

8.0 ENVIRONMENTAL IMPACTS

The following sections of this document discuss the potential impacts of the Proposed Management Action (Section 4.0) as well as all of the management alternatives and independent measures that were considered in the Amendment 1 DSEIS. The impact analysis focuses on the valued ecosystem components (VECs) that were identified for Amendment 1 and described in detail in Section 7.0 of this document. The VECs for consideration in Amendment 1 include: **Atlantic herring; protected resources; physical environment and essential fish habitat (EFH); fishery-related businesses and communities; and other fisheries.**

VECs represent the resources, areas, and human communities that may be affected by a Proposed Action or alternatives and by other actions that have occurred or will occur outside the Proposed Action. VECs are the focus of an EIS since they are the “place” where the impacts of management actions are exhibited. An analysis of impacts is performed on each VEC to assess whether the direct/indirect effects of an alternative adds to or subtracts from the effects that are already affecting the VEC from past, present and future actions outside the Proposed Action (i.e., cumulative effects).

The impact analyses below focus primarily on the management action proposed in Amendment 1. Because the Proposed Action represents a combination of elements from the seven management alternatives that were considered in the DSEIS, the analyses in this section also addresses these additional (non-preferred) management alternatives. For reference, a complete description of Alternatives 1-7 and the other non-preferred management measures considered in this amendment is provided in Section 5.1 of this document (p. 36).

For reference purposes, Table 134 summarizes the various elements of the limited access programs that were considered in Amendment 1, including the Proposed Action that was approved at the January 2006 Council meeting. A complete description of the Proposed Action can be found in Section 4.0 of this document.

Table 134 Summary of Limited Access Qualification Criteria in Amendment 1

	AREA 1 LA CRITERIA	AREAS 2/3 LA CRITERIA	LA INCIDENTAL CATCH PERMIT*
Alternative 1	N/A	N/A	N/A
Alternative 2	Access to all areas Current permit plus 500 mt in one year between 1/1/93-12/31/03	Current permit plus 100 mt in 12 months, 9/16/93-9/15/99 OR 250 mt in 12 months, 9/16/99-9/15/01	Current permit plus 25 mt in one year between 1/1/88-12/31/02 25 mt possession limit
Alternative 3	Current permit plus 100 mt in one year between 1/1/88-12/31/03	Controlled Access Moratorium 9/18/03 plus one pound landings LA after Trigger – Current permit plus 250 mt in one year between 1/1/88-12/31/03	Current permit plus 100 mt cumulative between 1/1/88-12/31/02 25 mt possession limit
Alternative 4	Current permit plus 500 mt in one year between 1/1/88-12/31/03	Controlled Access Moratorium 9/18/03 plus one pound landings LA after Trigger – Current permit plus 250 mt in one year between 1/1/88-12/31/03	Current permit plus 100 mt cumulative between 1/1/88-12/31/02 25 mt possession limit
Alternative 5	Access to all areas Current permit plus 500 mt in 12 months, 9/16/93-9/15/99 OR 500 mt in 12 months, 9/16/99-9/15/01 Inshore Priority Permit Cat. A permit plus 4,000 mt from 1A, 9/16/93- 9/15/99 OR 2,000 mt from 1A, 9/16/99-12/31/01	Current permit plus 100 mt in 12 months, 9/16/93-9/15/99 OR 250 mt in 12 months, 9/16/99-9/15/01	Current permit plus 25 mt in one year between 1/1/88-12/31/02 25 mt possession limit
Alternative 6	Current permit plus 250 mt in one year between 1/1/88-9/16/99	Current permit plus 250 mt in one year between 1/1/88-12/31/03	Current permit plus 25 mt in one year between 1/1/88-12/31/02 25 mt possession limit
Alternative 7	Current permit plus 500 mt in one year between 1/1/88-9/16/99	Current permit plus 250 mt in one year between 1/1/88-12/31/03	Current permit plus 15 mt in one year between 1/1/93-12/31/02 15 mt possession limit
PROPOSED ACTION	Current permit plus 500 mt in one year between 1/1/93-12/31/03	Current permit plus 250 mt in one year between 1/1/93-12/31/03	Current permit plus 15 mt in one year between 1/1/88-12/31/03 25 mt possession limit, one landing per calendar day

**Note: In November 2005, the Herring Committee recommended changing the end date for the limited access incidental catch criteria from 12/31/02 to 12/31/03. Analyses reflecting this change were provided to the Council prior to making final decisions at the January 2006 meeting and are included in this document.*

8.1 IMPACTS ON ATLANTIC HERRING

This section evaluates the impacts of the Proposed Action as well as the seven management alternatives (in addition to the no action alternative) and the various independent measures from the DSEIS on the Atlantic herring resource. The Atlantic herring resource is one of the valued ecosystem components (VECs) that was identified specifically for Amendment 1. Analysis of the impacts of the proposed management measures on this VEC essentially represents the biological impact analysis for Amendment 1. To the extent possible, the analyses in the following subsections discuss the short-term and long-term impacts of the Amendment 1 measures on Atlantic herring in the context of stock status, fishing mortality, total removals from the fishery, impacts on individual stock components, and the importance of herring as a forage species.

The management action proposed in this amendment includes: a limited access program, open access incidental catch permit, and limited access permit provisions; a seasonal purse seine/fixed gear-only area in the inshore Gulf of Maine; establishment of an MSY proxy; a TAC set-aside process for research; adjustments to the herring fishery specification process; adjustments to herring management area boundaries; measures to address fixed gear fisheries; and changes to the regulatory definition of midwater trawl gear. Relative to impacts on the Atlantic herring resource – biological impacts – the proposed limited access program, purse seine/fixed gear-only area, and MSY proxy are the primary focus of the following discussion. Management measures that are more administrative in nature and/or relate to the fishery specification process are not expected to have any direct impacts on the resource. Moreover, because of the nature of this fishery (TAC-managed), many measures proposed in this amendment are not expected to produce impacts on the resource because they will not affect removals from the fishery.

The proposed limited access program and the purse seine/fixed gear-only area evolved from consideration of seven management alternatives in the Amendment 1 DSEIS. The seven management alternatives are described in Section 5.1 of this FSEIS document and consist of measures related to a limited access program for some or all of the Atlantic herring fishery and a seasonal purse seine/fixed gear only area within some or all of Area 1A. In addition, the no action alternative was considered by the Council. For reference purposes, Table 134 summarizes the various elements of the limited access programs that were considered in Amendment 1, including the Proposed Action that was approved at the January 2006 Council meeting.

Similar to the seven management alternatives that were considered in Amendment 1 (discussed below), the Proposed Action would not affect the amount of total removals from the fishery, an outcome that would be most likely to directly result in impacts on the herring resource. Therefore, no additional impacts on the herring resource overall are expected from the Proposed Action when compared to the management alternatives that were considered in Amendment 1. The impacts of the Proposed Action relative to the no action alternative are expected to be positive over the long-term, as discussed in the following subsections. In general, the Atlantic herring fishery will continue to be managed by quotas (“hard” TACs) under all of the limited access alternatives, which restrict total removals to levels that are intended to prevent overfishing.

8.1.1 Impacts of No Action

The no action alternative equates to status quo conditions for the Atlantic herring fishery and maintains the current regulatory environment if Amendment 1 is not completed, so additional impacts on the herring resource are not expected under this scenario. The herring fishery would continue to be managed by the current annual specification process, during which TACs for the various management areas would be established and evaluated to achieve OY and minimize the risk of overfishing individual stock components. Under the no action alternative, impacts on the Atlantic herring resource of OY and the area-specific TACs would be evaluated as part of the fishery specification process. However, it is important to note that the specifications and the area-specific TACs are evaluated and established in the context of Atlantic herring biomass/abundance and do not consider either the rate at which fish in a particular area may be caught or catch-at-age/maturity of fish that are taken.

Under the no action alternative, the herring resource would not be afforded the long-term benefits associated with a limited access fishery and other measures that are proposed in this amendment to address capacity and slow the race to fish. These benefits are discussed in the following subsections.

8.1.2 Impacts of Proposed Action and Non-Preferred Alternatives on Atlantic Herring

8.1.2.1 Impacts of Proposed Limited Access Program

The Proposed Action includes a limited access program for Area 1 and Areas 2/3 that qualifies vessels based on landings history in the fishery from 1993-2003. A second tier limited access incidental catch permit is proposed for vessels that do not have significant landings history but can document 15 mt of landings in any year from 1988-2003. Overall, the Proposed Action is estimated to result in 34 limited access directed fishery permits and 56 limited access incidental catch permits. The fishery will continue to be managed by hard TACs, established through the specification process as modified in this amendment.

