ	0	(0%)	76	(99%)	1	(1%)	77
	NY	1	(1%)	110	(95%)	5	(4%)	116
	RI	0	(0%)	89	(87%)	13	(13%)	102
	VA	0	(0%)	8	(89%)	1	(11%)	9
2004	CT	0	(0%)	14	(82%)	3	(18%)	17
	DE	0	(0%)	1	(33%)	2	(67%)	3
	MA	167	(28%)	169	(28%)	268	(44%)	604
	MD	0	(0%)	5	(100%)	0	(0%)	5
	ME	15	(10%)	43	(29%)	89	(61%)	147
	NC	0	(0%)	20	(91%)	2	(9%)	22
	NH	36	(57%)	2	(3%)	25	(40%)	63
	NJ	0	(0%)	75	(99%)	1	(1%)	76
	NY	0	(0%)	105	(100%)	0	(0%)	105
	RI	0	(0%)	93	(90%)	10	(10%)	103
	VA	0	(0%)	9	(100%)	0	(0%)	9
2005	CT	0	(0%)	14	(93%)	1	(7%)	15
	DE	0	(0%)	2	(40%)	3	(60%)	5
	MA	143	(27%)	162	(30%)	232	(43%)	537
	MD	0	(0%)	3	(100%)	0	(0%)	3
	ME	13	(10%)	38	(29%)	78	(60%)	129
	NC	0	(0%)	20	(95%)	1	(5%)	21
	NH	31	(54%)	3	(5%)	23	(40%)	57
	NJ	0	(0%)	77	(100%)	0	(0%)	77
	NY	1	(1%)	93	(97%)	2	(2%)	96
	RI	0	(0%)	96	(92%)	8	(8%)	104
	VA	0	(0%)	9	(100%)	0	(0%)	9

Table 4.3 summarizes the information by year and home-port state. Vessels that only fished in the GOM differential DAS area had home ports in Massachusetts, Maine, New Hampshire, and New York. Thus, these are the states whose vessels would potentially be affected by the action. The vessels listing New York home ports and fishing only in the GOM differential DAS area only had trips ending in Massachusetts in those years. Thus, it is likely more appropriate to consider them Massachusetts vessels for the purposes on this study. To focus the analysis on the states that will be affected, results are hereafter reported only for Massachusetts, Maine, and New Hampshire.

Table 4.4. Potentially Affected Groundfish Vessels by Year, Home-Port State, and Size Class

Year	Home-port State	Length in feet	Fished Only Inside of GOM Differential DAS Area		Fished Only Outside of GOM Differential DAS Area		Fished Inside and Outside of GOM Differential DAS Area		Total Limited Access Groundfish Vessels
2002	MA	<50	151	(36%)	85	(20%)	182	(44%)	418
		50-70	28	(21%)	29	(22%)	74	(56%)	131
		>70	2	(2%)	71	(59%)	48	(40%)	121
	ME	<50	16	(14%)	38	(34%)	57	(51%)	111
		50-70	1	(3%)	10	(29%)	24	(69%)	35
		>70	0	(0%)	2	(20%)	8	(80%)	10
	NH	<50	32	(59%)	1	(2%)	21	(39%)	54
		50-70	3	(38%)	0	(0%)	5	(63%)	8
		>70	0	(0%)	0	(0%)	1	(100%)	1
2003	MA	<50	157	(39%)	85	(21%)	164	(40%)	406
		50-70	30	(24%)	30	(24%)	64	(52%)	124
		>70	4	(3%)	69	(58%)	46	(39%)	119
	ME	<50	11	(10%)	36	(34%)	60	(56%)	107
		50-70	2	(6%)	10	(29%)	23	(66%)	35
		>70	0	(0%)	4	(33%)	8	(67%)	12
	NH	<50	30	(60%)	1	(2%)	19	(38%)	50
		50-70	3	(43%)	1	(14%)	3	(43%)	7
		>70	0	(0%)	0	(0%)	1	(100%)	1
2004	MA	<50	139	(37%)	72	(19%)	160	(43%)	371
		50-70	26	(23%)	23	(20%)	65	(57%)	114
		>70	2	(2%)	74	(62%)	43	(36%)	119
	ME	<50	14	(14%)	31	(31%)	56	(55%)	101
		50-70	1	(3%)	8	(23%)	26	(74%)	35
		>70	0	(0%)	4	(36%)	7	(64%)	11
	NH	<50	32	(60%)	1	(2%)	20	(38%)	53
		50-70	4	(50%)	1	(13%)	3	(38%)	8
		>70	0	(0%)	0	(0%)	2	(100%)	2
2005	MA	<50	118	(37%)	64	(20%)	138	(43%)	320
		50-70	20	(20%)	25	(25%)	54	(55%)	99
		>70	5	(4%)	73	(62%)	40	(34%)	118
	ME	<50	11	(13%)	30	(34%)	47	(53%)	88
		50-70	2	(6%)	5	(15%)	26	(79%)	33
		>70	0	(0%)	3	(38%)	5	(63%)	8
	NH	<50	29	(60%)	1	(2%)	18	(38%)	48
		50-70	2	(29%)	1	(14%)	4	(57%)	7
		>70	0	(0%)	1	(50%)	1	(50%)	2

Information by year, home-port state, and size class is summarized in Table 4.4 for these potentially affected states. In each year, small vessels from Massachusetts comprise the largest group of vessels that may be affected.

Identification of Trip Ranges

The number of vessels fishing only within the GOM differential DAS area is reported in the preceding tables, providing an upper bound on the number of vessels incapable of fishing outside of the area. However, that a vessel chooses to fish only within the area is not necessarily indicative that they are operationally constrained to that area. To determine if a vessel is limited to the differential DAS area, the distance that a vessel may be reasonably expected to travel on a fishing trip was determined. This was accomplished by calculating the distance from the landing port to the fishing locations listed on the vessel trip reports for each particular vessel. The maximum distance for each vessel is assumed to be the operating range of the vessel. Using GIS, the operating range for each vessel is plotted as a circle around the home port of the vessel. If any part of that range is outside of the GOM differential DAS area, strictly speaking the vessel is not operationally constrained to the area. Figures 4.2 through 4.5 show the trip ranges for vessels fishing in the GOM differential DAS in 2002–2005, respectively. The number and percentage of vessels limited to the GOM differential DAS area appear in Tables 4.5 through 4.8.

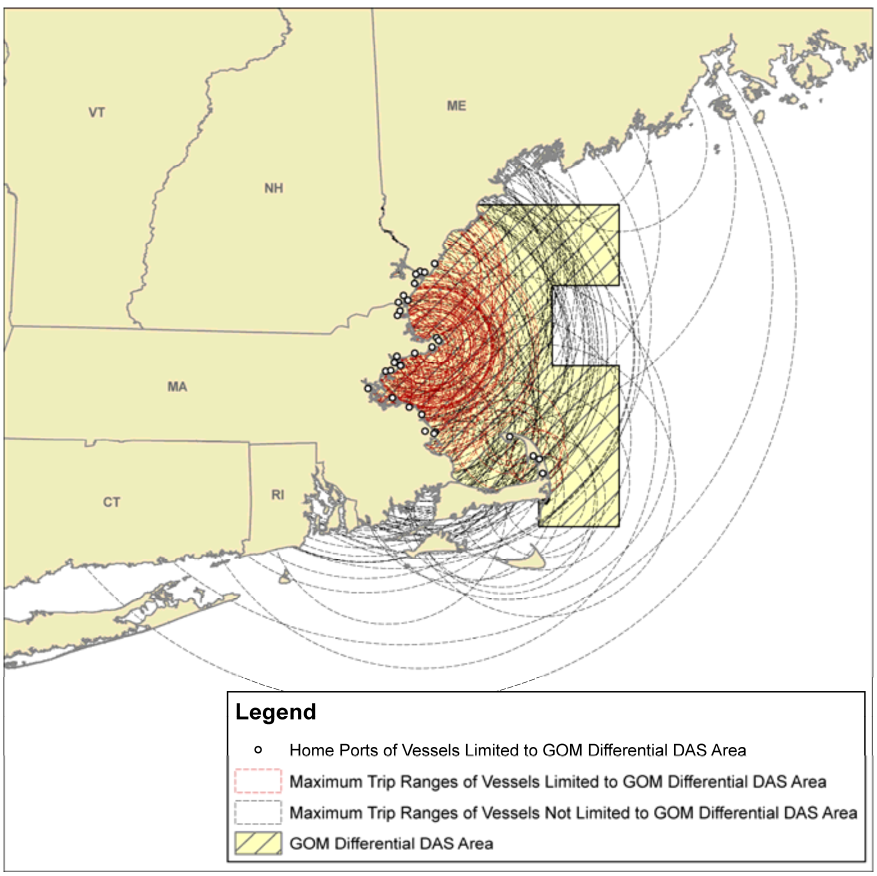

Figure 4.2. Maximum Ranges for Vessels Fishing in GOM Differential DAS Area – Calendar Year 2002

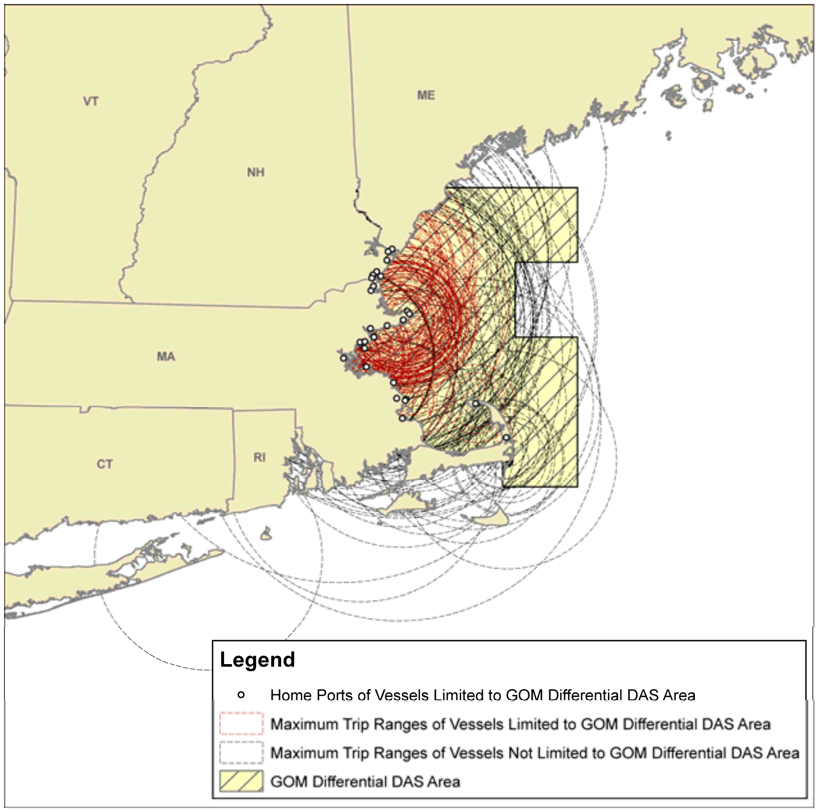

Figure 4.3. Maximum Ranges for Vessels Fishing in GOM Differential DAS Area – Calendar Year 2003

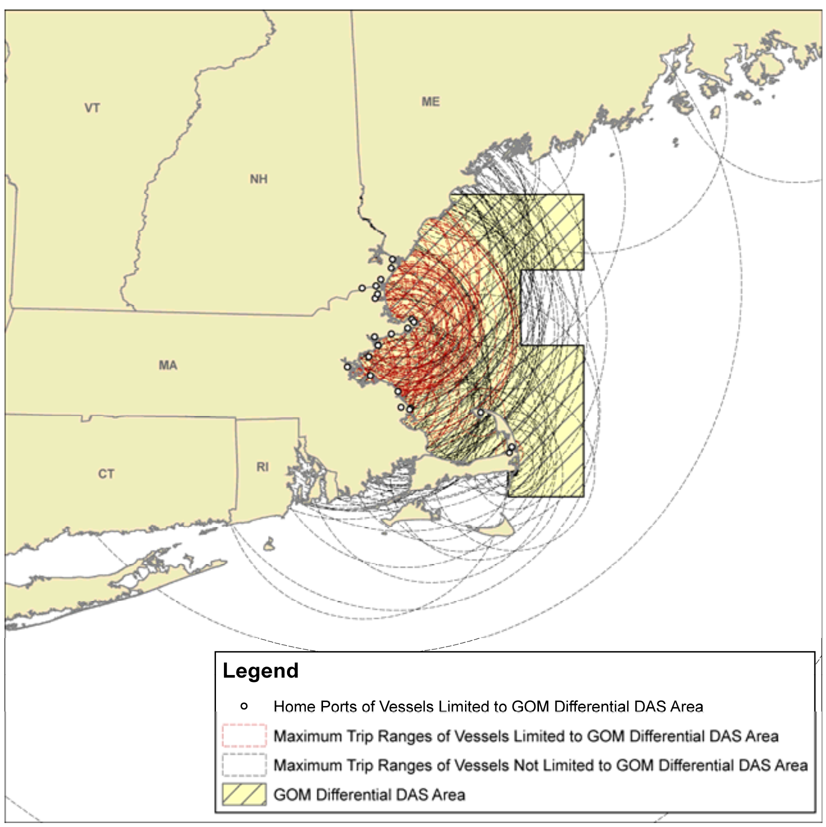

Figure 4.4. Maximum Ranges for Vessels Fishing in GOM Differential DAS Area – Calendar Year 2004

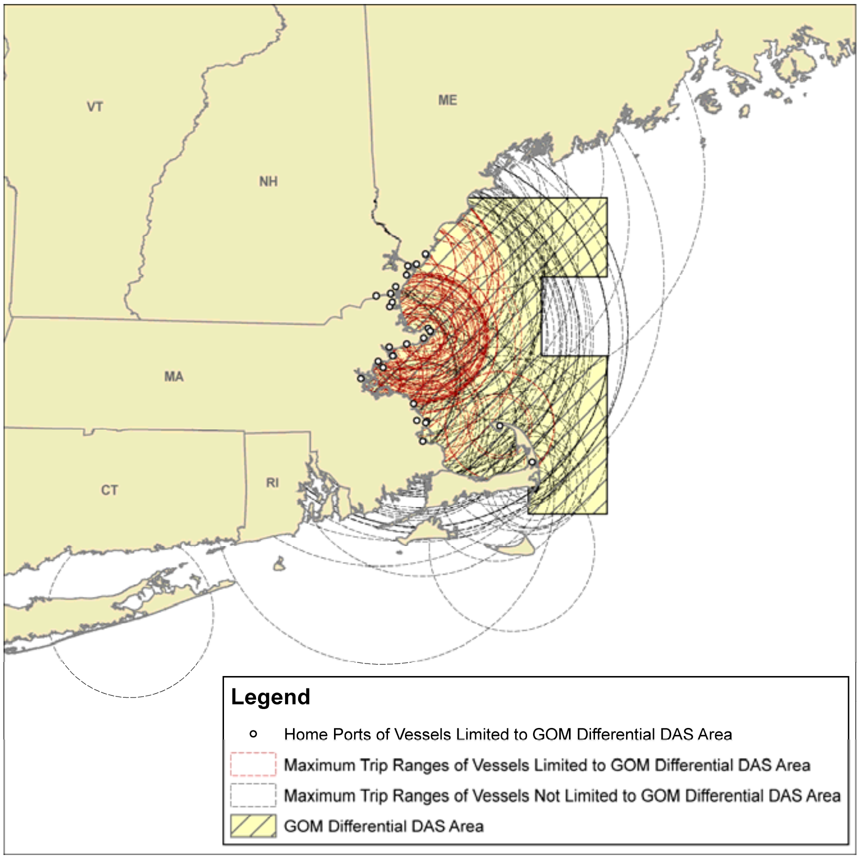

Figure 4.5. Maximum Ranges for Vessels Fishing in GOM Differential DAS Area – Calendar Year 2005

Summary of Affected Vessels

As shown in Table 4.5**,** 54 to 59 percent of the vessels fishing exclusively in the GOM differential DAS area may be classified as being incapable of fishing outside the area. That is, they have no history of taking a trip of sufficient length to allow them to fish outside the area, given their current home port. These vessels represent 10 to 12 percent of limited access groundfish permit holders.