The seven management alternatives that the Council considered in the Amendment 1 DSEIS (non-preferred alternatives, Section 5.1.2) included different limited access programs with varying provisions and qualifying time periods. Alternative 1 was the least restrictive alternative and maintained an open access fishery in all management areas; Alternative 7 was the most restrictive alternative and implemented a limited access program in Area 1 that utilized the September 16, 1999 control date in conjunction with a high threshold of landings.

Similar to the no action alternative, Alternative 1 proposed to take no action on the primary management measures in Amendment 1 – the limited access program and the purse seine/fixed gear only area. While the Council could select a combination of independent management measures in conjunction with Alternative 1, the impacts on the herring resource expected from Alternative 1 itself are expected to be the same as those expected from the no action alternative (see previous discussion).

Relative to the herring resource and its individual stock components, management measures that affect the total amount and/or rate of removals are most likely to produce direct impacts. Overall, the area-specific TACs (“hard” quotas), which are designed to minimize the risk of overfishing individual stock components, control the total amount of removals from the resource during any given fishing year.

In general, the limited access program proposed in this amendment would not affect the amount of total removals from the fishery, so the *direct* impacts of this measure on the herring resource would be minimal. This conclusion also holds true for the limited access programs proposed in Alternatives 2-7 of the DSEIS. The Atlantic herring fishery will continue to be managed by quotas (“hard” TACs) under all of the limited access alternatives, which restrict total removals to levels that are intended to prevent overfishing.

However, there may be indirect benefits to the resource, especially over the long-term, of a limited access program if it prevents overcapacity, effectively matches harvesting capacity with the optimum yield from the fishery, and helps to prevent overfishing. A paper written by Pamela Mace (*Developing and Sustaining World Fishery Resources: The State of Science and Management*, delivered to the World Fisheries Congress, Brisbane, 1997) addresses some of the potential biological impacts associated with preventing overcapacity in a fishery (or failing to prevent overcapacity). Although not specific to the herring fishery, the problems identified and described below should be considered relative to the no action (or status quo) alternative, or Alternative 1, which maintains an open-access fishery.

It is widely recognized that overcapacity in a fishery is primarily a social and economic problem. From an economic perspective, overcapacity is equated with an excessive quantity of vessels or fishing gear that are not fully utilized (overcapitalization). However:

“When a high proportion of fishers are economically marginal, the net result is likely to be, (i) increased pressure on scientists to conduct ‘optimistic’ assessments and increased challenges of the validity of the science, (ii) increased pressure on managers to select TACs from the upper, risk-prone confidence intervals of projected catch distributions, (iii) increased pressure on governments to provide financial aid (i.e., subsidies) to prop up failing businesses, and (iv) increased incentive to circumvent fishing regulations, including under-reporting of landings and use of destructive fishing practices. In addition, highliners who are doing well may not want to change the *status quo*.” (Mace 1997)

Until the overcapacity problem is solved, attempts to address many other important fisheries problems may largely be wasted, and reductions in fleet capacity in overcapitalized fisheries are a precondition to the success of management measures designed to mitigate overfishing, solve bycatch issues, eliminate environmentally-destructive fishing practices, reduce underreporting, and improve government-industry relations.

There are likely to be indirect impacts on the herring resource associated with minimizing the race to fish in any management area and extending the fishing season, an outcome usually intended to be achieved through a limited access program. Changes in the spatial/temporal distribution of fishing effort can impact total removals from individual stock components, which mix seasonally in the various management areas. These outcomes can be either positive or negative. For example, more fish from the inshore component of the resource are caught in Area 1A during the fall and winter when compared to the summer months, so shifting effort in this area to later in the fishing year could result in a greater amount of total removals from the inshore component. However, uncertainty associated with stock component mixing ratios makes it impossible to quantify specific impacts of this kind. Moreover, predicting the effects of a limited access program on spatial-temporal aspects of the fishery or comparing potential impacts among limited access programs is not possible. Fishing patterns and removal rates should be monitored closely, particularly in Area 1A, once a limited access program is implemented to ensure that total removals from the inshore component do not exceed long-term sustainable levels.

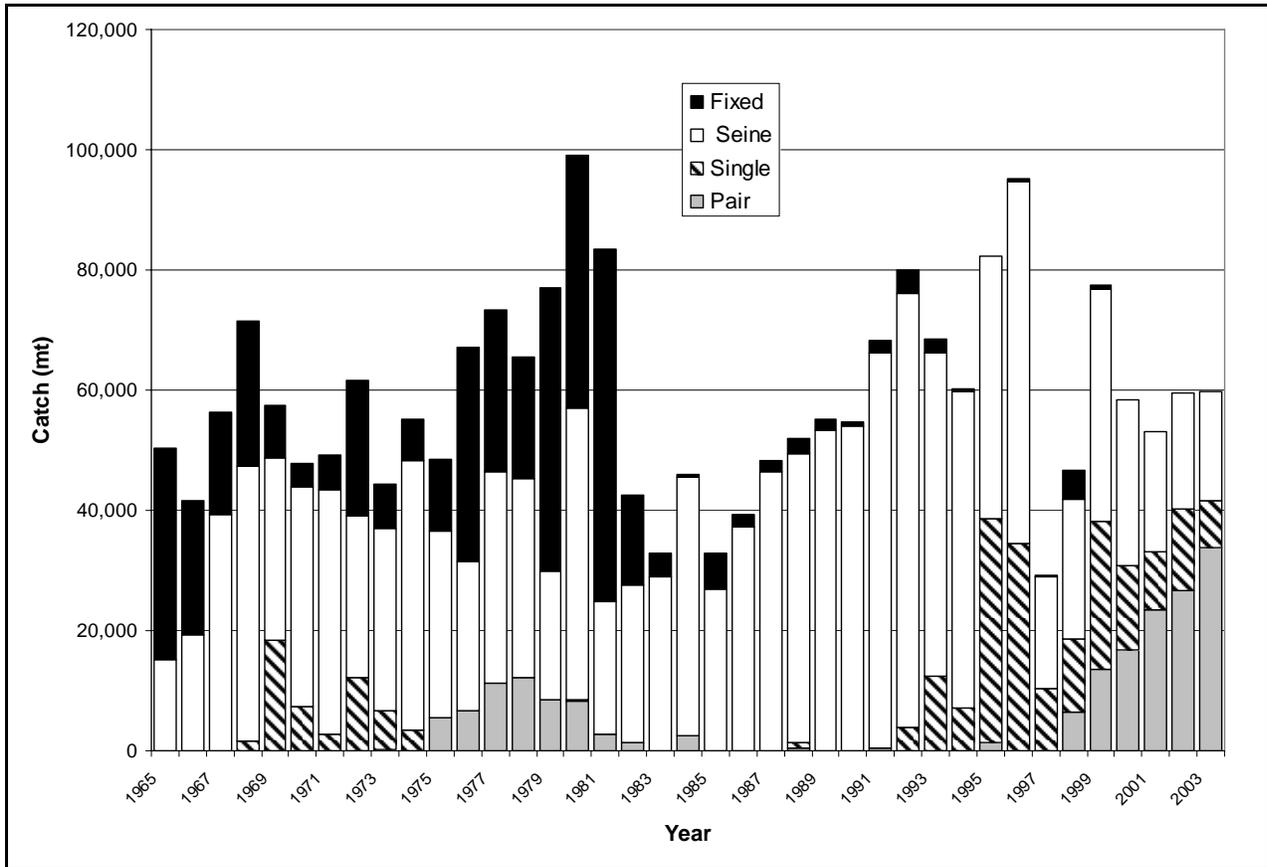
8.1.3 Impacts of Purse Seine/Fixed Gear-Only Area

The Proposed Action includes a seasonal purse seine/fixed gear-only area representing all of Area 1A (inshore Gulf of Maine) from June – September of each fishing year. During this time, midwater trawls (single and paired) will be prohibited from fishing for herring in Area 1A. This measure was included in Alternative 7 (see Section 5.1.2.7) and was the most restrictive purse seine/fixed gear measure under consideration in this amendment.

Establishing a purse seine/fixed gear-only area in the inshore Gulf of Maine could affect access to the herring fishery for some midwater trawl vessels and could produce changes in fishing patterns, but the specific *biological* impacts resulting from purse seine/fixed gear measures cannot be predicted with any degree of certainty. Measures considered in the Amendment 1 DSEIS ranged from no action on the purse seine/fixed gear-only area (Alternatives 1, 2, and 5) to a seasonal purse seine/fixed gear-only area in Area 1A east of 69° (Alternatives 3, 4, and 6) to a seasonal purse seine/fixed gear-only area in all of Area 1A (Alternative 7). Alternatives 1, 2, and 5 are not expected to produce any additional impacts on the resource since they propose to take no action relative to a purse seine/fixed gear-only area. Clearly, the purse seine/fixed gear-only area included in Alternative 7 (now the Proposed Action) could affect fishing patterns more than other alternatives under consideration, but the resulting impacts of this measure on the herring resource, especially as compared to other alternatives under consideration, cannot be quantified at this time. To qualitatively characterize the potential impacts of the proposed purse seine/fixed gear measure relative to the no action alternative, additional information is provided below.

The management action proposed in Amendment 1 establishes all of Area 1A as a purse seine/fixed gear only area from June – September, similar to Alternative 7 from the DSEIS. Figure 88 shows that in recent years, midwater trawlers (single and paired) take close to 2/3 of the available TAC in Area 1A. Figure 91 and Figure 92 indicate that June – September is the peak season for herring fishing in Area 1A. Given the recent levels of participation by midwater trawlers during this time, this measure could reduce the catch of herring in Area 1A *if* only the current purse seine vessels (about five) fish in 1A from June – September. However, there may be enough economic incentive under this alternative for some midwater trawl vessels to re-rig to purse seines; the extent to which this may occur is unknown. The specific impacts of this measure will depend greatly on the extent to which vessels re-rig.

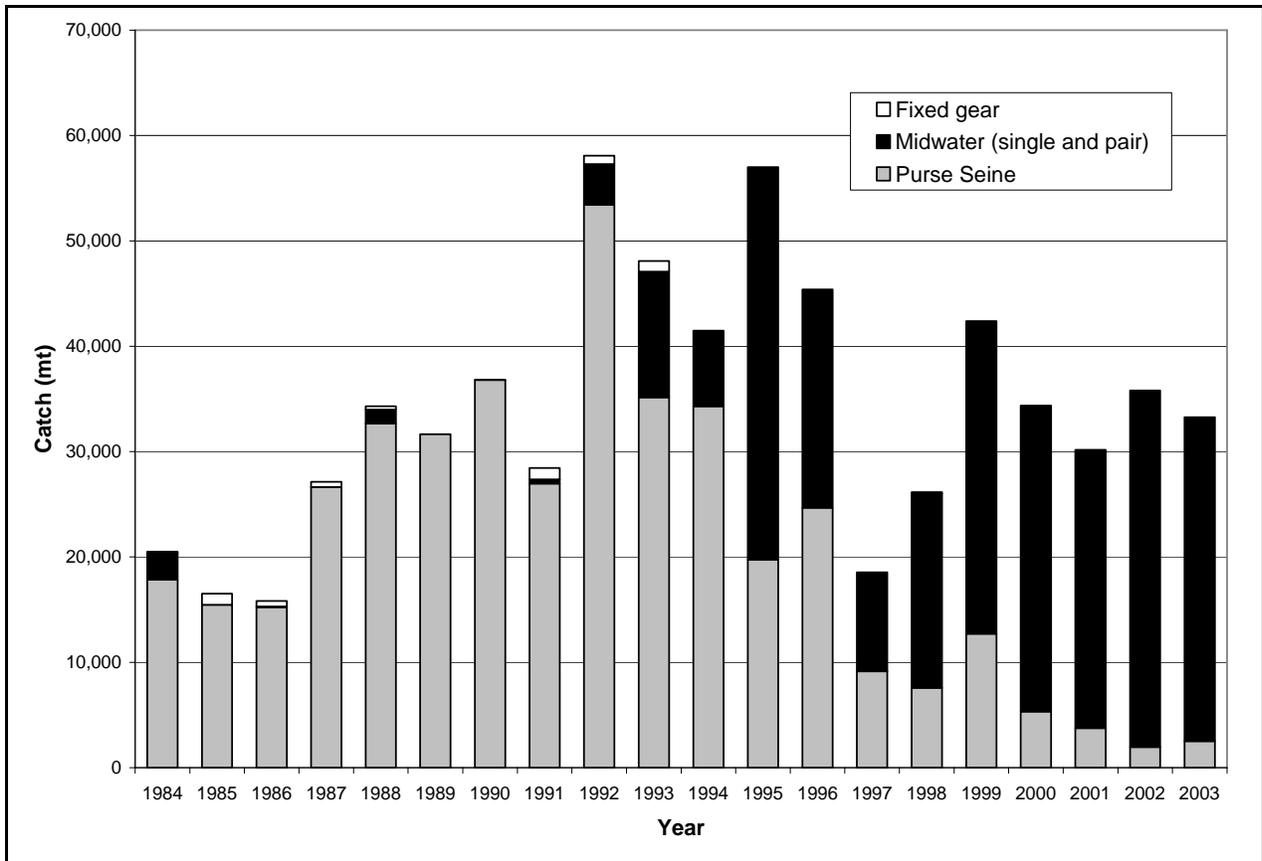
Figure 88 Catch by Gear Type in All of Area 1A, 1965-2003



Note: The Herring FMP became effective in 2000, at which point the Area 1A TAC was set at 60,000 mt.

In contrast to the Proposed Action, several management alternatives with a purse seine/fixed gear-only area proposed that the area within Area 1A east of 69° be closed to midwater trawl fishing from June – September of each year. Historical analysis of herring catch in Area 1A (1984-2003) suggests that throughout the fishing year, fixed gear (weirs, stop seines) has been a minor component of the catch in Area 1A *west* of 69°. Purse seines accounted for the bulk of the catch in this area until 1995. Since 1995, however, the majority of the herring catch in Area 1A west of 69° has been taken by midwater trawl vessels (Figure 89).

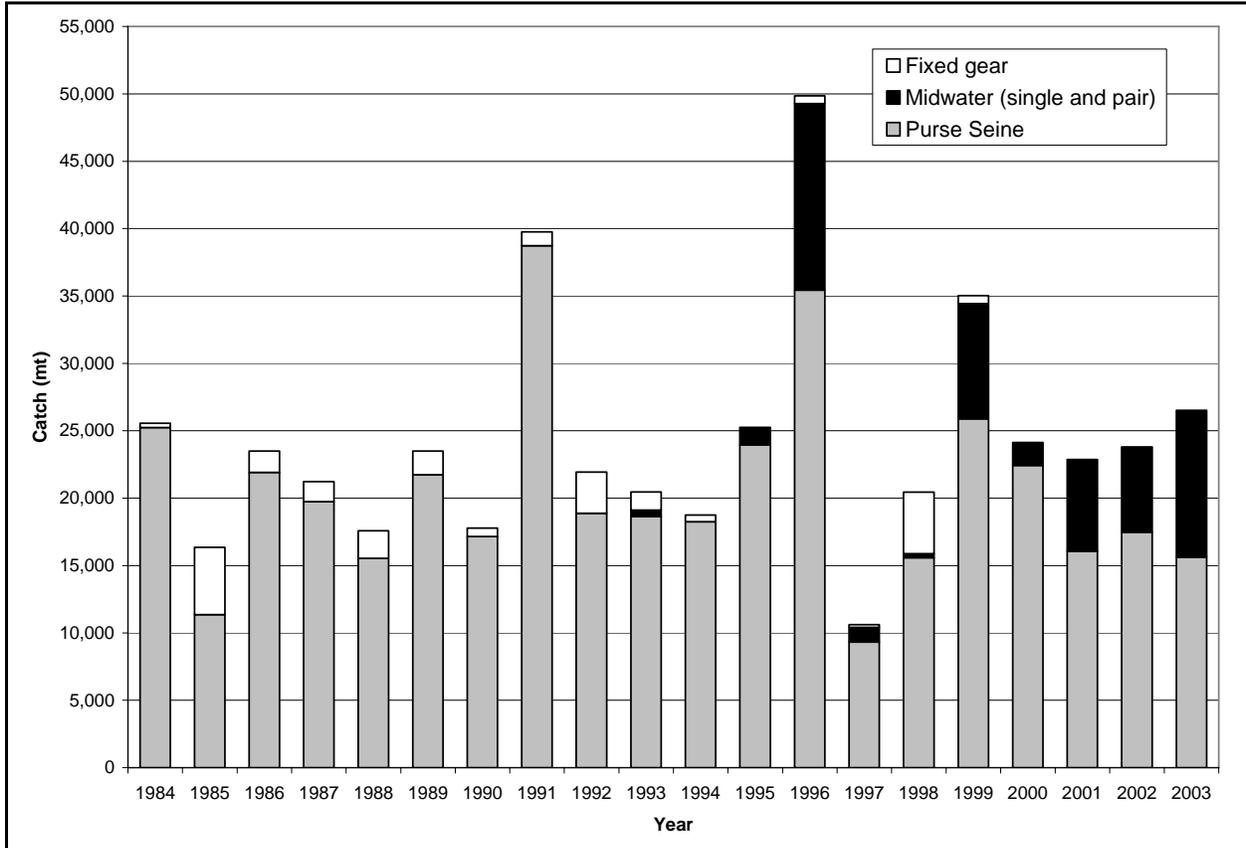
Figure 89 Herring Catch by Gear Type West of 69°, 1984-2003



Note that the Atlantic Herring FMP, including TACs (“hard” quotas) for all management areas including Area 1A, became effective at the start of the 2000 fishing year.