Table 4.5. Affected Groundfish Vessels by Year

Year	Fished Only Inside of GOM Differential DAS Area	Trip Range Limited to GOM Differential DAS Area	% of Limited Access Groundfish Vessels
2002	233	137 (59%)	11%
2003	238	140 (59%)	12%
2004	218	115 (53%)	10%
2005	188	101 (54%)	10%

Table 4.6 summarizes this information by year and vessel size class. As would be expected, smaller vessels are more likely to be incapable of fishing outside of the area. Table 4.7 summarizes the results by year and state.

Table 4.6. Affected Groundfish Vessels by Year and Size Class

Year	Length in feet	Fished Only Inside of GOM Differential DAS Area	Trip Range Limited to GOM Differential DAS Area	% of Limited Access Groundfish Vessels
2002	<50	199	120 (60%)	17%
	50-70	32	16 (50%)	6%
	>70	2	1 (50%)	0%
2003	<50	198	120 (61%)	17%
	50-70	36	18 (50%)	6%
	>70	4	2 (50%)	1%
2004	<50	185	100 (54%)	15%
	50-70	31	13 (42%)	5%
	>70	2	2 (100%)	1%
2005	<50	158	88 (56%)	15%
	50-70	25	10 (40%)	4%
	>70	5	3 (60%)	1%

Table 4.7. Affected Groundfish Vessels by Year and Home-port State

Year	Home-port State	Fished Only Inside of GOM Differential DAS Area	Trip Range Limited to GOM Differential DAS Area	% of Limited Access Groundfish Vessels
2002	MA	181	112 (62%)	17%
	ME	17	3 (18%)	2%
	NH	35	22 (63%)	35%
2003	MA	191	117 (61%)	18%
	ME	13	1 (8%)	1%
	NH	33	22 (67%)	38%
2004	MA	167	98 (59%)	16%
	ME	15	0 (0%)	0%
	NH	36	17 (47%)	27%
2005	MA	143	80 (56%)	15%
	ME	13	2 (15%)	2%
	NH	31	19 (61%)	33%

Finally, Table 4.8 provides the complete breakdown of the results by year, state, and size class. These results indicate that small and medium-sized vessels from Massachusetts and New Hampshire are most likely to be incapable of fishing outside of the differential DAS area.

Table 4.8. Affected Groundfish Vessels by Year, Home-port State, and Size Class

Year	Home-port State	Length in feet	Fished Only Inside of GOM Differential DAS Area	Trip Range Limited to GOM Differential DAS Area	% of Limited Access Groundfish Vessels
2002	MA	<50	151	96 (64%)	23%
		50-70	28	15 (54%)	11%
		>70	2	1 (50%)	1%
	ME	<50	16	3 (19%)	3%
		50-70	1	0 (0%)	0%
		>70	0	0 (0%)	0%
	NH	<50	32	21 (66%)	39%
		50-70	3	1 (33%)	13%
		>70	0	0 (0%)	0%
2003	MA	<50	157	100 (64%)	25%
		50-70	30	15 (50%)	12%
		>70	4	2 (50%)	2%
	ME	<50	11	1 (9%)	1%
		50-70	2	0 (0%)	0%
		>70	0	0 (0%)	0%
	NH	<50	30	19 (63%)	38%
		50-70	3	3 (100%)	43%
		>70	0	0 (0%)	0%
2004	MA	<50	139	85 (61%)	23%
		50-70	26	11 (42%)	10%
		>70	2	2 (100%)	2%
	ME	<50	14	0 (0%)	0%
		50-70	1	0 (0%)	0%
		>70	0	0 (0%)	0%
	NH	<50	32	15 (47%)	28%
		50-70	4	2 (50%)	25%
		>70	0	0 (0%)	0%
2005	MA	<50	118	69 (58%)	22%
		50-70	20	8 (40%)	8%
		>70	5	3 (60%)	3%
	ME	<50	11	2 (18%)	2%
		50-70	2	0 (0%)	0%
		>70	0	0 (0%)	0%
	NH	<50	29	17 (59%)	35%
		50-70	2	2 (100%)	29%
		>70	0	0 (0%)	0%

Section (5). Discussion of the percentage of the annual groundfish catch in the New England fishery that is harvested by small vessels

In developing a response to this request, the share of total groundfish landed by small vessels and vessels of other size classes was characterized, as well as a breakdown of shares by species/stock. These shares were estimated by using vessel trip report (VTR) data for all limited-access permit holders for calendar years 2000 through 2005. These data were not prorated to the dealer data, because calculation of landings shares did not require an estimate of total landings. That is, the VTR data were assumed to represent the distribution of landings by vessel size, so prorating to the dealer data was unnecessary.

Aggregate Groundfish Landings

The share of aggregate groundfish species (cod, haddock, pollock, redfish, white hake, yellowtail flounder, witch flounder, windowpane flounder, American plaice, and winter flounder) landed by small vessels was highest in 2000 at 26 percent, but ranged from 22 to 25 percent in all other years (Figure 5.1). The percentage of aggregate groundfish landed by medium-sized vessels has been declining over time, from 30 percent in 2000 to 25 percent in 2005. By contrast, the share of aggregate groundfish landed by large vessels has increased from a low of 44 percent in 2000 to more than 50 percent in both 2004 and 2005.

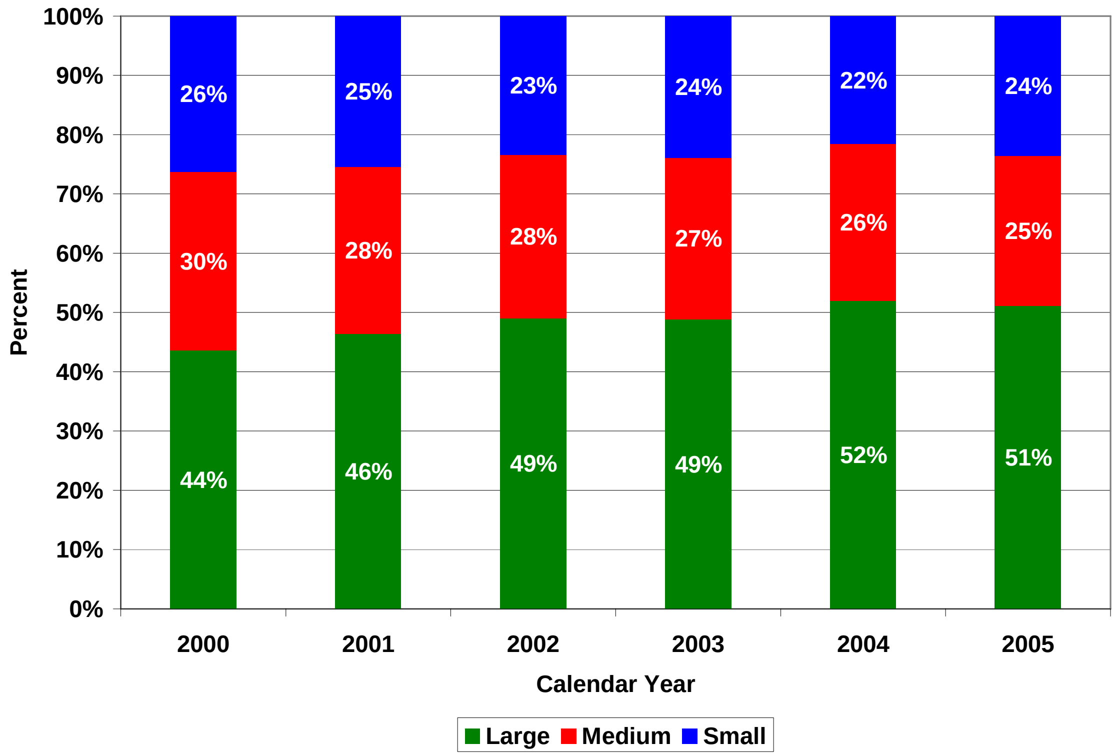

Figure 5.1. Share of Combined Groundfish Landings by Vessel Size

Based solely on aggregate groundfish, large vessels have landed slightly more than half of all groundfish in calendar years 2004 and 2005, while the remainder has been landed in roughly equal parts by small and medium-sized vessels. However, the percentage of landings by vessel size varies considerably when specific groundfish stocks are taken into consideration. These differences are particularly noteworthy for the Gulf of Maine stocks of cod, yellowtail flounder, and winter flounder, and the Georges Bank stocks of cod, haddock, winter flounder, and yellowtail flounder.

Gulf of Maine Cod – The percentage of total Gulf of Maine cod landings harvested by small vessels was 68 percent in 2000, but has increased to at least 70 percent from calendar year 2001 through 2005 (Figure 5.2). By contrast, the percentage of Gulf of Maine cod landings harvested by large vessels was 7 percent in most years but fell to 5 percent in 2005, while the proportion of Gulf of Maine cod landings harvested by medium-sized vessels has ranged without trend between 22 and 25 percent.

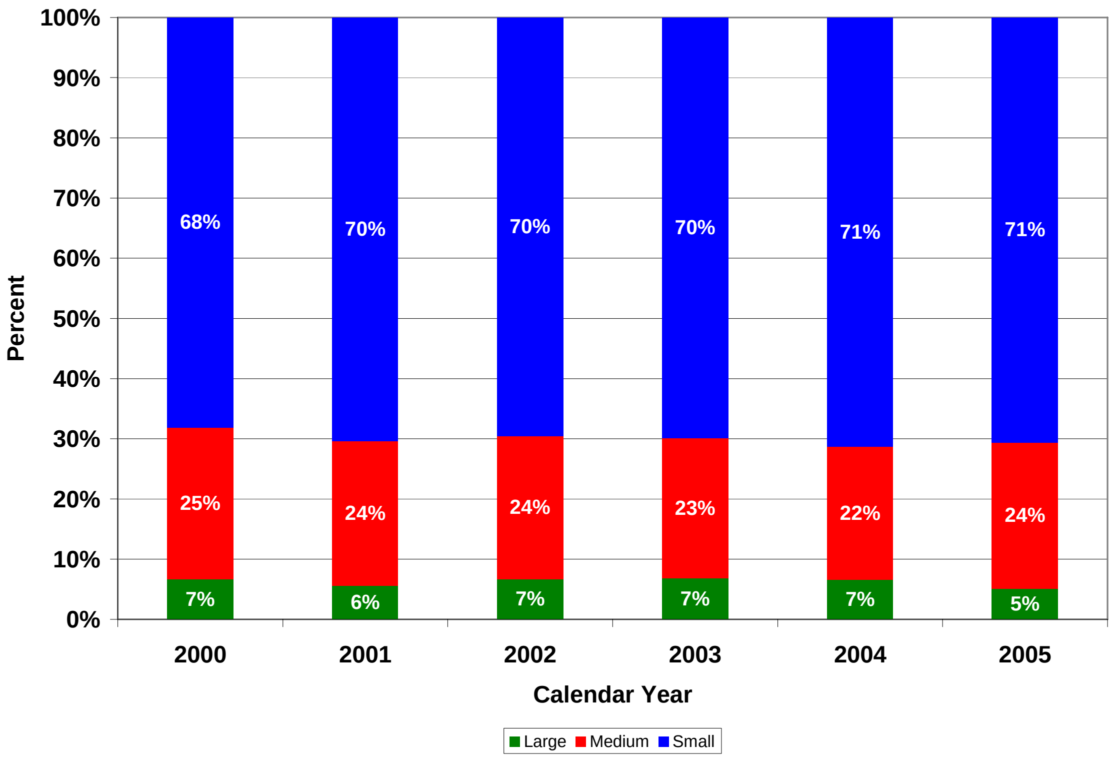

Figure 5.2. Share of Gulf of Maine Cod Landings by Vessel Size

Cape Cod/Gulf of Maine Yellowtail Flounder – The percentage of Cape Cod/Gulf of Maine yellowtail flounder landings harvested by small vessels was 37 percent in 2000 (Figure 5.3). This share declined to 25 percent in 2002, but increased in every subsequent year and was 48 percent of total landings in 2005. With the exception of calendar year 2000, when medium-sized vessels accounted for 46 percent of total Cape Cod/Gulf of Maine yellowtail flounder landings, medium-sized vessel landings ranged without trend from 35 to 41 percent. As the percentage of total Cape Cod/Gulf of Maine yellowtail flounder landings harvested by small vessels increased during 2003–2005, the percentage of total landings harvested by large vessels has declined threefold, from 38 percent in 2002 to 12 percent in 2005.

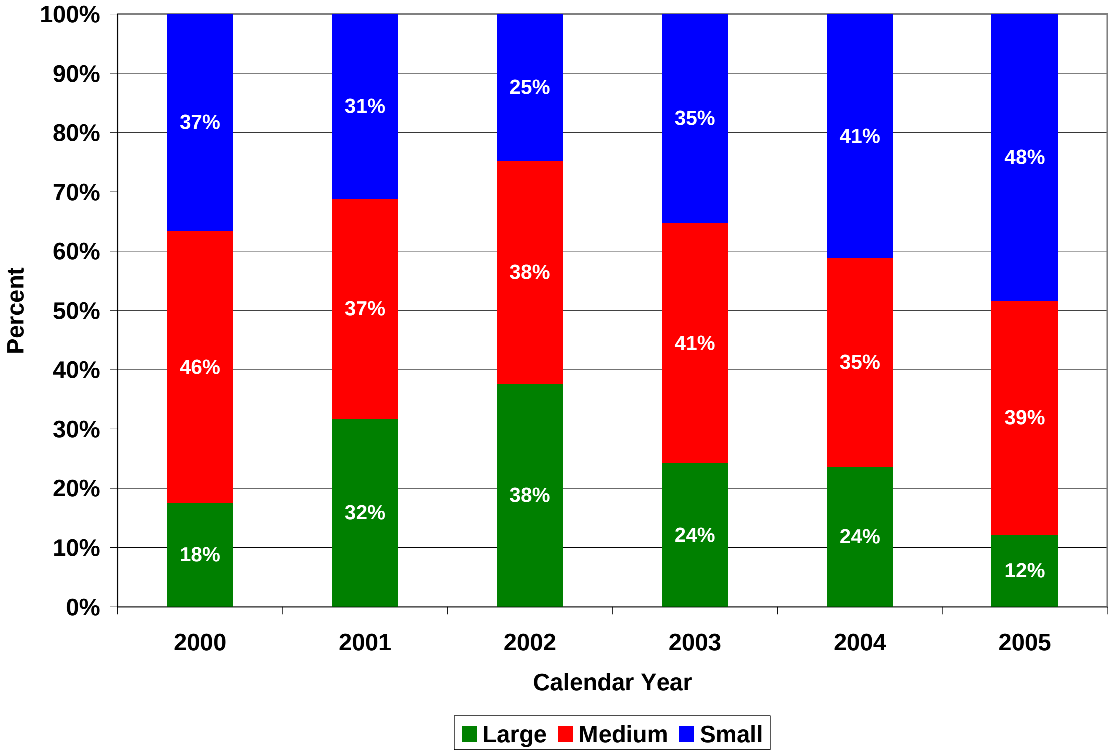

Figure 5.3. Share of Gulf of Maine/Cape Cod Yellowtail Flounder Landings by Vessel Size

Gulf of Maine Winter Flounder –Large vessels accounted for 10 percent of Gulf of Maine winter flounder landings in 2005, but this percentage was no more than 7 percent in any other year (Figure 5.4). From 2000 to 2002 small vessel landings of Gulf of Maine winter flounder averaged 42 percent of the total, while medium-sized vessels accounted for about 52 percent of the total. Over the past 3 years, the percentage of Gulf of Maine winter flounder annual landings by small vessels has been generally higher than that of medium-sized vessels, although the shares were similar between the two vessel size classes in both 2003 and 2005.