East of 69°, herring catch throughout the time series is dominated by purse seine vessels (Figure 90). Both midwater trawl and fixed gear catches have been variable, but midwater trawl catches are relatively new to the area and seem to be increasing just recently. However, even during recent years, midwater trawl catches are small compared to purse seines in the area east of 69°.

Figure 90 Herring Catch by Gear Type East of 69°, 1984-2003



Note that the Atlantic Herring FMP, including TACs (“hard” quotas) for all management areas including Area 1A, became effective at the start of the 2000 fishing year.

From June –September, the time period during which a seasonal purse seine/fixed gear-only area would apply under Alternatives 3, 4, and 6, herring catch from the area east of 69° contributes most to the yearly catch from Area 1A (approximately 60%: Figure 91 and Figure 92). Catch rates (catch per unit time) by gear type in the area east of 69° (Figure 93) suggest that midwater trawling accounts for a smaller component of the catch rate when compared to purse seines. In other words, the bulk of the herring that is caught in the proposed purse seine/fixed gear-only area is already taken primarily by purse seine vessels. The information provided in Figure 91 and Figure 93 also indicates that the Proposed Action includes the four months with the highest herring catch rates in Area 1A.

Figure 91 Average Herring Catch Rate (Mt/Month) in Area 1A, 1999-2003

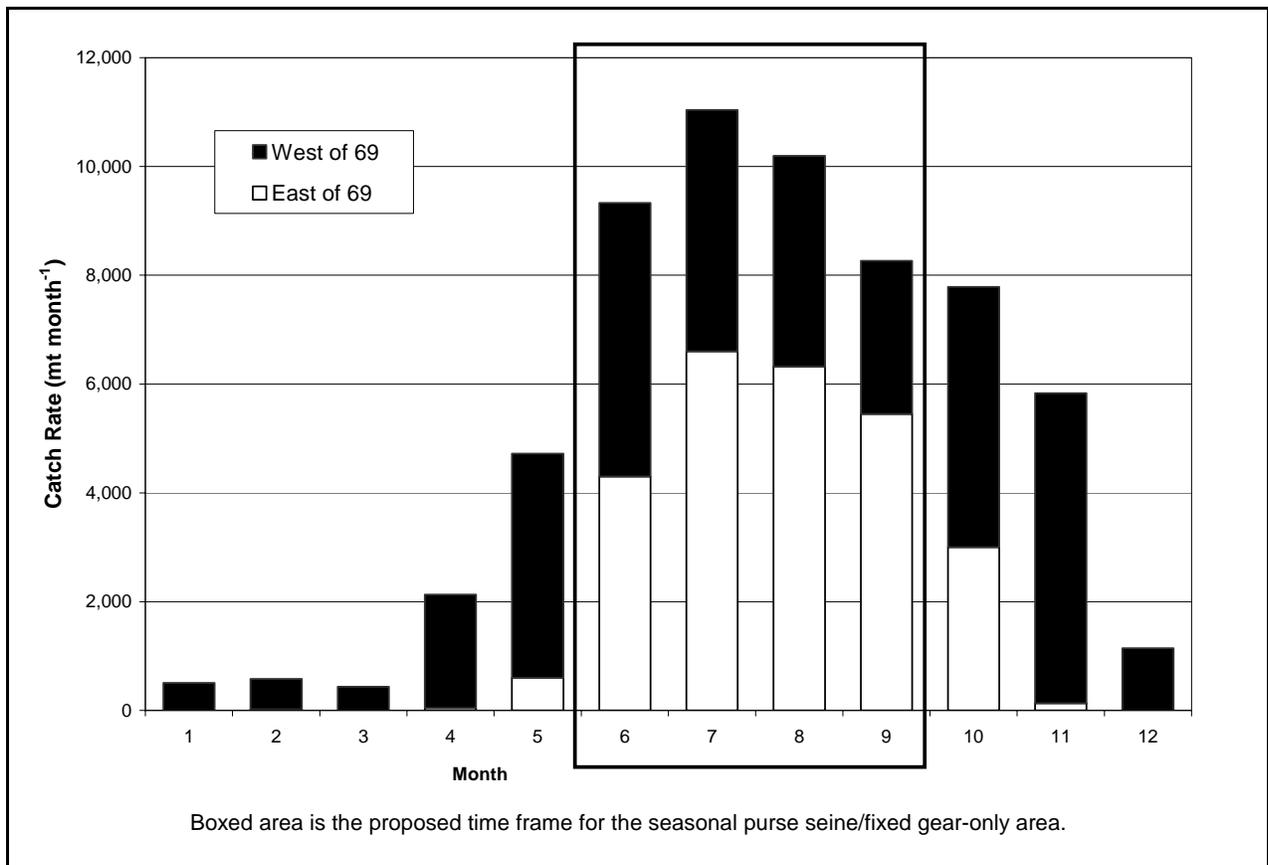


Figure 92 Average Herring Catch by Geographic Area Within Area 1A as a Percentage of Total 1A Catch, 1999-2003