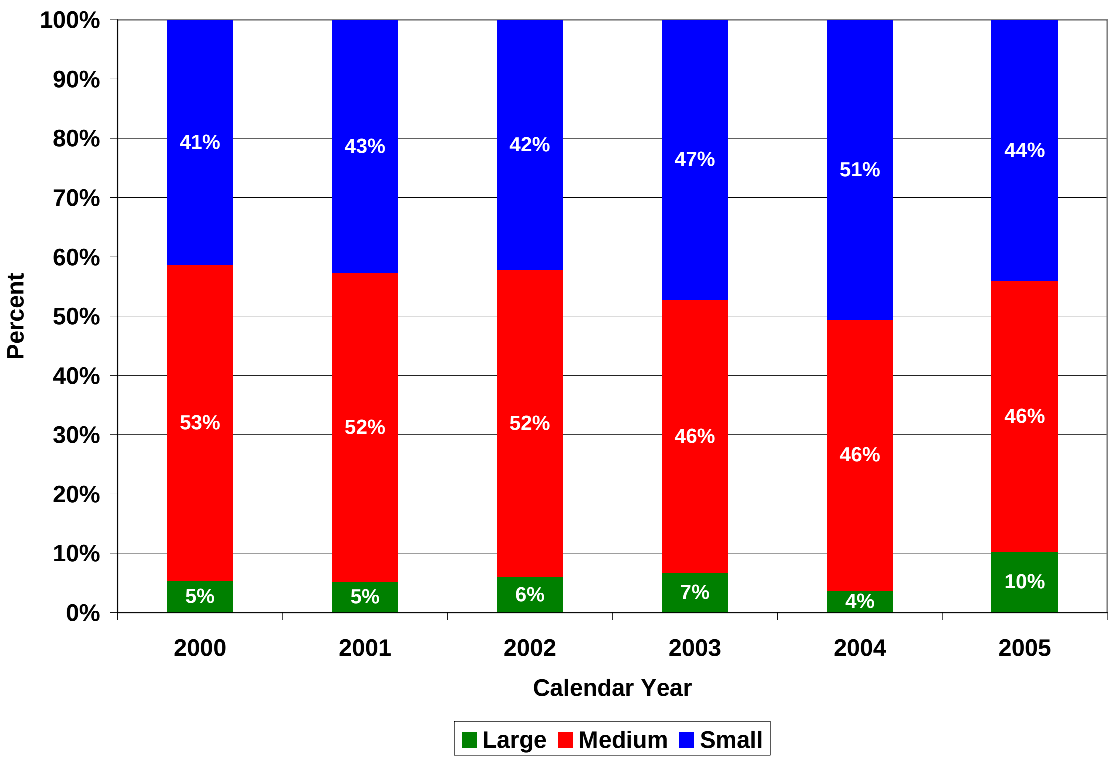

Figure 5.4. Share of Gulf of Maine Winter Flounder Landings by Vessel Size

Georges Bank Cod – The share of total Georges Bank cod landed by small vessels has declined by more than half, from 37 percent in 2000 to 16 percent in 2005, while the share taken by medium-sized vessels has remained relatively constant (Figure 5.5). By contrast, large vessels took 46 percent of the Georges Bank cod landings in 2000, and increased their share in every year thereafter to 64 percent of Georges Bank cod landed in 2005.

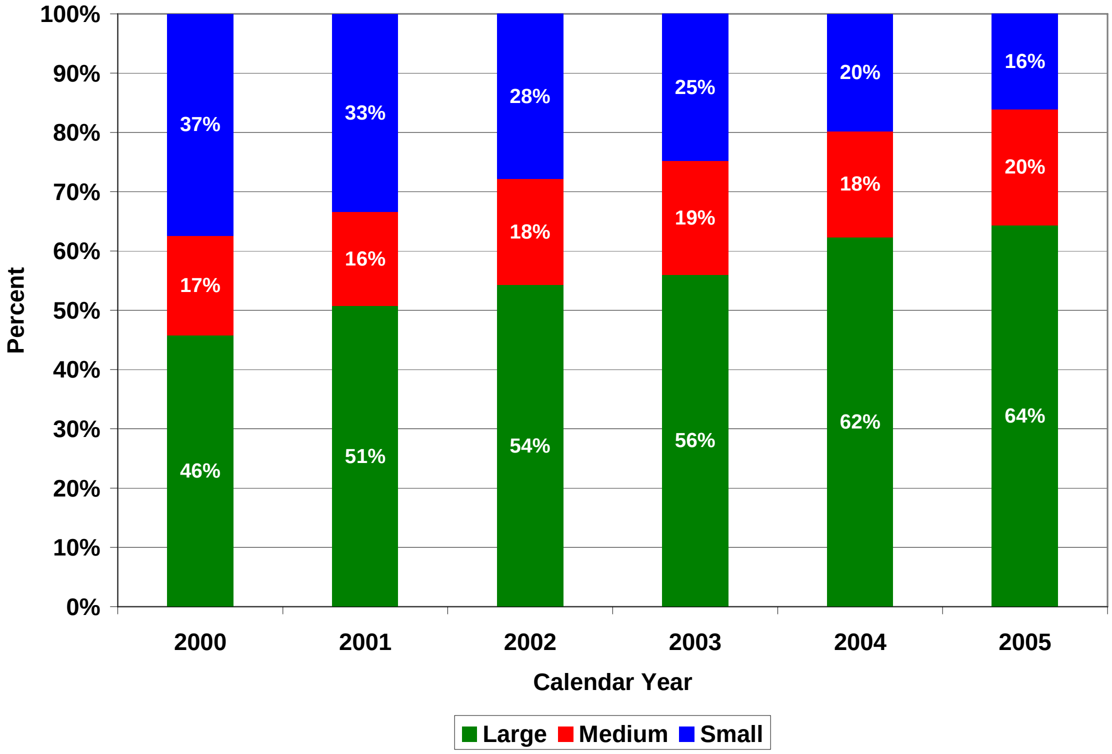

Figure 5.5. Share of Georges Bank Cod Landings by Vessel Size

Georges Bank Yellowtail Flounder – Large vessels accounted for more than 80 percent of total Georges Bank yellowtail flounder landings in every year except 2004 (Figure 5.6). Medium-sized vessels landed virtually all of the remainder. Small vessels accounted for at most 0.1 percent of annual Georges Bank yellowtail flounder in any year from 2000 to 2005.

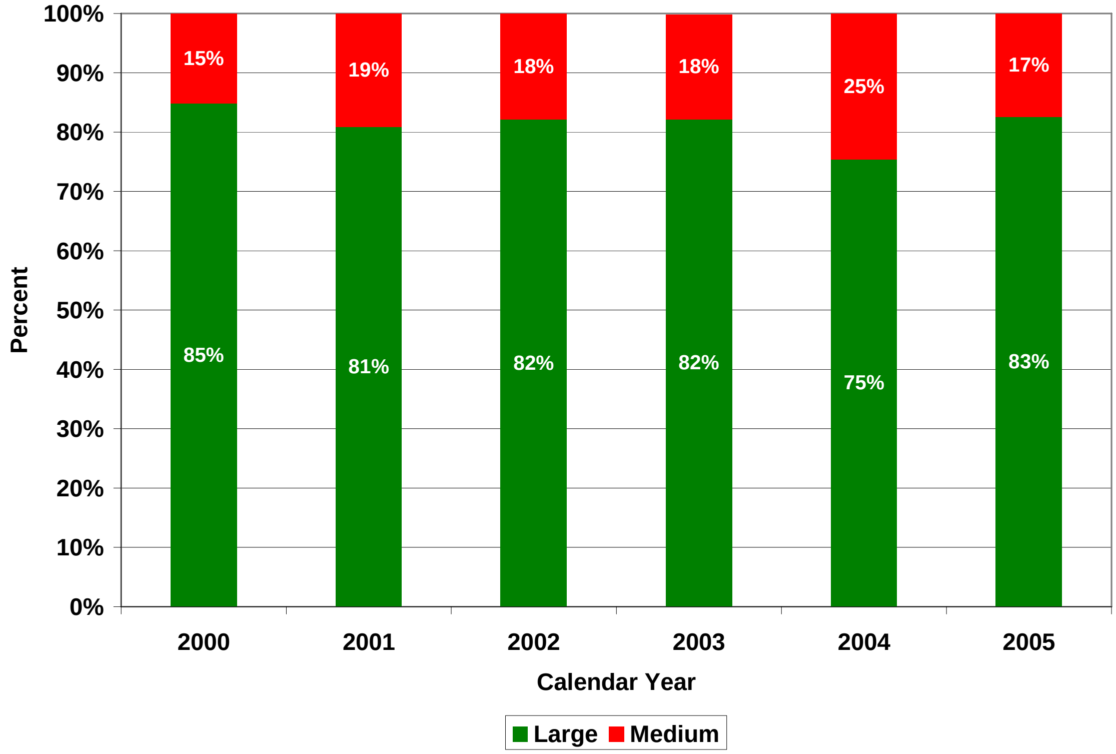

Figure 5.6. Share of Georges Bank Yellowtail Flounder Landings by Vessel Size

Georges Bank Winter Flounder – As was the case for yellowtail flounder, large vessels landed the majority of Georges Bank winter flounder during 2000–2005 (Figure 5.7). Medium-sized vessels landed between 16 percent and 29 percent, while landings by small vessels were less than 0.1 percent of total annual Georges Bank winter flounder.

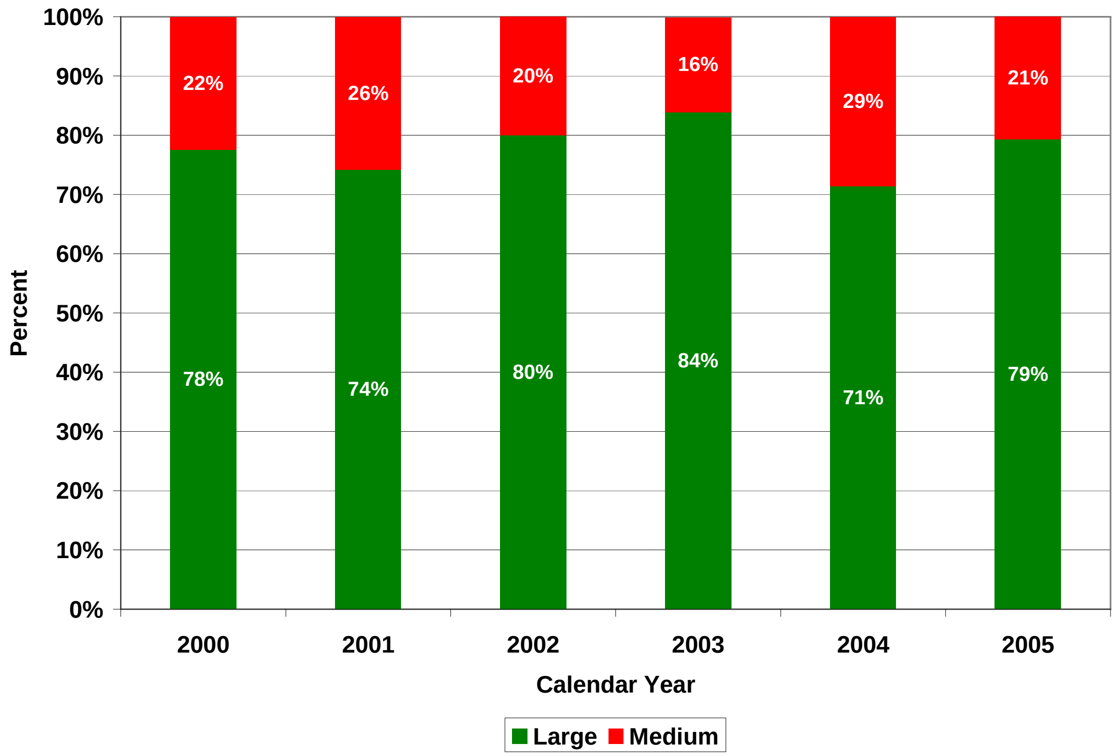

Figure 5.7. Share of Georges Bank Winter Flounder Landings by Vessel Size

Georges Bank Haddock - Large vessels landed the majority of Georges Bank haddock, although the share of Georges Bank haddock landed annually by small vessels nearly doubled in 2004 and 2005 compared to prior years (Figure 5.8). The increase in small vessel landings is attributable to the hook-gear Special Access Program (SAP) implemented under Amendment 13. This SAP allowed access to a portion of the Georges Bank haddock stock that would not otherwise have been available to hook vessels, as they do not have sufficient range and/or are not equipped to fish further offshore.

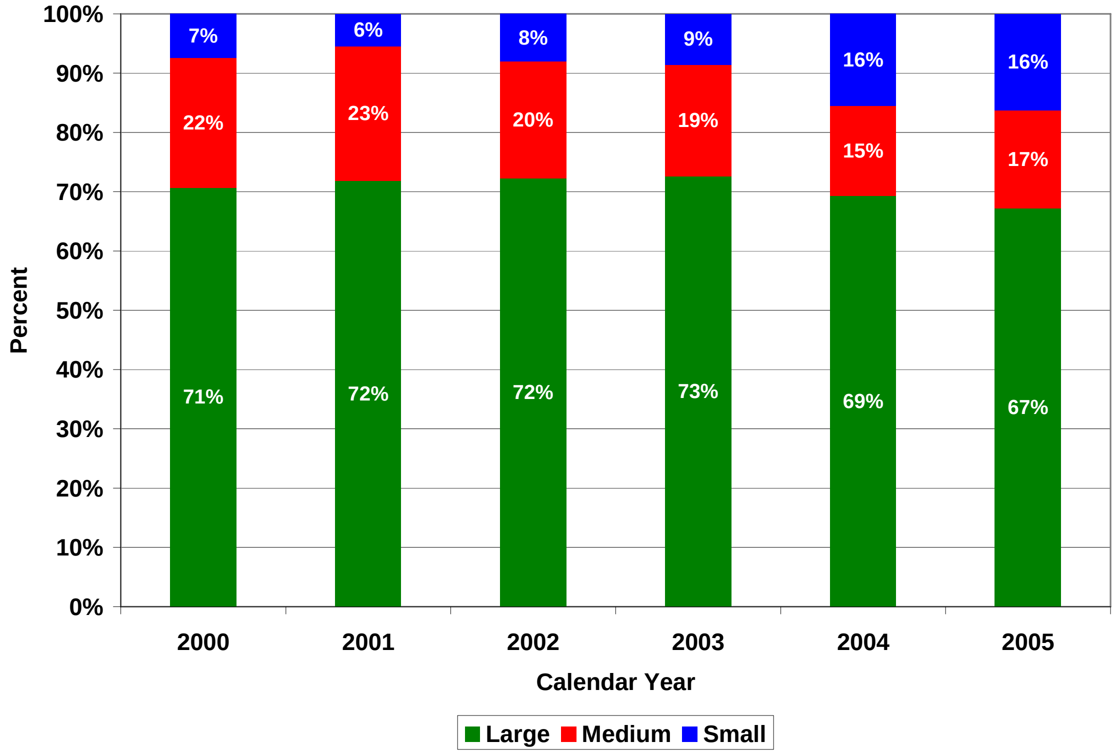

Figure 5.8. Share of Georges Bank Haddock Landings by Vessel Size

Southern New England Mid-Atlantic Yellowtail – As a percentage of total landings, small vessels took between 5 and 9 percent of southern New England Mid-Atlantic yellowtail flounder annually from 2000–2005, with no apparent trend. From 2000–2003, medium-sized vessels averaged about 53 percent of southern New England Mid-Atlantic yellowtail flounder annual landings, but in both 2004 and 2004 medium-sized vessels accounted for no more than 45 percent of landings from this stock, while large vessels landed 50 percent of all southern New England yellowtail flounder.