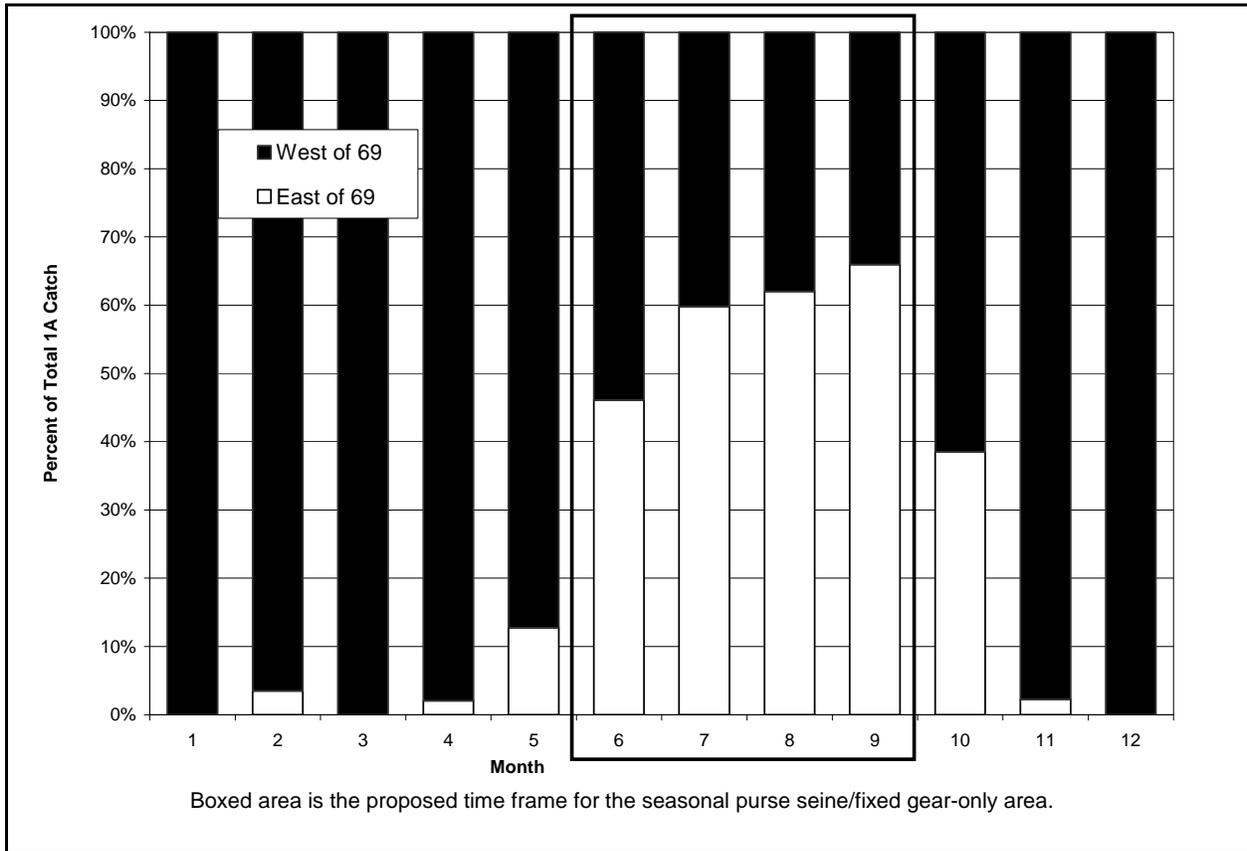
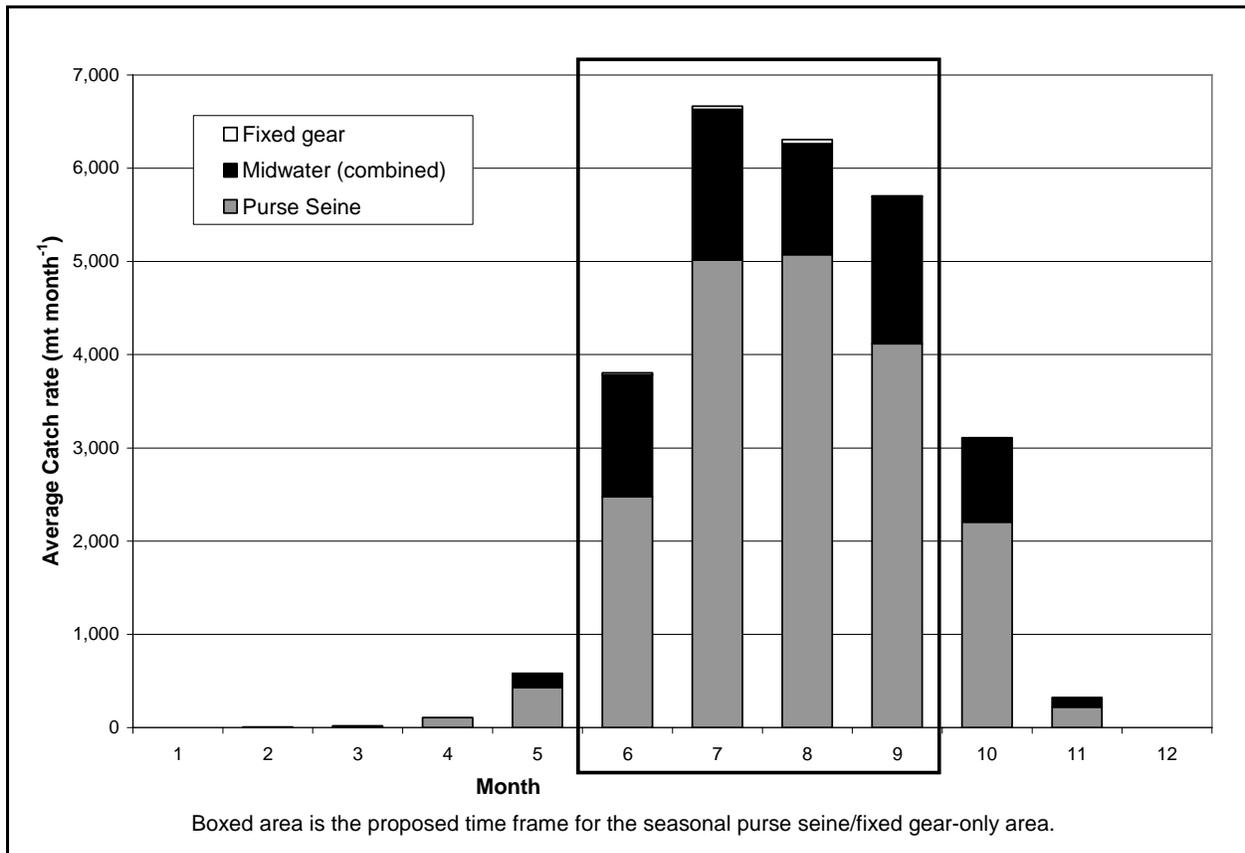


Figure 93 Average Herring Catch Rate (Mt/Month) in Area 1A East of 69° by Gear Type, 1999-2003



Under the alternatives that establish a purse seine/ fixed gear-only area east of 69° from June-September, the assumption that the Area 1A TAC would continue to be fully-utilized is reasonable because (1) the majority of the catch from the proposed area already is taken by purse seiners and (2) midwater trawl vessels (single and paired) would continue to have access to fish in Area 1A west of 69°. If midwater trawl effort is simply displaced into the western area within Area 1A and the TAC continues to be fully-utilized in a manner similar to recent years, then catch rates (catch per unit time) in Area 1A would likely not change and the biological impacts of this measure would be minimal.

For the management alternatives that include a purse seine/ fixed gear-only area east of 69°, the general conclusion that the biological impacts of the proposed purse seine/ fixed gear measures are not likely to be significant is based on the assumption that herring will be distributed throughout Area 1A and that midwater trawl vessels will have sufficient access to the fish west of 69° to fully utilize the available TAC. Average catch rates (1999-2003) have generally been high during the June-September period in Area 1A both east and west of 69°. It appears that, on average, fish are available throughout most of Area 1A during this time frame. However, seasonal and annual variability in fish distribution could lead to shortages.

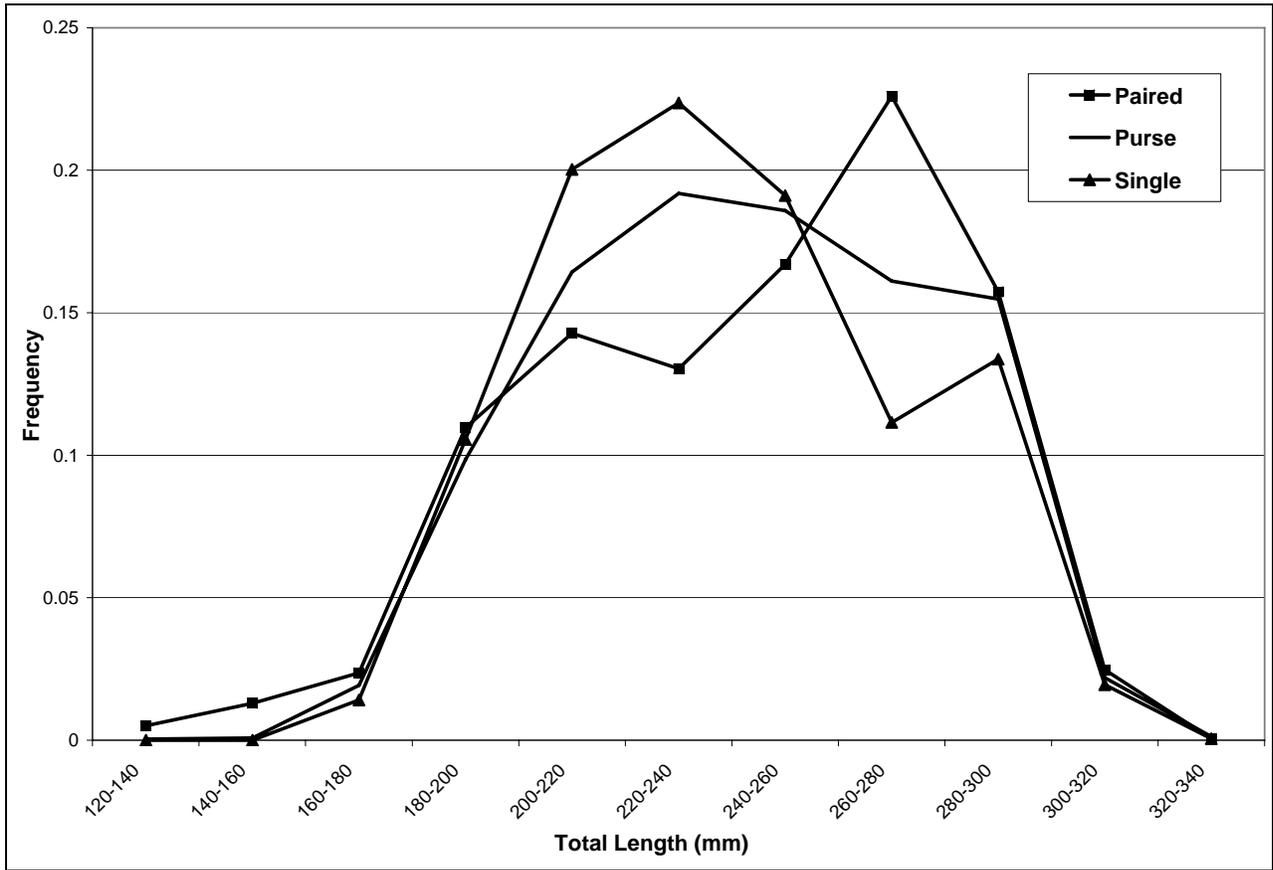
Another important consideration is whether or not establishing a purse seine/fixed gear-only area would increase the harvest of juvenile fish, as purse seine gear is perceived to target/catch smaller fish. If this is indeed the case, increased effort by purse seiners resulting from a purse seine/fixed gear-only area could have impacts on the inshore component of the resource. Commercial fishery samples collected by ME DMR and ACCSP were examined to address this issue.