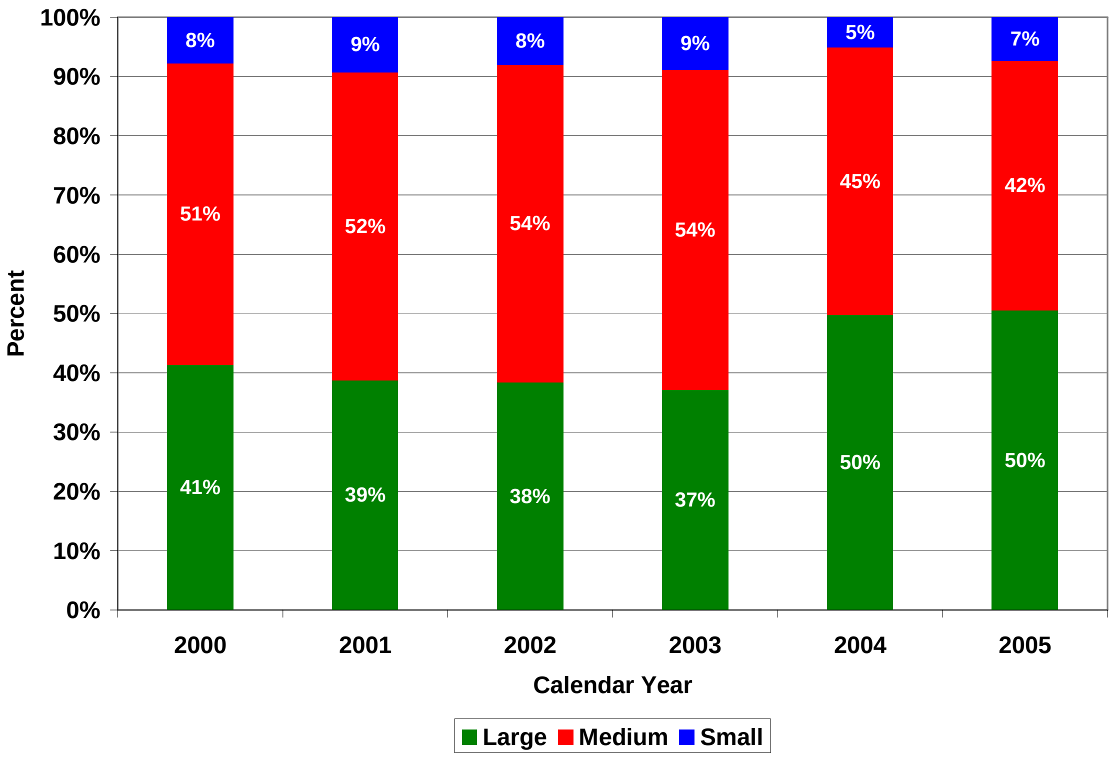

Figure 5.9. Share of Southern New England Mid-Atlantic Yellowtail Flounder Landings by Vessel Size

Southern New England Mid-Atlantic Winter Flounder – Annual landings of southern New England Mid-Atlantic winter flounder by large vessels ranged between a low of 23 percent in 2000 to a high of 36 percent in 2005. Although this range corresponds with the first and last years of the time period, there does not appear to be anything notable suggesting that 2005 represents an increasing trend in the large vessel share of southern New England Mid-Atlantic winter flounder. Over time, the majority of winter flounder in the New England Mid-Atlantic stock area have been landed by medium-sized vessels. Annual landings from this stock by small vessels were less than 20 percent from 2000 to 2004 and fell to less than 15 percent in 2005.

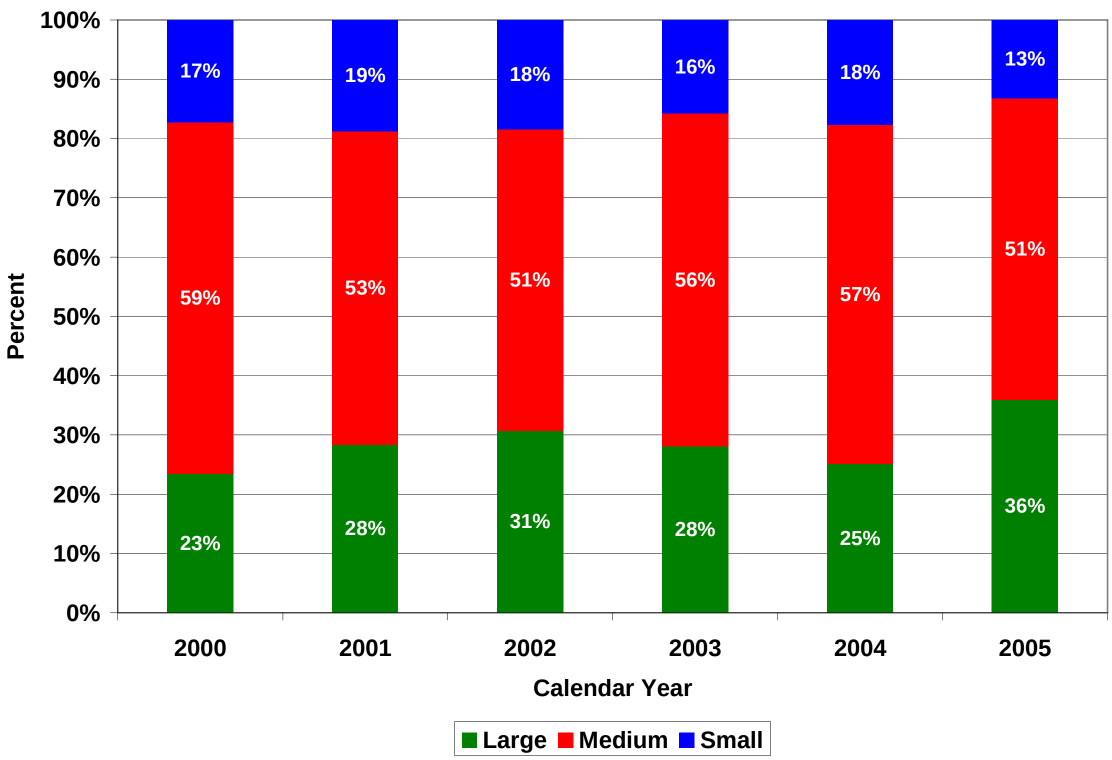

Figure 5.10. Share of Southern New England Mid-Atlantic Winter Flounder Landings by Vessel Size

Witch Flounder – Landings of witch flounder by small vessels were as high as 28 percent of the total in 2002 and were 26 percent of the total in 2003 (Figure 5.11). In all other years, small vessels landings were about 20 percent of total witch flounder landings. Medium-sized vessel landings fluctuated without trend between 35 and 39 percent of the total. This means that much of the increase in small vessel witch flounder shares in 2002 and 2003 corresponded with a lower share of total landings by large vessels. Otherwise, the large vessel share of witch flounder landings varied by no more than three percentage points, ranging between 41 and 44 percent.

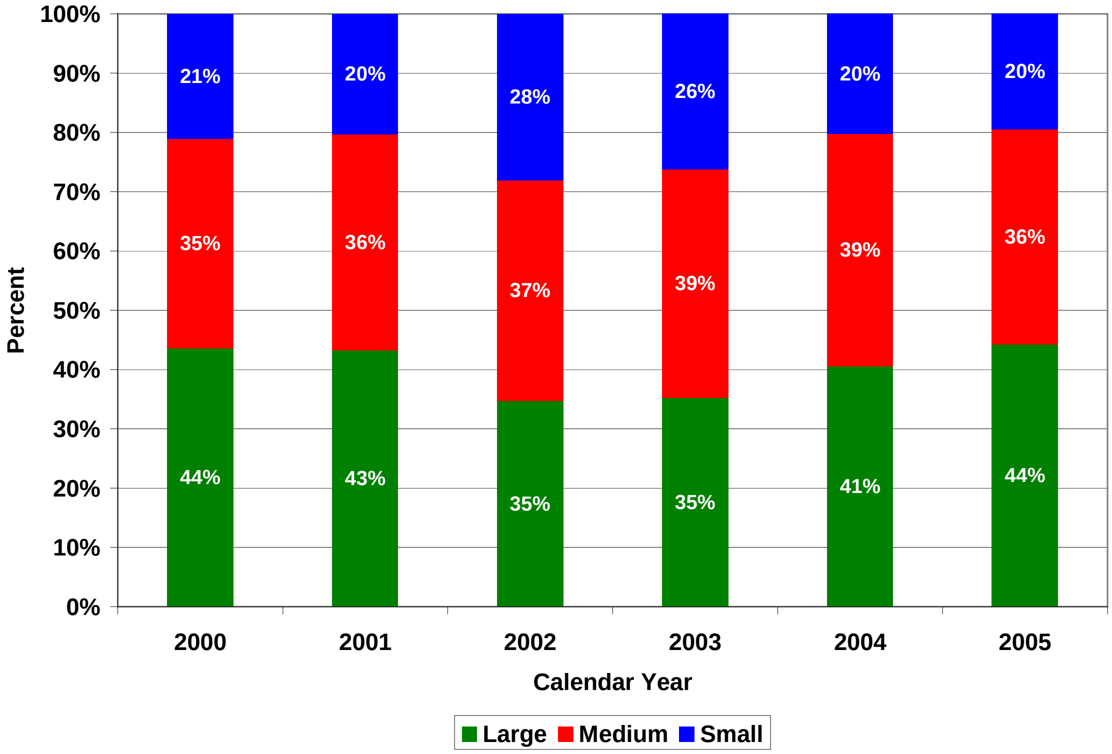

Figure 5.11. Share of Witch Flounder Landings by Vessel Size

American Plaice – From 2000–2002 the relative distribution of American plaice was almost unchanged among small, medium, and large vessels (Figure 5.12). Since 2002, the share of American plaice annual landings made by small vessels has gradually declined from 22 percent to 12 percent in 2005, while the share of American plaice annual landings by large vessels has increased from 40 percent to 49 percent. The share of plaice annual landings by medium-sized vessels has ranged without trend, from 37 percent to 40 percent.

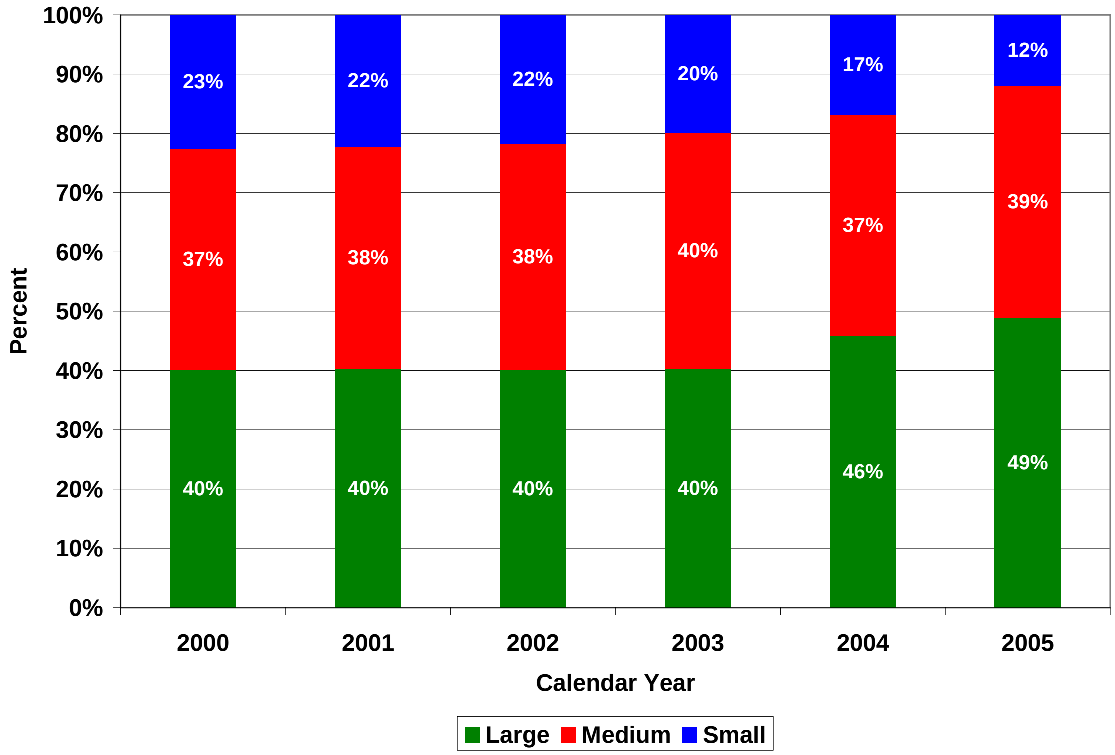

Figure 5.12. Share of American Plaice Landings by Vessel Size

Windowpane Flounder – The small vessel share of total windowpane flounder landings more than doubled from 2000 to 2002, from 23 percent to 52 percent (Figure 5.13). This change was short-lived; however, as the small-vessel windowpane flounder share dropped back to 23 percent in 2003 and has remained at 21 to 23 percent since. The reason for the one-year increase in small vessel share is not known, although windowpane flounder landings are low, so even a relatively modest change in landings would have a large effect on the proportion attributable to small vessels. In 2002, large vessels landed 20 percent of the total windowpane flounder harvest, increasing that share in each subsequent year to 50 percent by 2005, while the proportion landed by medium-sized vessels has declined after reaching a high of 48 percent in 2003.

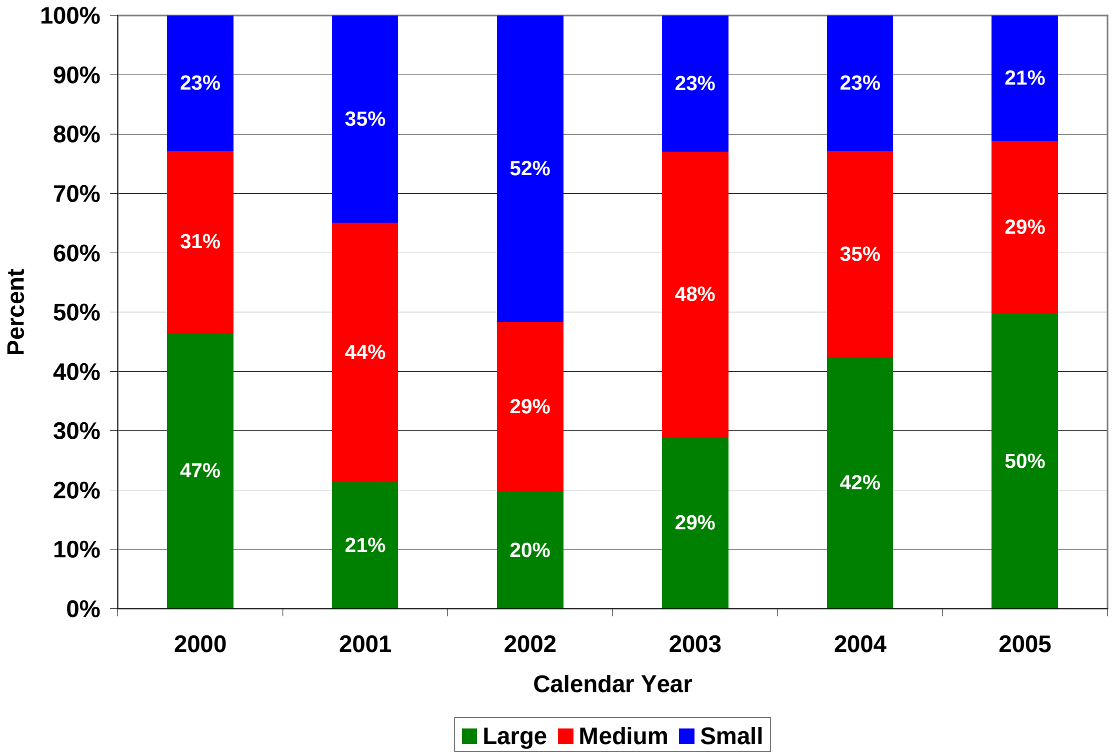

Figure 5.13. Share of Windowpane Flounder Landings by Vessel Size

Acadian Redfish – Large vessels accounted for at least 50 percent of the redfish landings in 2000, increasing that share in each subsequent year to a high of 61 percent in 2005 (Figure 5.14). The proportion of landings attributable to small vessels declined in 2003–2005, to 13 percent in 2005. The 2005 landings share was within the time-series range for small vessels.

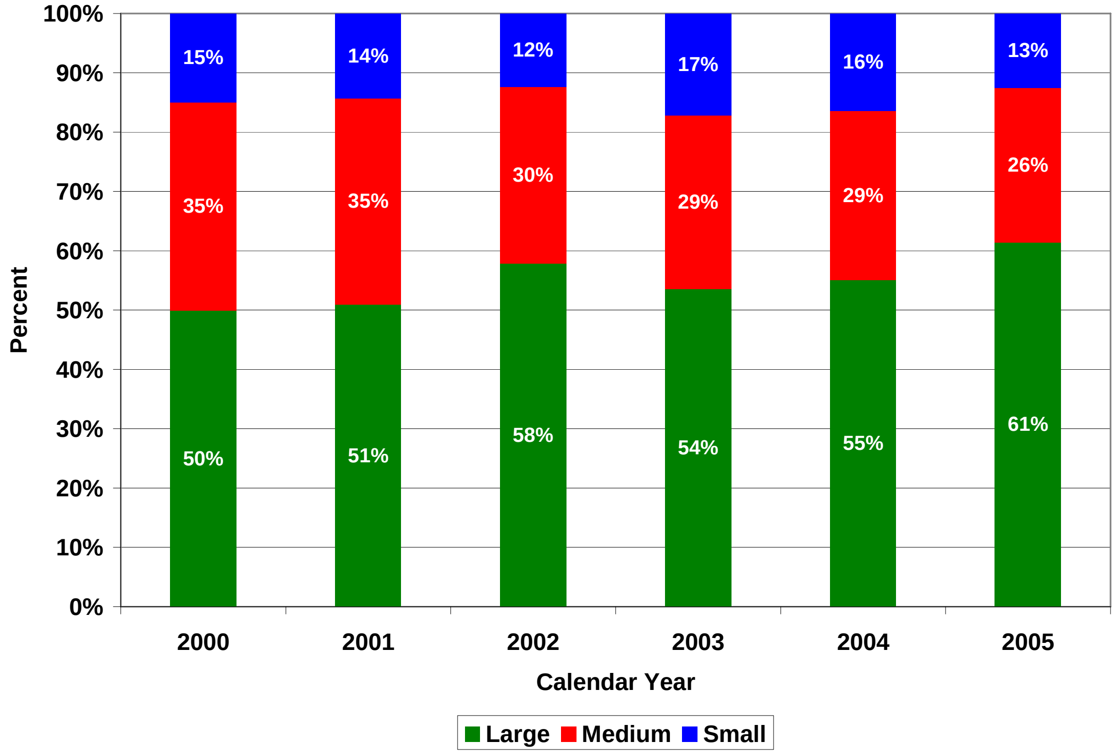

Figure 5.14. Share of Acadian Redfish Landings by Vessel Size

Pollock – With the exception of calendar year 2000, the proportion of pollock landed by medium-sized vessels was lower than that of other vessel size-classes (Figure 5.15). From 2001–2005 the medium-sized vessel share of annual landings ranged between 26 and 29 percent. The share of pollock landed annually by small vessels exceeded that of large vessels by at least 5 percent in every year except 2005. In 2005, the annual landings share for both small and large vessels was 37 percent.

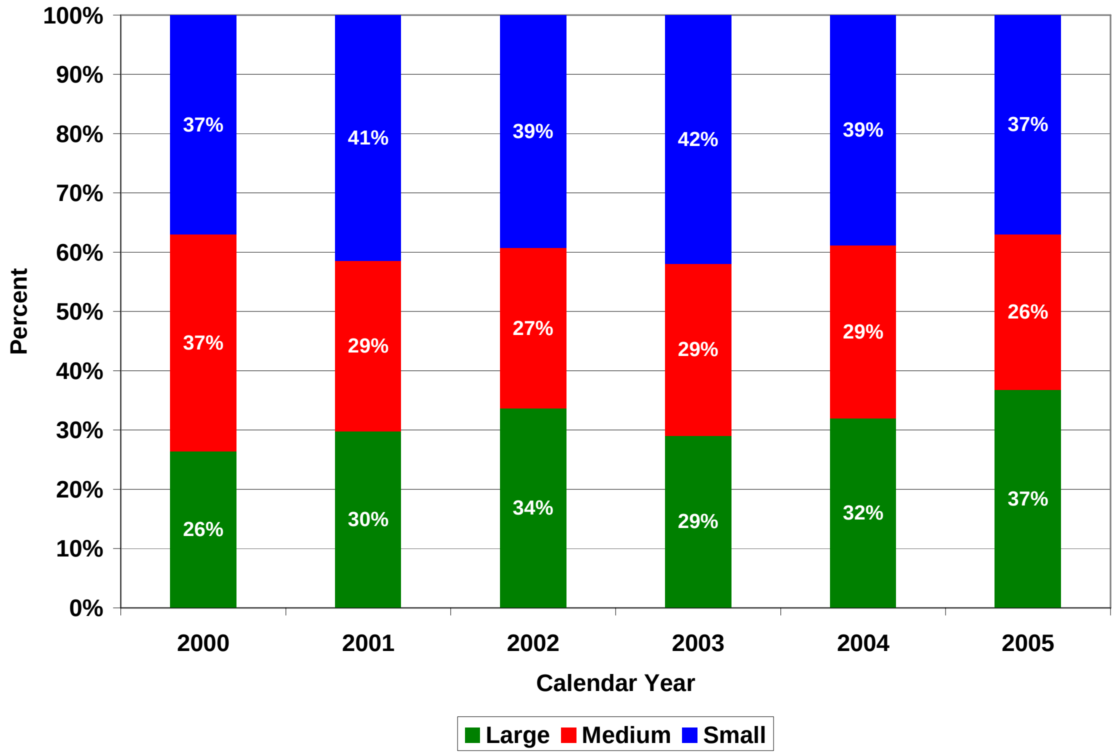

Figure 5.15. Share of Pollock Landings by Vessel Size

White Hake – The proportion of white hake landed annually by large vessels fluctuated without trend between 39 percent and 42 percent from 2000 to 2005 (Figure 5.16). From 2000 to 2002, the share of white hake landed annually by small vessels was declining, while the medium-sized vessel share was increasing. This trend reversed as the small-vessel share of white hake increased from 18 percent in 2002 to 22 percent in 2003 and increased again to 27 percent in 2004. By 2005, however, the small-vessel share of annual landings had dropped to 18 percent, while the medium-vessel share increased to 41 percent, up from 32 percent in 2004.

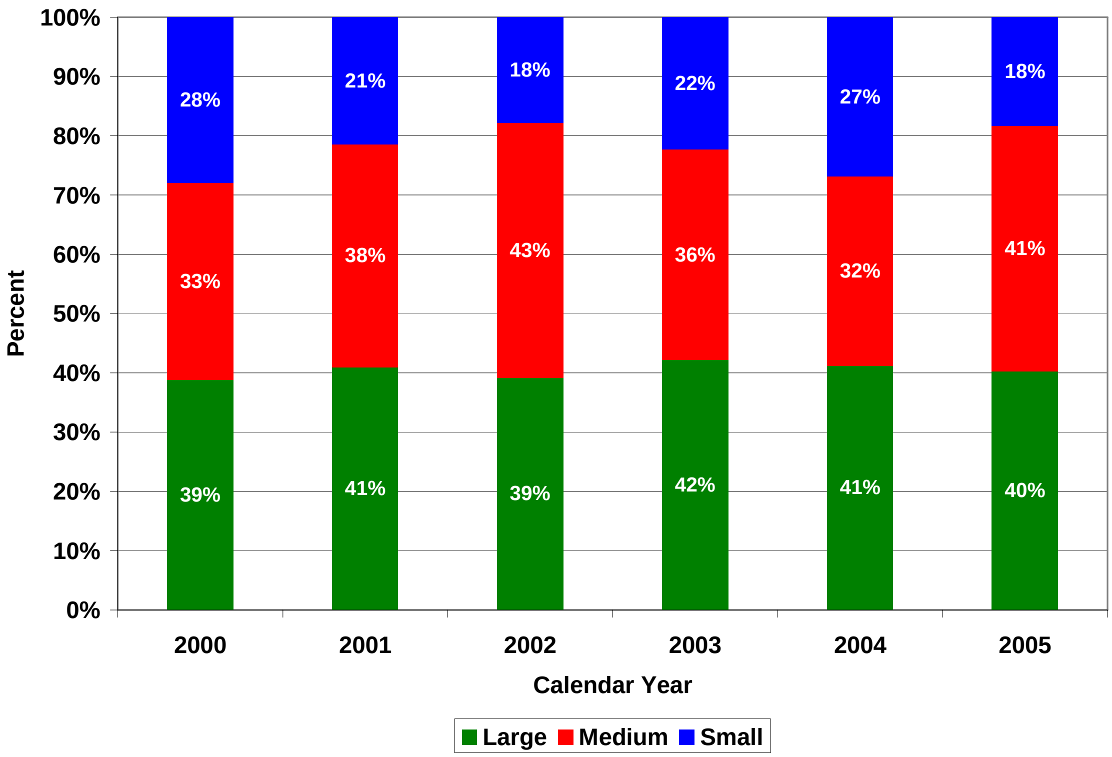

Figure 5.16. Share of White Hake Landings by Vessel Size

Section (6). Discussion of the current monetary value of groundfish permits in the New England fishery and the actual impact that the potential imposition of Framework 42 is having on such value

In the Northeast region, permits may not be separated from a vessel. Permits are not freely transferable from one vessel to another, and no market in groundfish permits, as such, exists. Vessel owners are able to acquire a particular suite of desired permits through one or more transactions involving the transfer of a vessel and its permits. The value or sale price paid for these transfers is not collected or recorded by NOAA's National Marine Fisheries Service. Data are collected on the leased value of a DAS through the leasing program. Although these data suggest a positive relationship between the lease value and permit value, leasing reflects a short-term value, whereas the value of a permit is based on the expected earnings over a longer period of time. Further, a substantial number of recorded lease prices are zero or nearly zero. These zero values may reflect an intra-company lease or some other form of remuneration other than a fixed payment. See Section (7) in this report for a more detailed discussion of leasing.

For these reasons, reliable data were not available on which a quantitative estimate of the market value of a groundfish permit could be based, and it is not possible to provide an estimate of the impact that Framework 42 would have on permit values. Nevertheless, a qualitative assessment of the potential impact on permit values is possible.

A fishing vessel is a productive asset, the value of which is determined by the discounted flow of future income over the useful life of the vessel. The amount of future income is modified by the suite of limited access permits assigned to the vessel, as well as the level of access privileges (i.e., days-at-sea) that may be assigned to such permits. In this manner, although two vessels have identical permits, one can still be valued more highly than the other for various reasons: it may be newer, more efficient, or may have some other operational advantage, for example. Similarly, for identical vessels, one vessel may be valued higher than another because it has a higher days-at-sea allocation than the other vessel or has a limited access permit that the other vessel does not have.

The market value of a vessel or permit is determined by the interplay between a buyer's willingness to pay and the seller's asking price (i.e., the value of the asset to the owner in its current use). Because value is determined by the flow of future income streams, anything that disrupts that flow would reduce the value of the productive asset. This means that the potential value to both buyer and seller are reduced, resulting in a reduction in the market value of a vessel or permit. The reduction in market value depends on the magnitude and duration of the disruption in income streams.

Framework 42 reduces fishing opportunities for all vessels, particularly those unable to adjust fishing practices to offset the effects of the differential DAS counting area in the Gulf of Maine. This means that the potential impact on the market value is larger for some fishing businesses than others.

Section (7). Discussion of whether permitting days-at-sea to be leased is altering the market value for groundfish permits or days-at-sea in New England

For reasons noted under Section (6) of this report, it is not possible to estimate market values for groundfish permits. To see how DAS leasing might affect the value of a fishing business, consider what would happen in the absence of leasing. As explained in Section (6), the value of the fishing business is affected by the stream of future income. In the absence of leasing, the marginal contribution of groundfish to the fishing business is constrained by the individual's DAS allocation. Leasing provides an opportunity for mutually beneficial gains between lessee and lessor. The lessee can increase potential income received from groundfish, while the lessor receives higher income than could have been earned otherwise. In this respect, days-at-sea leasing may be propping up market values of groundfish vessels or permits, because the program offers vessels an opportunity to increase fishing income in a way not possible without it. This potential beneficial effect on market values may be enhanced or lost depending on participant expectation about future groundfish management measures.

Under the leasing program, the history of landings is retained by the lessee but the history of days-at-sea use stays with the lessor. Assuming days-at-sea management is maintained for groundfish, the market value of a lessor vessel may be enhanced because of the joint effects of higher income potential from leasing as well as the value of days-at-sea use history in the event that baseline allocations are re-evaluated. By contrast, if groundfish management evolves into some form of dedicated access privilege, the leasing program would enhance the market value of lessee vessels, as landings made with leased days accrue to the lessor's landings history.

Section (8). Discussion of whether there is a substantially high probability that the biomass targets used as a basis for Amendment 13 remain achievable

All biomass targets in Amendment 13 had at least a 50 percent chance of being attained if the state of the populations as projected for 2003 (NEFSC 2002a) and the fishing mortality targets laid out in the plan were achieved. A thorough review of the existing biological reference points will take place in 2007 and 2008 in advance of the 2008 Groundfish Assessment Review Meeting. This review will include additional modeling approaches, revised data sets, and a review of methods to compute reference points. These meetings are anticipated in the fishery management plan, and the New England Fishery Management Council will use the results to revise the plan as necessary to ensure stock rebuilding and an end to overfishing where it exists.

Ultimately, the "achievability" of a suite of biomass targets depends on the combined effects of sound fisheries management and moderate levels of recruitment and average rates of growth in the stock. The probability of attaining a biomass target is always changing with the duration of the forecast period. As the endpoint of a forecast period approaches, the probability of achieving the target depends less on assumptions and more on the actual levels of F, recruitment, and growth that have occurred since the start of the forecast period.

The biomass targets incorporated into Amendment 13 were derived by the Working Group on Re-evaluation of Biological Reference Points for New England Groundfish, which met in February 2002 (NEFSC 2002b). The Working Group comprised assessment scientists from the Northeast Fisheries Science Center (who were responsible for producing the individual groundfish stock assessments) as well as independent experts from other NMFS Science Centers and from other institutions in the United States and Canada. These reference points and projection methodologies were subsequently reviewed by an international panel of experts in February 2003.[5]

For several important stocks (e.g., cod, haddock and yellowtail flounder), revised biomass reference points were higher than the previous ones—in some cases substantially so. The new estimates relied on recruitment distributions near the long-term mean, or recruitments correlated with increases in projected spawning stock biomasses. Currently available information does not permit the estimation of population sizes prior to the development of modern monitoring programs in the early 1960s. However, such information is sufficient to conclude that chronic growth overfishing has limited stock biomasses to well below their estimated potential.

In essence, the Working Group recognized that the period within which we are able to estimate stock biomass is relatively short compared to the long exploitation history of the stocks. Most of the stocks have been subjected to high levels of fishing mortality and relatively high retention of immature fish. This has hindered stocks from achieving the full biological potential in terms of growth and recruitment. In other words, analyses suggested that population sizes and landings to the fisheries would have been much higher during the latter part of the 20th century had the rates of fishing mortality been lower.

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[5] February 3, 2003 groundfish science review reports available online here: http://www.nefsc.noaa.gov/groundfish/#gs

Atlantic sea scallops serve as an important illustration of this principle. These stocks were at very low population sizes in the early 1990s. However, observed levels of recruitment suggested that much higher biomass and fishery yields were possible if fishing mortality was reduced. The closure of three large areas on Georges Bank to sea scalloping in 1994 provided an unequivocal demonstration of the effects of chronic growth overfishing. Reductions in fishing mortality allowed for rapid attainment of stock levels that have eclipsed any on record. The success of the sea scallop fishery, which is currently the region's second most valuable, can be attributed to decreased fishing effort, increased recruitment, and effective reduction in fishing mortality through the fishery management plan.

Also, retrospective patterns have been observed in a number of groundfish stock assessments. The most common pattern has been an overestimate of stock abundance and an underestimate of fishing mortality in the terminal year of the assessment. As additional years of data are added, typically stock abundance is updated to lower values and fishing mortality rates are updated to higher values, although the opposite has been observed as well. If management regulations for rebuilding do not account for the effect of retrospective patterns on estimates of initial population size, then rebuilding will be slower than projected if the stock abundance is updated to lower values, or faster than projected if the stock abundance is updated to higher values.