Across the entire fishing year, the three gear types in the herring fishery catch similar-sized fish east of 69°. Figure 94 compares the size distribution of catch by gear type in the proposed area across the fishing year (2000-2004) using 260 commercial fishery samples collected by ME DMR. Although paired midwater trawls may appear to catch larger fish than single midwater trawls and purse seines based on the information provided in Figure 94, statistically, there is no significant difference in the size of fish caught by these gear types in this area across the fishing year.

Figure 95 compares the size distribution of catch by gear type east of 69° from June – September only, the time during which fishing may be limited to purse seines and fixed gear. Based on commercial catch samples during this time period, purse seines catch larger fish than midwater trawls (single or paired); the difference is statistically significant. Therefore, it does not appear that a purse seine/fixed gear-only area east of 69° from June – September would result in an increased harvest of juvenile fish (less than 230 mm).

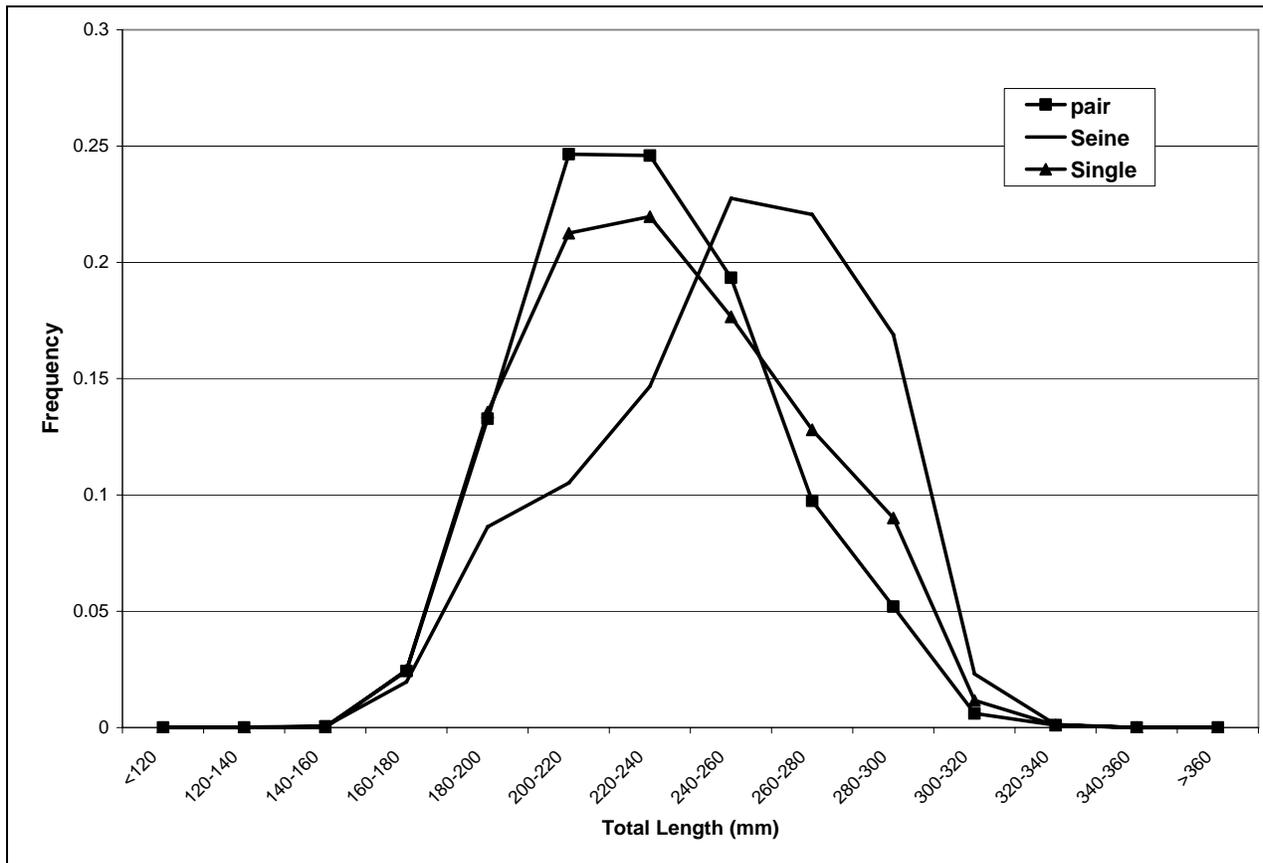
Many factors can influence the size of fish harvested in Area 1A, including market demand, regulatory measures (i.e. ASMFC spawning provisions and tolerances), gear selectivity, fishing behavior, and fish availability. Therefore, it cannot be predicted if this specific management measure will affect the size of herring harvested.

Figure 94 Length Frequencies By Gear Type East of 69° Across the Entire Fishing Year, Collected by ME DMR Commercial Fishery Sampling, 2000 – 2004



Juvenile fish are considered to be 230 mm or smaller.

Figure 95 Length Frequencies By Gear Type East of 69° From June – September, Collected by ME DMR Commercial Fishery Sampling, 2000 – 2004



Juvenile fish are considered to be 230 mm or smaller.

Summary

Predicting whether or not establishing a purse seine/fixed gear-only area will increase catch per unit effort for purse seine vessels is difficult. ASMFC effort controls have been proven relatively successful in reducing the removal rate in Area 1A, and the provision for days out of the fishery already limits vessels to fishing five days per week. ASMFC effort control provisions, when combined with the current small size of the purse seine fleet, weather limitations, and difficulties associated with purse seining farther from shore and/or in other areas, may mean that purse seine catch rates in Area 1A would not increase significantly if midwater trawl vessels are restricted in the proposed area.

It is important to note much of the above analysis is based on exclusion of current midwater trawl vessels from this area during these months. In actuality, some unknown number of current midwater trawl vessels may re-rig with purse seines to exploit the fish available in Area 1A during the summer months. The number of vessels and/or time frame for re-rigging is currently not known but will influence both the biological and economic consequences of this measure. Potential catch rates (catch per unit time), size distribution of herring harvested, and effort in this area cannot be predicted. However, it may be possible for all current herring vessels to rig over to purse seining given adequate financial incentive, as three of the remaining five purse seine vessels have participated in midwater trawling in recent years.

The likelihood that vessels will re-rig to purse seining is higher under the Proposed Action, which proposes to make all of Area 1A purse seine/fixed gear-only from June – September, relative to other alternatives and certainly relative to the no action alternative. Re-rigging to purse seining is most likely to occur if (1) fish are not available to midwater trawlers in other areas; (2) bycatch problems like those experienced with juvenile haddock on Georges Bank occur and vessels choose to fish in the Gulf of Maine to minimize interactions with other fish; and/or (3) fuel costs continue to increase and vessels can be more profitable fishing closer to shore.

For Alternatives 3, 4, and 6, which proposed to establish a seasonal purse seine/fixed gear-only area in Area 1A east of 69°, the likelihood that a significant number of midwater trawl vessels will re-rig to purse seining as a direct result of this measure is small because midwater trawl vessels would retain access to Area 1A west of 69° year-round and east of 69° from January – May and October – December. The economic incentive to switch gears, therefore, is low, unless fish are not available in the western portion of Area 1A or unless new factors arise to provide economic reasons to switch.

Because the herring fishery is managed by area-specific “hard” TACs, no significant biological impacts are expected to result from this measure for the stock complex as a whole. However, if catch rates (catch per unit time) slow as a result of these measures, a larger proportion of catch in Area 1A may be taken later in the fishing year. This could result in a larger removal of the inshore component if more of the catch would come after the area is re-opened for midwater trawling, when most of the fish present in the area are thought to come from the inshore component of the resource. Catch rates in Area 1A should be monitored closely following the implementation of this measure.

8.1.4 Impacts Relative to the Importance of Herring as a Forage Species

The importance of herring as a forage species is discussed in great detail in Section 7.1.4 of this document, and additional information is provided in Appendix V (Volume II). The Council acknowledges the importance of herring as one of many forage species in the Northeast Region ecosystem. One of the goals of Amendment 1 (Section 3.2) is to:

Provide for long-term, efficient, and full utilization of the optimum yield from the herring fishery while minimizing waste from discards in the fishery. Optimum yield is the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, taking into account the protection of marine ecosystems, including maintenance of a biomass that supports the ocean ecosystem, predator consumption of herring, and biologically sustainable human harvest. This includes recognition of the importance of Atlantic herring as one of many forage species of fish, marine mammals, and birds in the Northeast Region.

While information to quantify the importance of herring as a forage species is not available at this time, there is a substantial amount of literature that describes the role that herring plays in the ecosystem and estimates the amount of herring consumed by various fish, marine mammal, and seabird species. The first step to account for the importance of herring as a forage species in the herring management program is to compile and consider available information on the subject; the second step is to identify where information is lacking and prioritize research needs to fill the data gaps. This amendment addresses both of these steps to the extent possible.

The impact of the Proposed Action and the non-preferred management alternatives on herring as forage/prey for predator fish in the inshore Gulf of Maine is difficult to predict because it depends on how the management alternatives affect fishing patterns in specific areas, which, as discussed above, cannot be forecasted with any degree of certainty. Concerns about localized depletion of herring in the inshore GOM have been raised by some stakeholders who support the establishment of a purse seine/fixed gear-only area to help address this problem. Most concerns relate to the seasonal availability of herring to predators like bluefin tuna, whales, and other marine mammals that usually migrate to the inshore GOM to feed on herring and other prey species and the notion that midwater trawlers in particular break up large schools of herring in this area, consequently reducing food availability for these predators. Limiting removal rates in some parts of the inshore Gulf of Maine during some times of the year, particularly the summer months, may help to address this issue (if it exists) to some extent. Measures that impact fish availability on a small scale could impact forage, but the resolution (i.e., detail) of available data is currently insufficient to make any predictions. Preliminary information from recent tagging studies do show that herring can move long distances rather quickly (26 days from Rhode Island to Nova Scotia, for example; see Section 7.1.1.5.2 of this document).

In terms of providing quantitative analyses related to localized depletion and forage concerns and the impacts of the proposed management action, several important points should be considered:

- There is no specific scientific information that suggests that localized depletion of herring is occurring in the inshore Gulf of Maine.
- There appears to be no scientific evidence either local or world-wide, that midwater trawling or purse seining causes any long-term dispersal of herring (Section 7.1.1.6).
- Aside from the diurnal differences in fishing practices (purse seines fish primarily during the night, while midwater trawl vessels are capable of fishing during the day and night), there is no information available to suggest that midwater trawling is any more or less capable of causing localized depletion events than purse seining. If a significant number of midwater trawl vessels rigged over to purse seining because herring were more abundant in a purse seine/fixed gear-only area, it is reasonable to assume that a localized depletion event could still occur just from a significant amount of fishing pressure applied to a localized area in a short time frame. Again, these events and their associated impacts are very difficult to predict at this time.

In general, measures that affect total removals from the fishery would have the greatest impact on the availability of herring as forage. Since the proposed limited access program and purse seine/fixed gear-only area are not likely to change total removals from the fishery (because the fishery is managed through hard TACs), the overall impacts on herring as forage are not likely to be significant. Although small-scale impacts cannot be predicted at this time, it is recognized that significant changes in fishing patterns could impact the seasonal availability of herring for forage (for example, if fishing patterns changed such that the majority of fish from Area 1A are caught during June/July, which is unlikely under the Proposed Action). Fishing patterns, particularly in Area 1A, should be monitored closely following the implementation of Amendment 1.

Although scientific data to substantiate the biological need for a purse seine/fixed gear-only area are lacking, the Council may take management action for reasons other than a clear biological need, and the Council also may take a management action with biological impacts that cannot be quantified. The Council supports the purse seine/fixed gear-only area for many reasons, which are discussed in detail in Section 6.5 of this document.

The Gulf of Maine ecosystem is fragile, and interactions and relationships between species are not fully understood yet. One of the Council's primary reasons for supporting this measure relates to its potential long-term biological impacts. Atlantic herring is a **keystone species**: a species whose very presence contributes to a diversity of life and whose extinction would consequently lead to the extinction of other forms of life. Keystone species help to support the ecosystem of which they are a part. It is obvious that significant damage to a keystone species like herring could result in long-term and possibly irreversible damage to many other components of the Gulf of Maine ecosystem. Given the importance of herring in the Gulf of Maine ecosystem, overwhelming concerns expressed about the health of the inshore stock, and the general lack of detailed biological data specific to the inshore stock, the Council has concluded that a precautionary approach to managing the herring fishery in the inshore Gulf of Maine is warranted. The Council's precautionary approach is embedded in this measure, which would restrict concentrated midwater trawl (single and pair) effort in the inshore Gulf of Maine during the summer months, some of which incorporate important spawning months for this stock.

Another important biological reason that the Council supports this measure is that it may provide a mechanism to improve scientific information related to fisheries interactions with herring. This area could be a research area to further explore factors related to herring distribution, localized depletion, ecological influences, habitat issues, predator/prey interactions, and other issues that may affect the abundance and distribution of Atlantic herring in the inshore GOM. There may be an opportunity to observe the differences in catch rates and fish availability/distribution inside and outside of the area; research differences between purse seines, fixed gear, and midwater trawls; and observe short-term/long-term changes in the ecosystem within the area where midwater trawling is restricted. See Section 6.5 for additional information.

8.1.5 Impacts of MSY Proxy on Herring

Two measures were considered by the Council in Amendment 1 to specify maximum sustainable yield (MSY) based on the best available scientific information: (1) no action, which maintains MSY at 317,000 mt and (2) action to establish a proxy for MSY at 220,000 mt. The Proposed Action (Section 4.0) establishes a 220,000-mt proxy for MSY, to be replaced with a scientifically-accepted value for MSY when one becomes available.

Background Information and Analysis

There was no scientific consensus reached at the last herring stock assessment (TRAC 2003, see Appendix I) regarding either the current biomass of the resource or the short-term and long-term impacts of harvesting Atlantic herring at various levels of yield. Both a U.S.-led assessment (forward projection analysis, (FPA)) and a Canadian-led assessment (virtual population analysis, VPA) of the herring resource were presented and reviewed at the TRAC Meeting in St. Andrew's, New Brunswick from February 10-14, 2003. The two assessments produced different results (Figure 96), and no overall consensus was reached regarding which assessment was correct. While the ADAPT assessment did not provide biological reference points and/or other information that is useful from a management perspective, the TRAC review group did not support the reference points that resulted from the FPA assessment either.

During the review of TRAC assessment results on June 19, 2003, the Council's Scientific and Statistical Committee (SSC) agreed that some level of recovery has occurred in the herring stock complex, but that it might not be at the level suggested by the FPA assessment (see June 19, 2003 SSC Recommendations in Appendix II). The consensus of the SSC was also that herring biomass was probably not as low as suggested by the VPA. The SAW 27 (1998) estimate of MSY is 317,000 mt, the current value of MSY included in the Herring FMP; the SSC considered this to be too high. The estimate of MSY from the FPA assessment is 222,000 mt, but it was not accepted by either the TRAC or the SSC.

In the face of scientific uncertainty, the Council is proposing to establish a proxy for MSY until another stock assessment is conducted by the TRAC.