Recovery delays induced by overly optimistic estimates of stock size are especially problematic because of the difficulties and lead times for implementing management measures to reduce fishing mortality. Under these circumstances, the regulations will be less effective than predicted, and additional management measures could be required.

Retrospective patterns in stock assessments occur for a variety of reasons and are problematic for assessments worldwide. Investigation of the underlying causes for retrospective patterns is an active area of research. A working group at the Northeast Fisheries Science Center will be collaborating with an international panel of experts in March 2007 to addresses this issue more completely. In particular, we hope to develop a risk analysis framework that evaluates the risk to the fish stocks and implications for stock rebuilding if the recent retrospective patterns persist.

Section (9). Discussion that identifies the year in which the biomass targets used as a basis for Amendment 13 were last evident or achieved, and the evidence used to determine such a date

To provide the information requested, we compared the biomass estimates over the span of the assessment period with the corresponding biomass target (Bmsy, or a Bmsy proxy) for each stock. The current Bmsy for 18 Amendment 13 stocks (Atlantic halibut is excluded) are presented in Table 9.1. The stocks are listed in two groupings: (1) assessments based on an analytical model that included catch-at-age data from the fishery and research surveys and (2) assessments based on age-aggregated catch and research survey data.

One of the striking features evident in the first group is that most stock assessments that incorporate age composition information begin in the early 1980s. A few, such as Georges Bank and southern New England yellowtail flounder, commence in 1973, and Georges Bank haddock commences in 1963. The Georges Bank winter flounder assessment begins in 1964, but this is based on an age-aggregated biomass dynamics model. The Acadian redfish assessment is based on a model that combines age-aggregated and age-disaggregated information over the assessment period, allowing the model to initiate in 1940. In contrast, the assessments based on age-aggregated catch and research survey data commence in 1963, the year in which the NEFSC autumn research survey began.

Stocks in the group where model-based assessments include catch-at-age data have very different results than those with assessments based on total catch and research survey indices. Only four stocks in the first group show years when the Bmsy value has been previously observed, whereas all of the stocks in the second survey-based groups show many years of observed biomass indices at or above the Bmsy proxy. Some of these differences are attributable to the different assessment methods, but much of the contrast is due to the inclusion of the 1960s and 1970s in the assessment time period. By basing the assessment on a more simplistic index-based approach, we are able to extend the assessment period back to a time when biomasses were higher and exploitation was generally lower on most stocks. In the second group, most of the years when observed biomass was at or above the Bmsy proxy were during the decades of the 1960s and 1970s. In the first group, almost all of the years when observed biomass was at or above Bmsy were at the beginning of the assessment periods.

In the first group, comparisons for Georges Bank haddock and Georges Bank winter flounder indicate that biomass has been close to Bmsy in the past. These two stocks have the longest assessment time periods in the first group. Georges Bank haddock was at 71 percent of Bmsy in 1966 and Georges Bank winter flounder was at 89 percent of Bmsy in 1970. Both of these years occur in the decade of the 1960s. It should also be noted that for several stocks, research survey biomass indices were in the range of 2 to 4 times higher during the 1960s compared to the assessment period.

This suggests that many of the Bmsy estimates are within the range of previously observed levels. Biomass reference points estimated from the age-structured assessments capture each stock's productivity in terms of spawning biomass per recruit combined with the most likely recruitment history. As discussed in Section (8) of this report, many of the stocks have been subjected to chronic growth overfishing that has limited stock biomasses well below their estimated potential during the assessment period. This should not suggest that conditions of stock productivity that existed prior to periods of high exploitation cannot be achieved after exploitation rates are brought under control.

Table 9.1. Estimates of Bmsy and Observed Stock Biomass for 18 Northeast Groundfish Stocks Based on the 2005 Groundfish Assessment Review Meeting (NEFSC 2005)

Stock Biomass	Bmsy	Assessment Period	Years When Bt>= Bmsy	Maximum Estimated Biomass	Year	Maximum Biomass Percentage of Bmsy
Model-based (mt)						
Gulf of Maine Cod[1]	82,800	1982-2004	None	24,261	1990	29.30%
Georges Bank Cod	216,800	1978-2004	None	89,852	1982	41.44%
Georges Bank Haddock	250,300	1963-2004	None	478,266	1966	71.22%
Georges Bank YT[2]	58,800	1973-2004	None	21,947	1973	37.32%
GoM/CC YT	12,600	1985-2004	None	3,819	1991	30.31%
SNE/MA YT[3]	69,500	1973-2004	None	24,324	1983	35.00%
Am Plaice[4]	28,600	1980-2004	1980-1982	46,701	1980	163.29%
Witch fl.[5]	19,900	1982-2004	2004	21,175	2004	106.41%
GoM Winter fl.	4,100	1982-2005	1982	4,776	1982	116.49%
SNE Winter fl.	30,100	1981-2004	None	14,792	1983	49.14%
GB Winter fl.[6]	9,400	1964-2005	None	8,366	1970	89.00%
Acadian Redfish[7]	236,700	1934-2004	1940-1949	580,878	1940	245.41%
Survey Index-based (kg per tow)						
GoM Haddock	22.17	1963-2004	1963	50.70	1963	228.69%
Pollock	3.00	1963-2005	1963, 1969, 1972-73, 1976-79	8.57	1976	285.67%
N. Windowpane	0.94	1963-2006	1973, 1976-78, 1984-86, 1990, 1998	2.14	1984	227.66%
S. Windowpane	0.92	1963-2007	1963, 1966	1.99	1963	216.30%
Ocean Pout	1.90	1963-2008	1968-70, 1980-81, 1984-86, 1990	7.61	1981	155.31%
White Hake	7.70	1963-2009	1971, 1973-74, 1979-82	9.09	1982	118.05%

Notes

1 Gulf of Maine Cod surveys show biomass 2x that of VPA period during 1960s
2 Georges Bank YT surveys show biomass 3-4x that of VPA period during the 1960s
3 SNE/MA YT surveys show biomass 3-4x that of VPA period during the 1960s
4 Am. Plaice surveys show biomass 2x that of VPA period during the 1960s
5 Witch fl. surveys show biomass 3-4x that of VPA period during the 1960s
6 GB Winter fl. 84-92% of Bmsy during 1969-80
7 Acadian Redfish ~170 kt in 2004

Section (10). Discussion of any separate or non-fishing factors, including environmental factors that may be leading to a slower rebuilding of groundfish than previously anticipated

The rebuilding status of groundfish is determined by comparing the current stock size with a biological reference point for biomass. For age-based stock assessments, the biological reference point is based on spawning stock biomass, whereas for other stocks the reference point is based on an index of total stock biomass. Spawning stock biomass is less than total stock biomass, as it is restricted to the fraction of the population that is reproductively mature.

The primary biological factors that would contribute to slower rebuilding of biomass are a decrease in the growth rate, a delay in maturation, or both. A reduction in growth rate can be caused by increased competition for food when stock numbers are high, resulting in "density-dependent" growth. Growth rate can also decline if there is decreased productivity in the system, caused either by fishing removals or by environmental factors. The environment can also directly influence growth. For example, growth rates of some stocks will decrease if persistent large-scale changes in temperature are sub-optimal for growth. A reduction in growth rate (i.e., lower mean lengths and weights at age) also influences the length and age of sexual maturation of a stock. A delay in maturation will also delay the increase in the spawning stock biomass.

Growth of several example stocks from Georges Bank and the Gulf of Maine are presented in Figures 10.1 through 10.6. The mean weights at age are presented as Z-scores,[6] removing the scale and allowing for easier comparisons among ages. These stocks were chosen to illustrate the trends in growth, both decreasing and increasing, exhibited by stocks that co-occur either spatially or temporally. References to stock biomass are based on assessments reviewed at the Groundfish Assessment Review Meeting in 2004 (NEFSC 2005). Comparisons between growth rate and biomass trends herein are qualitative. However, quantitative analyses to detect significant trends in growth and associations with biological and environmental factors will be undertaken at the 3rd Groundfish Assessment Review Meeting in 2008 (GARM III).

[6] Observed mean/standard deviation

Georges Bank haddock is known to exhibit density-dependent growth, particularly when the stock experiences large recruitment events. The very strong 1963 year class exhibited a decreased growth rate and, most recently, the very strong 2003 year class has exhibited a growth rate lower than that of the 1963 year class. The periods of increasing mean weights at age correspond to periods of lower stock size (Figure 10.1). The decrease in mean weights at age since 1990 corresponds to an increase in the spawning stock biomass, particularly since 1995.

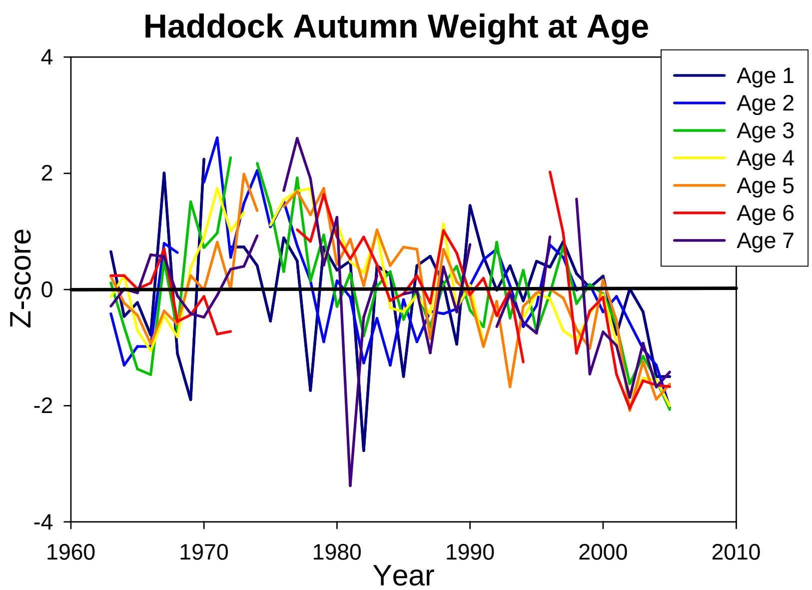

Figure 10.1. Georges Bank Haddock Mean Weights for Ages 1-7, 1963-2005

Georges Bank yellowtail flounder exhibits an increase in mean weights for both males and females since the early 1990s (Figs 10.2 through 10.3). In contrast to Georges Bank haddock, the trend in weights corresponds to an increase in stock size during the same time period.

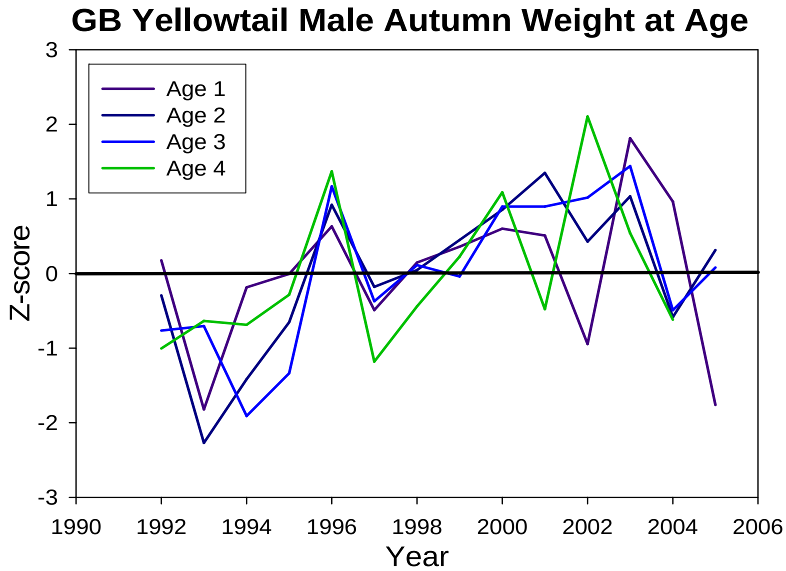

Figure 10.2. Georges Bank Male Yellowtail Flounder Mean Weights for Ages 1-4, 1992-2005

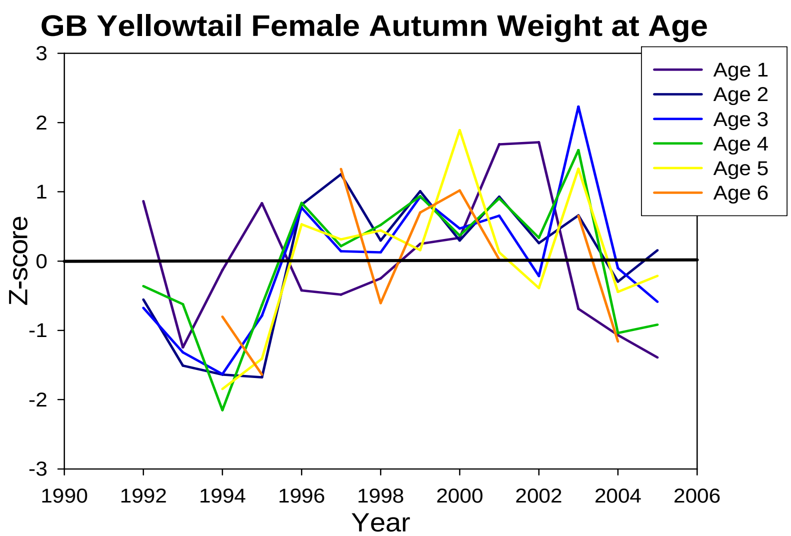

Figure 10.3 Georges Bank Female Yellowtail Flounder Mean Weights for Ages 1-6, 1992-2005

Georges Bank cod (Figure 10.4) exhibits a decline in mean weights at age since the mid-1980s. This corresponds to a declining trend in biomass until 1995, after which the biomass increases gradually but is relatively stable. Gulf of Maine cod (Fig. 10.5) does not show any persistent trend throughout the time series, although mean weight at age appears to have an opposite trend to that of biomass for short time periods of 5 to 10 years.

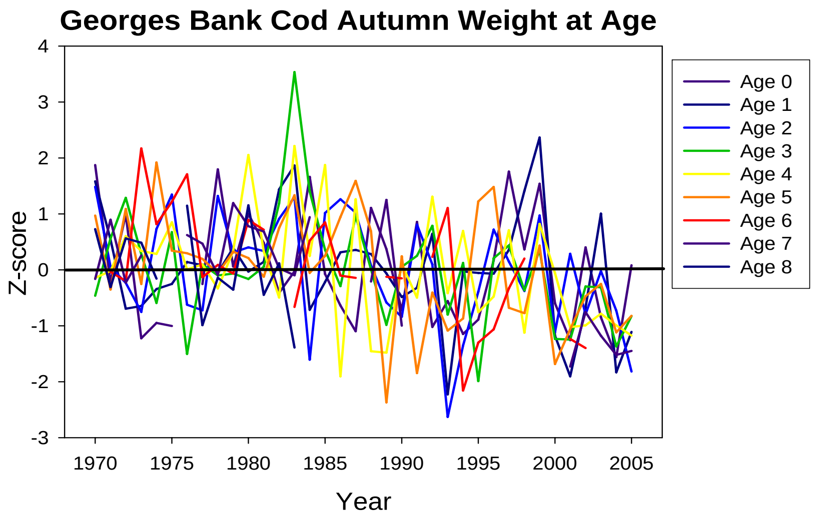

Figure 10.4 Georges Bank Atlantic Cod Mean Weights at Ages 1-8, 1970-2005

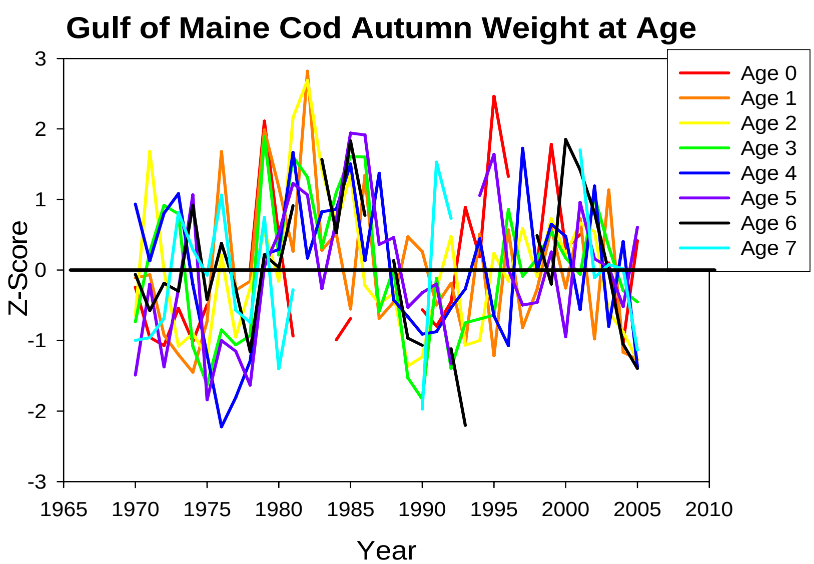

Figure 10.5 Gulf of Maine Atlantic Cod Mean Weights at Ages 1-7, 1970-2005

American plaice in the Gulf of Maine exhibit a declining trend in mean weights at age for both males and females since the early 1990s (Figs.10.6 to 10.7). Biomass remained relatively stable during this time period, increasing slightly during 1995–2000.

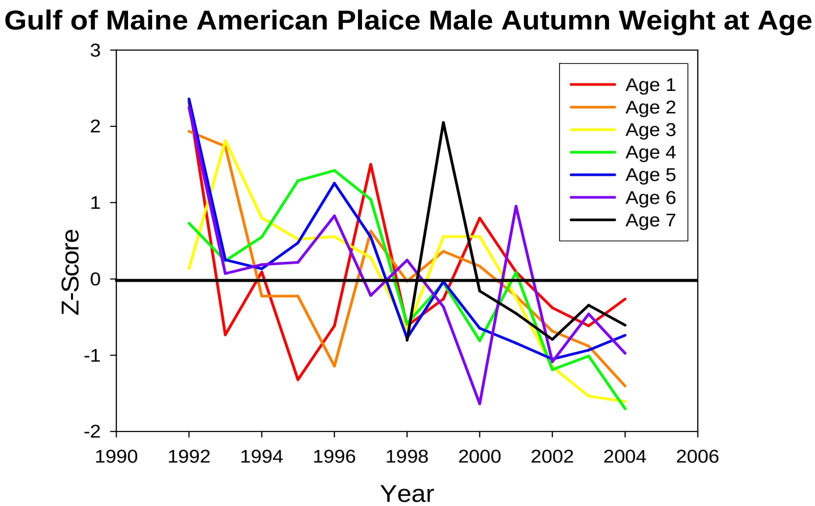

Figure 10.6 Gulf of Maine American Plaice Male Mean Weights at Ages 1-7, 1992-2005

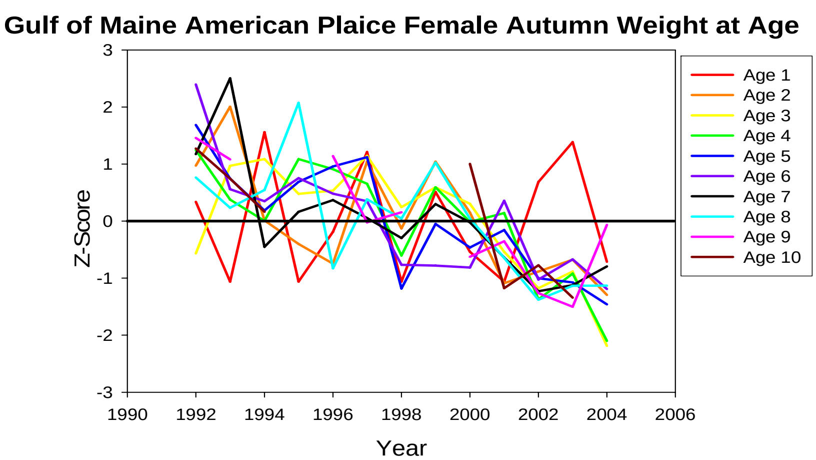

Figure 10.7 Gulf of Maine American Plaice Female Mean Weights at Ages 1-10, 1992-2005

GARM II (NEFSC 2005) explicitly did not assign any causes to the observed trends in average size. Insights into causes must await further analyses of environmental conditions and more thorough comparative analyses among species. Moreover, trends in average weight at age can be the result of biological and environmental factors operating simultaneously. For example, a change in temperature that might otherwise result in reduced growth might be offset by density-dependent increases in growth (i.e., if low densities imply more prey per individual). Long-term genetic effects of size-selective fishing mortality have also been posited as factors responsible for smaller average size at age. However, evidence for such changes and their timing must be consistent with known genetic and life-history theory. At present, the evidence for broad-scale genotypic changes in the stocks is weak.

In summary, there is some evidence that non-fishing factors may reduce the attainment of biological reference points for some species. Further analysis of these factors is ongoing and will be part of the overall assessment in 2008 of groundfish species regulated under Amendment 13. It should be emphasized that, because the trends among species are not consistent, not all of the species will be affected in the same way.

Section (11). Discussion of the potential harm to the non-fishing environment and ecosystem from the reduction in fishing resulting from Framework 42 and the potential redevelopment of the coastal land for other purposes, including potential for increases in non-point source of pollution and other impacts

We interpreted this topic as having two closely related parts. The first part addresses "potential harm to the non-fishing environment and ecosystem from the reduction in fishing resulting from Framework 42." The second part addresses (potential harm to the non-fishing environment and ecosystem from) "the potential redevelopment of the coastal land for other purposes, including potential for increases in non-point source of pollution and other impacts."

Analyses performed for Framework 42 to the Multispecies FMP evaluated the potential impacts of the proposed management actions and concluded there would be no adverse impact on essential fish habitat. Thus, the other "harm" to the marine environment that could be evaluated would be harm associated with possible changes in waterfront land and water uses owing to Framework 42, not from any change in fishing itself. For this reason, our response to this question focuses on the second part of the query.

The socioeconomic impact analysis of Framework 42 concludes there would be a "reduced ability of shoreside infrastructure to maintain year-round operations" in the affected ports and that "port infrastructure may be affected by the gradual loss of shore-based services essential to a strong working waterfront." In this section, we provide additional information on the potential indirect environmental impacts that could result from changes in waterfront infrastructure in ports and harbors in New England that serve the groundfish industry.

Many fishing ports and harbors in New England provide markets, services, and homes for fishermen who participate in the groundfish fishery. Some of them, like Portland and Boston, are deep-water, industrialized ports whereas others, like Chatham and Provincetown, are much smaller, non-industrialized, shallow-water ports. Some, like Gloucester, have been centers of fish harvesting and processing activities for almost 400 years. All of them have been affected by the decline in the fishery resources since the early 1980s, as well as by the nationwide trend to a more diversified, service-based economy resulting in competing demands for use of the shoreline and by the increasing value of waterfront property. All of these factors act together, threatening to displace many traditional waterfront uses by more profitable non-water-dependent uses such as residential development, hotels, offices, restaurants, and retail shops (Walker and Arnn 1998).

At the same time, there is growing demand for marinas to service the increasing number of recreational vessels that use New England harbors and waterfront facilities. In most cases, working waterfronts are being protected by local zoning ordinances and state laws that prohibit or restrict non-water-dependent and/or recreational uses. In some places, however, these restrictions are being relaxed to encourage investment in waterfront property and diversification of businesses, even those that have historically relied heavily on the groundfishing industry. Many communities need to revitalize their waterfront economies without losing infrastructure required to serve the groundfish industry 5 to 10 years from now when resources are expected to recover from overfishing.

We have selected two of the harbors evaluated in Framework 42—Portland and Gloucester—to illustrate some of the trends in waterfront use and development in New England and to describe alterations that have been made to waterways and shorelines in these harbors. We examine these trends in terms of the quality of the marine environment, remaining sources of pollution, and current status of water and sediment quality. With this information as background, potential environmental impacts that would be expected if there is a further reduction in groundfishing infrastructure are identified and evaluated. This evaluation is limited to potential impacts in harbor areas, primarily in more heavily developed inner harbors. It recognizes current degraded quality of marine environments in these harbors. It also considers impacts attributable to groundfish vessels and facilities that would potentially be replaced by other uses that could affect the environment less severely, or in different ways.

Trends in Waterfront and Harbor Development and Uses

Portland

Like many urban waterfronts, Portland Harbor has a long history of industrial uses. Through the middle to late 1800s, Portland Harbor was a heavily industrialized area with uses ranging from paint manufacturing, metal foundries, and refineries, to ship building, canneries, and fishing (Casco Bay Estuary Project 1994). Over time, the uses of Portland Harbor shifted to other industries, including petroleum transportation, shipping, ferry services, cruise ships, container ships, and commercial fishing and fish processing. Portland is currently the largest oil port on the U.S. East Coast, as well as the largest tonnage port in New England (Hall-Arber et al. 2004). Commercial fishing has remained a significant industry in the port. In recent years, Portland has become the center of activity for the groundfish industry in the State of Maine, a trend that increased between 1992 and 2002 (Hall-Arber et al. 2004). A significant aspect of Portland's commercial fishing infrastructure is the Portland Fish Exchange, where approximately 90 percent of the groundfish landed in Maine ports is sold (PFEX 2006). Currently, much of the waterfront is related to commercial fishing infrastructure, and includes ice suppliers, vessel repair services, electronics, and gear and supply shops. Portland is the second largest fishing port in New England, with 148 groundfishing vessels listing Portland as their home port in 2002 (Hall-Arber et al. 2004).

Although Portland, like many other urban harbors, has retained a diverse working waterfront, recent demand for waterfront property has resulted in pressure for conversion into non-water-dependent uses such as residential and commercial development (Hall-Arber et al. 2004). Recreational boat usage within the State of Maine and Casco Bay has increased over the past 5 years, and the demand for recreational boating and boating facilities is increasing. Research conducted by the Maine Coastal Program found increased launches per day by recreational boats as well as increased time on mooring waiting lists (Stephenson and Wilson 2006). The same study concluded that the number and capacity of marinas in southern Maine and mid-coast Maine is expected to increase.

Gloucester

(From Wilbur and Courtney 2004a and 2004b, and City of Gloucester 2006)

Development and industrialization of Gloucester Harbor has been largely associated with commercial fishing. Urbanization between the late 1800s and early 1900s was characterized by rapid population growth, economic prosperity, and diversification of maritime businesses related to the fishing industry. Harbor development was supported by public policy and public works projects. Gloucester was the fishing center of North America in the 1870s and 1880s. Its importance declined in the early 20th century, but it remained an important fishing port because of development of fish processing infrastructure, marketing networks, and skilled labor. A shift from trains to trucks for freight handling in the 1950s caused the redevelopment of the inner harbor and created a working waterfront to accommodate freighters and truck traffic.

Gloucester's business profile has diversified in recent years and includes high technology, light industrial, and tourism sectors. Despite economic change, fishing and traditional maritime industries remain an important part of local economics and waterfront-related visitor and recreational services continue to expand. The harbor is used for a variety of purposes, including marine shipping, commercial fishing, recreational fishing and boating, excursion and tour boats, and a mix of other commercial, industrial, and recreational uses. The operating depth of the main channel is slightly over 18.5 feet, making it impractical for use by very large ships.

Landings—especially of groundfish—declined dramatically in the 1960s and 1970s. During this time, the processing of imported fish was the most important industry. Landings increased after foreign fishing was eliminated, but stocks declined dramatically after 1978 because of overfishing. Subsequent management restrictions decreased groundfish landings to half of port revenues by the mid-1990s. The commercial groundfish fleet has diminished in size from about 200 vessels in the mid-1980s to about 80 in 2005–2006. Most of the decline has been in large (70–100 ft) offshore vessels that have moved to other ports, been scrapped, or been converted to other uses. In 2006, about 250 commercial vessels were home-ported in Gloucester's Designated Port Area (DPA)—most of them 30–60 ft lobster boats.

Currently over 360 recreational boats consider Gloucester's inner harbor their home port. During the summer, they fill all available marina slips and moorings authorized for recreational boats. Under current city and state regulations, no new permanent recreational boat marinas may be built within Gloucester's DPA. Existing facilities have little room to expand, and waiting lists for slips at these marinas and for private moorings in the harbor are long. One of the recommendations of the 2006 Harbor Plan and DPA Master Plan is to investigate the feasibility of using temporary, bottom-anchored floats or rafts for recreational boat berthing.

Other existing or expected water-dependent operations in the inner harbor include fish processing, cruise and tour vessels, whale-watching, and charter boat operations for recreational fishermen. There are also a number of water-related businesses (vessel services such as ice and haul-out facilities) in the inner harbor. Many of those that depended heavily on the commercial groundfish industry and that failed to diversify have gone out of business. Non-water-related businesses in the inner harbor include restaurants and private residences; many of these existed before land use regulations were implemented.

Trends in Environmental Quality

Portland

The industrial uses of Portland Harbor resulted in a legacy of pollutants, many of which still persist in the marine environment (Casco Bay Estuary Project 1994; CBEP 2005a). Industries such as paint manufacturing and shipbuilding resulted in the discharge of heavy metals, whereas petroleum transport and other marine uses such as boat yards and marinas have contributed to the release of polycyclic aromatic hydrocarbons (PAHs) (Casco Bay Estuary Project 1994). Unregulated sewer outfalls resulted in significant degradation of water quality. With passage of federal environmental laws such as the Clean Water Act and the Coastal Zone Management Act, as well as the State of Maine Natural Resource Protection Act and the Shoreland Zoning Law, nearly all discharges to the coastal environment are now regulated.

Although studies have found that water quality within Casco Bay and Portland Harbor improved between 1993 and 2004, the Fore River (Portland Harbor) currently does not meet state water quality standards for toxics and fecal coliform bacteria. Sampling performed within Portland Harbor in 2004 found elevated PAH concentrations in sediments, likely associated with industrial history, recent oil spills, and proximity to combined sewer overflows. Remaining sources of pollution include municipal point and non-point sources of pollution. Nutrient loading in Portland Harbor is high, and dissolved oxygen levels are low. As of 2005, Portland Harbor had 12 active Combined Sewer Overflows (CSOs). A CSO abatement plan is being undertaken by the cities of Portland and South Portland (CBEP 2005b).

Upon closure of existing CSOs, water quality in Portland Harbor is expected to improve. In 2006, Casco Bay, including Portland Harbor and the Fore River, was designated as a No Discharge Area under the Clean Water Act. This designation prohibits the overboard discharge of treated or untreated boat sewage and requires adequate sanitary pumpout facilities. This designation is expected to contribute to water quality improvements in Portland Harbor.

Gloucester

(Information from Wilbur and Courtney 2004a and 2004b, and City of Gloucester 2006, or from primary sources cited in text and referenced by Wilbur and Courtney 2004a and 2004b)

The development of Gloucester Harbor for industrial uses during the past 400 years has required significant alterations in shoreline and subtidal habitats, including the filling of coastal salt marsh and intertidal habitats, the construction of docks, piers, a breakwater in the outer harbor, a fish pier to accommodate larger commercial vessels, boat yards, fish processing facilities, the dredging of navigation channels and anchorage areas, and the armoring of portions of the shoreline. A canal, originally dug in the early 1600s, connects the harbor with the Annisquam River. Water quality in the harbor was severely degraded by untreated domestic sewage, waste from fish processing plants, and toxic contamination such as copper from a paint factory.

The earliest evaluation of water quality occurred during the 1950s when untreated wastes were still being discharged directly into the harbor. The original wastewater system (constructed over a 20-year period starting in 1928) centralized downtown effluent, releasing 4 million gallons of sanitary sewage and industrial waste per day into the outer harbor (Whitman and Howard 1958;

Kooken et al. 2000). Most of the industrial waste was generated by fish processing plants (fish waste, oils, and grease by-products). Domestic sewage was also still being discharged directly into the inner harbor. The 1958 report describes conditions that may be a snapshot of the poorest environmental quality in the history of the harbor. Conditions improved with the implementation of environmental laws and regulations, but were still heavily degraded in the late 1970s and early 1980s. The municipal waste treatment plant began operation in 1984. Treatment was primary only (removal of solids and sludge), and treated waste was initially discharged into the middle of the outer harbor. The outfall was extended further offshore in 1991, and treatment was chemically enhanced (ferris chloride was added to settle small solids) in 1993. The sewer system for most of Gloucester was constructed in the 1990s. A CSO abatement project is currently underway.

Forty-one discharges in the harbor require non-point-source permits, 40 of them minor (<1 million gal/day) and located mostly in the inner harbor; the major facility is the municipal waste treatment facility on the Annisquam River. Four CSOs discharge urban and residential runoff during wet weather. Seventeen storm drains located around the harbor annually discharge 575 millions gallons of stormwater (Metcalf and Eddy 1992). Other sources of pollution are aquatic spills (accidental discharge of contaminants such as gasoline and diesel fuel directly into the water) and much more frequent land spills of petroleum products, benzene, ammonia, and lead. Fifty state hazardous waste sites are found throughout Gloucester, predominantly characterized as areas contaminated by petroleum and associated products, and may release PCBs, petroleum hydrocarbons, volatile organic compounds, and heavy metals to soils, surface water, and groundwater (DeCasare et al. 2000). These pollutants potentially settle to the seafloor and bind with sediments.

Non-point source pollutants are associated with industrial, commercial, and residential land use, intense waterfront development, and waterside use by recreational and commercial vessels, and can be assumed to add to the pollution load in the inner and outer harbor. Environmental conditions in Gloucester Harbor are threatened by organic waste, hydrocarbons, heavy metals (e.g., tin and copper-based paints), fertilizers and pesticides, pathogens, and suspended solids. Other potential sources that contribute to environmental stress include fish processing, land-based and water-side transportation, vessel servicing activities, landscaping and lawn care, marine head discharges, urban and residential runoff, and atmospheric deposition. Runoff from impervious surfaces exacerbates the problem. Contaminated seafloor sediments are a reservoir of pollutants that can be disturbed and resuspended. Areas within the harbor are still unsewered and septic systems present an additional source of contamination.

Other potential environmental problems in Gloucester Harbor are eutrophication, low dissolved oxygen (DO), oil, grease and toxic contaminants, and pathogens. The harbor has been identified as an embayment with high nutrient loading and moderate nitrogen sensitivity (Menzie-Cura 1996). Nutrient input may be higher than baseline historic levels. Sources of nutrients entering the harbor include wastewater, septic systems, fish waste, and runoff. Impacts associated with eutrophication are not obvious. Low DO is not a problem, although occasional violations of the state standard (6 mg/l) occur in the inner harbor. Low DO may occur in summer when temperatures are high and the water is stratified. Evidence of depressed oxygen levels—including low seafloor sediment oxidation and colonization of benthos by opportunistic, surfacedwelling organisms—has been observed in the inner harbor; seafloor conditions improved along a gradient from the inner to the outer harbor (Valente et al. 1999). Presence of organic matter and reduced water circulation in the inner harbor exacerbate low DO conditions. Oil and grease are recurring problems because of fish processing, and permissible limits are occasionally exceeded (Kooken et al. 2000). Monitoring of wastewater at the outfall and CSOs identified copper, nickel, mercury, silver, zinc, and lead in water samples, but contaminant levels do not indicate acute impacts (Metcalf and Eddy 1992; Michaels 2000a and 2000b). Potential pathogen sources include the wastewater outfall, CSOs, failing septic systems, sewage discharge from vessels, stormwater runoff, and marine sediments. Bacterial contamination was a problem throughout the harbor prior to construction of the waste treatment plant (DEQE 1982).

Sediment cores from the harbor were analyzed by Maguire (1998). Surficial sediments (top 1 m) at the entrance to the federal channel were fine-grained, anoxic, and high in organic carbon. Outer harbor sediments were mostly very fine sand or silt clay with low organic carbon content. Copper and lead were the most prevalent heavy metals in the federal channel, with values exceeding those in offshore reference samples (MCZM 2000). Total PAHs in the channel were substantially higher but were not detected at uncommon levels in the outer harbor (Duerring 1989). Copper and lead are common pollutants in nearshore sediments because of upland characteristics, such as the past use of lead in gasoline. PAHs are the result of incomplete combustion of fuel and are found in runoff, industrial discharge, and atmospheric deposition. Industrial use of PCBs (e.g., as cooling fluids for transformers) may have contributed to this pollutant to Gloucester waters. The sediments of Gloucester's inner harbor seafloor sediments appear to be fairly typical for an urban waterfront.

Regulations

Portland

Because of the increasing pressures for conversion of commercial waterfronts to recreational and non-water-dependent uses, many harbors and ports, including Portland, have established regulatory and planning frameworks to protect working waterfronts and commercial fishing access. The State of Maine has established a working waterfronts initiative through the Maine Coastal Program. This initiative encourages waterfront planning and the development of waterfront ordinances, including areas that give priority to commercial water-dependent uses over recreational uses. The Coastal Program has established a policy within the state coastal zone management plan to provide preferences to water-dependent uses. Furthermore, the city of Portland has restrictive zoning in place for the waterfront and has developed a master plan for the eastern waterfront that includes areas of Marine Zoning, a Waterfront Port Development Zone, and a Waterfront Special Use Zone.

In November 2005, a statewide constitutional amendment changed the tax assessment for commercial fishing waterfront land in order to allow tax assessments to be based on current use, rather than the previous "highest and best use" standard. This amendment will reduce the tax burdens for commercial fishing infrastructure in the face of increasing property values and taxes along the waterfront. Although regulatory and planning frameworks are in place to restrict and discourage the loss of existing commercial fishing infrastructure, pressure for conversion to recreational and non-water-dependent uses will increase. As property values continue to increase, and as the potential demand for commercial fishing infrastructure decreases, conversion of these areas to recreational and non-water-dependent uses could be realized, either by wholesale change in policy or, more likely, through incremental variances and revisions to harbor plans.

Gloucester

(Information from Wilbur and Courtney 2004a and 2004b, and City of Gloucester 2006, or from primary sources cited in text and referenced by Wilbur and Courtney 2004a and 2004b)

Most of the waterfront land within the inner harbor is zoned by the city for marine industrial use, which limits uses extending 20 feet back from the water's edge to those that require access to water-borne vessels. In addition, most of the inner harbor (waterfront and water area) has been designated by the state as a Designated Port Area (DPA) as part of the 1978 Massachusetts Coastal Management Plan. The intent of state policy is to encourage water-dependent industrial use and to prohibit other noncompatible uses. Until 1984, the DPA provisions only applied to the waterway itself; they were amended in that year to include filled wetlands. More recent changes to the regulations prohibited most nonindustrial uses in DPAs, limited the extent to which non-water-dependent industrial activities were allowed to occur, and enhanced the flexibility and economic viability of DPAs. The most significant change was a provision that up to 25 percent of all filled wetlands and piers within a DPA property could be permitted for "supporting DPA uses." Under this change, most non-water-dependent industrial and commercial uses are eligible for licensing if they provide direct economic or operational support to the water-dependent industrial use in the DPA. Larger amounts of the site may be developed for supporting use if authorized by an approved DPA Master Plan.

One of the two major recommendations of the 2006 Gloucester Harbor Plan and DPA Master Plan involves a series of regulatory changes that provide more opportunity for private investment along the waterfront. The city would divide the single existing Marine Industrial zoning district into three separate districts and establish a list of supporting non-water-dependent commercial uses that would be allowed in each district. In two of these smaller districts, property owners would be eligible to develop up to 50 percent of their land area for "supporting commercial uses" (instead of 25 percent) and up to 65 percent if an existing or proposed use on the property is critical to Gloucester's functioning as a full service, regional hub port (City of Gloucester 2006). These changes are subject to approval by the Massachusetts Department of Environmental Protection.

Potential Impacts

The impact of Framework 42 on fishing-related shoreside infrastructure is uncertain, but it is expected to be more severe in areas that are less diversified and less able to take advantage of other fishery resources. These ports are also impacted by nationwide trends toward increased use of waterfront property and waterways for recreational boating, residential development, and tourism, thus increasing the financial pressure on shoreside businesses that rely on the groundfish industry and possibly forcing some of them out of business. If this happens, there is likely to be increased conversion of commercial fishing infrastructure to non-water-dependent and recreational uses. These uses could potentially increase some environmental impacts in the affected harbors. If commercial fishing infrastructure is displaced, new infrastructure will need to be developed in potentially undeveloped areas once groundfish stocks recover. This re-establishment of infrastructure would likely result in ecological impacts associated with coastal development.

Potential changes in waterfront infrastructure are currently constrained by laws and regulations that protect "working waterfronts." As was shown for the port of Gloucester, coastal communities in New England that service the commercial fishing industry are under tremendous economic pressure to relax these regulations and to allow greater recreational and commercial use of waterfront property and harbors.

Recreational boating has the greatest potential to displace commercial fishing activity and to affect marine environments. As shown for Gloucester and southern and mid-coastal Maine, more recreational boats are being used, and there is a huge demand for new and expanded marina facilities in harbors that support commercial fishing. Very little available docking or mooring space is available in these ports, and what space there is often has priority use by commercial, not recreational, vessels (if it is in an area that is zoned for industrial use only). If Framework 42 causes more boats to leave the fishery or to relocate to other ports where vessel services and markets are more available, dock space may be created that could be used for recreational vessels. In addition, if waterfront use shifts from commercial fishing to recreational boating, there would be an increased demand to expand existing marinas and construct new facilities.

Because recreational boats can be trailered and launched at boat ramps (or berthed outside a harbor), recreational vessel activity may increase in the future even if the number of commercial fishing vessels declines and no additional marinas or marina expansions are built. If regulations are relaxed such that recreational vessel marina facilities are expanded or new ones built, the number of recreational boats based in these harbors will increase as well. Another possible scenario is that no new land-based marinas are built, but new floating dock space is created for recreational boats. The city of Gloucester is currently investigating the feasibility of installing floating dock space for 50 recreational vessels.

In short, there are two types of potential change:

1. Short-term, most realistic (for now): land and water use regulations protecting industrial uses of waterfront remain in place, no permanent recreational marinas are allowed in those portions of the waterfront, but there is a potential for increased use of the harbor for recreational vessels that are berthed and serviced elsewhere.
2. Longer-term (but maybe only a few years away), but less certain: reduced use of waterfront and inner harbor for commercial fishing and increasing demand for recreational vessels causes relaxation of regulations protecting industrial water-dependent uses, and existing marinas are expanded or new ones constructed. In this case, many more recreational vessels may be based in and using the harbor.

As a corollary to either of these scenarios, "lost" waterfront space no longer used by groundfish boats (or by businesses that depend on the groundfish industry and have not diversified to service a wider range of customers) could be used for other types of fishing (e.g., lobsters); or, in deep-water ports, for larger commercial (nonfishing) vessels like cargo and cruise ships, this space could be used for whale-watching, etc. In this case, the waterfront would not necessarily be converted into recreational boat marinas but may have expanded commercial, nonfishing, vessel facilities and operations.

Potential impacts on marine environments that could result from these potential changes in waterfront uses are listed by activity in Table 11.1. Potential impacts were evaluated relative to existing environmental conditions in Portland and Gloucester harbors (with an emphasis on more degraded inner harbors) and ranked as reduced impact (-), no change (0), or increased impact (+), or some combination of the three. Relative potential changes are described in the last column of the table.

Conclusions

A number of potential impacts to marine environments in New England harbors could result from a partial displacement of commercial fishing infrastructure by recreational boating and marina facilities, and by urban and suburban development of "working waterfronts" for non-water-dependent commercial and recreational uses. None of these potential impacts are new; they exist to some degree already in ports and harbors that service the groundfish industry. Some of them have the potential to be more severe if there is a significant increase in recreational boating and an expansion of existing marina facilities or construction of new marina facilities that are located in or near to inner harbor areas, or if shoreside facilities in deep-water ports are expanded to accommodate more commercial vessels. However, because the current condition of shoreline habitats and water and sediment quality in urbanized inner harbors in New England is already degraded, and because some sources of pollution will remain even with a reduction in commercial fishing infrastructure, it is very unlikely that conversion of land or water uses associated with the groundfish industry to other commercial or recreational uses will cause any measurable change in marine environmental quality in these ports.

Table 11.1. Comparison of Potential Environmental Impacts Between Existing Waterfront Conditions and Potential Waterfront Redevelopment Conditions (- = reduced impact; + = increased impact; 0 = no change)

Existing Waterfront Activity	Type of Impact	Net Impacts Associated with Redevelopment	Relative Change in Impact to Marine Environment from Change in Waterfront Use
Use of Vessels	Release of oil and gas (spills)	+	Increased number of recreational boats may increase number of spills, e.g., during refueling
	Release of hydrocarbons from boat engine exhaust	+/0	Greater number of recreational boats may increase the release of hydrocarbons into the water; phase-out of 2-cycle engines should lessen PAH emissions
	Release of contaminants (gray water, sewage, etc) from overboard discharges	/+	Increased number of recreational boats may increase number of discharges. However, designation of No Discharge Zones may decrease sewage discharges
	Improper disposal of solid waste and debris from vessels	0/+	Facilities utilizing appropriate best management practices (BMPs) will limit impacts associated with these activities– overall environmental conditions may improve; increased recreational vessels may result in greater overboard debris
	Impacts from vessel moorings and anchoring	+	Increased recreational vessels may result in more vessel moorings and anchoring leading to increased impacts
	Noise from vessel operations	0/+	Overall noise levels likely to remain the same if operated at low speeds and with phase-out of 2-cycle engines; greater number recreational vessels may increase noise levels
	Impacts from vessel traffic	+	Increased volume of vessel traffic may increase impacts, especially in shallow water habitats
	Introduction of invasive, exotic species	+	Commercial shipping and to a lesser extent, recreational boating, may increase the introduction of invasive, exotic species
Creation, Expansion and Operation of Marina/Port Facilities	**Short-term Impacts**		
	Noise from pile driving	+	Impacts may increase if need for new facilities or rehabilitation of existing facilities increases
	Sediment disturbance and suspension	+	Impacts may increase if need for new facilities or rehabilitation of existing facilities increases
	Long-term Impacts		
	Impacts from overwater structures	+	Impacts may increase if need for new facilities or rehabilitation of existing facilities increases
	Altered hydrological regimes	+	Impacts may increase if need for new and expanded facilities results in increased number of pilings, floating docks, bulkheads, breakwaters, jetties, etc.
	Release of contaminants from treated lumber	+	Impacts may increase if need for new and expanded facilities results in increased number of pilings and docks, unless other materials are used (e.g., concrete, steel)
	Release of contaminants from marina operations	0/-	Facilities utilizing appropriate BMPs will limit impacts associated with these activities – Overall environmental conditions may improve
	Release of non-point source pollution from marina facilities	0/-	Facilities utilizing appropriate BMPs will limit impacts associated with these activities – Overall environmental conditions may improve
	Improper disposal of solid waste and debris from marina facilities	0/+	Facilities utilizing appropriate BMPs will limit impacts associated with these activities– overall environmental conditions may improve; increased recreational vessels may result in greater overboard debris
	Shoreline fill and armoring	0/+	Most alterations in shoreline due to development that may affect fishery habitat already exist; some new and expanded facilities may impact intertidal and wetland habitat
Improvement and Maintenance Dredging	**Short- and Long-term Impacts** e.g., turbidity/sedimentation, loss of benthic habitat, release of contaminants, entrainment/impingement, noise, and alteration of physical, chemical and biological properties of aquatic habitat	0/+	Most commercial marina facilities in harbors are at greater depths than required by recreational boats, reducing the need for dredging; however, for waterfront use shifts from commercial fishing to commercial, non-fishing (e.g., cargo, cruise ships) the result may be increased use of large, deep-draft vessels and improvement/maintenance dredging may increase
Urban/Suburban Development	Release of non-point source pollution (e.g., nutrients, oil, PAHs, heavy metals) in runoff from paved parking lots, stormwater drains, etc)	0/+	Potential for increased runoff associated with conversion of water-dependent facilities to non-water dependent uses, but current regulatory requirements would most likely result in on-site treatment which may result in improved environmental conditions
	Alteration of water temperature regimes	0	Most alterations in shoreline and hydrology caused by development that may affect water temperatures already exist
	Shoreline fill and armoring	0/+	Most alterations in shoreline due to development that may affect fishery habitat already exist; some new and expanded development may impact intertidal and wetland habitat

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