Both the forward projection analysis (FPA) and the virtual population analysis (VPA) that were presented at the TRAC assessment meeting in 2003 agree on historical herring biomass estimates until about the mid-1980s, while the two models diverge from about 1985 onward (Figure 96). Subsequent to the SSC meeting of June 19, 2003, the Herring PDT proposed that a level of biomass consistent with the earlier time period in the assessments may be an appropriate level on which to base an estimate or proxy of MSY. This is the approach that the Council utilized to develop the proxy for MSY proposed in Amendment 1.

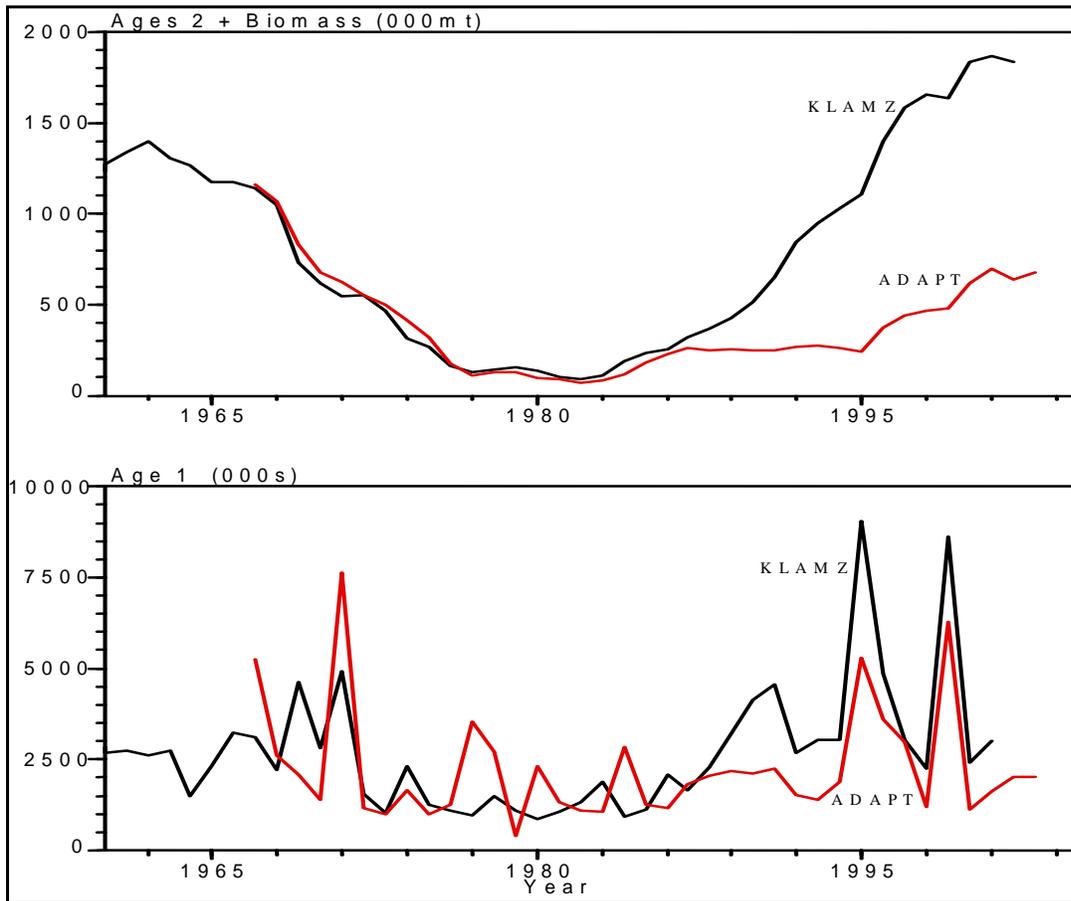
The Council utilized the average herring biomass estimate from the 1960-1970 time period to form the basis for a B_{MSY} proxy (from which MSY is derived). During this time period, biomass was still at a high level, and fishing mortality from foreign fishing activities ("ICNAF fisheries") had not reached peak levels. Fishing mortality from the ICNAF fisheries reached record-high levels in the mid-1970s, which is when the offshore component of the herring stock declined rapidly and crashed on Georges Bank.

At its June 19, 2003 meeting, the SSC agreed that estimates of F_{MSY} from 0.2-0.25 are similar and do not appear to be as sensitive to the differences between the two assessment models presented at the TRAC meeting. Atlantic herring biomass averaged 1.13 million mt (1,130,000 mt) during 1960-1970, and both TRAC assessments agree on this result (Figure 96).

When developing the proposed MSY proxy of 220,000 mt, the Council rounded the historical average biomass of 1.13 million mt down to 1.1 million mt. Applying the lower estimate of F_{MSY} to the 1,100,000 mt proxy for B_{MSY} results in the following proxy for MSY:

$$1,100,000 \text{ mt} \times 0.2 = 220,000 \text{ mt.}$$

Figure 96 Herring Biomass Estimates Resulting from the KLAMZ and ADAPT Assessment Models



The situation with Atlantic herring is unique in that two divergent stock assessments have been presented with no consensus on which assessment is most appropriate, and consequently, no consensus regarding the reference points to utilize for management purposes at this time. The Council, therefore, must make its selection of an MSY proxy based on the best available scientific information. Additional discussion of the Council's rationale for this decision is provided in Section 6.6 of this document (p. 99).

No Action Alternative

The following additional information should be considered in the context of the no action alternative – maintaining MSY at 317,000 mt.

The SAW 27 (1998) estimate of MSY is 317,000 mt, which is the current value of MSY included in the Herring FMP, but the SSC considered this to be too high when it provided related recommendations at its June 19, 2003 meeting. The Herring PDT agrees and does not support an MSY value of 317,000 mt at this time, primarily because of the SSC recommendations as well as the results of both stock assessments presented at the TRAC Meeting in 2003, neither of which suggested that MSY for the Atlantic herring resource should be as high as the current value.

Even though the Stock Assessment Working Group endorsed the MSY-based biological reference points at SAW 27, the Stock Assessment Review Committee (SARC), in its review, expressed reservations

about the surplus production model that was used in the assessment. In its final report, the SARC noted the following:

“The MSY estimate of 317,000 mt derived from the ASPIC model was considered to be somewhat unrealistic since the stock complex had only briefly (1968-1971) supported total landings of this level and higher, most of which had come from the Georges Bank stock, which collapsed shortly thereafter due to excessive exploitation...

As an alternative approach, the SARC applied yield-per-recruit and biomass-per-recruit values at $F_{0.1}$ (0.20) to average recruitment to estimate MSY and B_{MSY} . Depending on the range of years used in the analysis, the MSY values based on geometric mean recruitment ranged from 108,000 to 290,000 mt. Without a firm basis to select within this range, the SARC felt that it would not be prudent to consider MSY to be above 200,000 mt or B_{MSY} to be above 1.5 million mt until the sizes of recent, apparently large year classes were better estimated...(SAW 27, 1998)”

Potential Short-Term Impacts of Proposed MSY Proxy

The Herring PDT believes that removals consistent with an MSY of 220,000 mt (current value of OY at 150,000 mt) in the short-term would not jeopardize the health of the Gulf of Maine-Georges Bank herring complex.

NEFSC spring and autumn bottom trawl indices of abundance suggest that herring biomass from this stock complex increased dramatically during the 1990s (see Section 7.1.2.1). The autumn time series suggests that herring are as abundant or more abundant than during the 1960s and early 1970s. The spring index shows that trends in both series are consistent, suggesting a major recovery in the 1990s.

The Herring PDT believes that the proposed MSY proxy is precautionary enough to ensure the health of the resource while still allowing for expansion of the fishery beyond current levels. Any declines in the resource, although not likely, would be detected rather quickly through changes in the monitoring surveys and could be reversed in a short time frame. Total removals from the fishery are not equivalent to MSY, however; they will be based on the optimum yield (OY) from the fishery, which is considered more frequently through the fishery specification process. In general, expansion of the fishery should occur in areas where the risk of overfishing one of the spawning components (Georges Bank/Nantucket Shoals or Gulf of Maine) is low. Additional surveys, analyses and stock assessment work will be necessary to confirm the MSY and biomass estimates in future and to provide more accurate long-term projections (see below). The impacts of total removals under an MSY of 220,000 mt (and the current value for OY of 150,000 mt) are not expected to be significant enough to compromise the health of the resource as a whole.

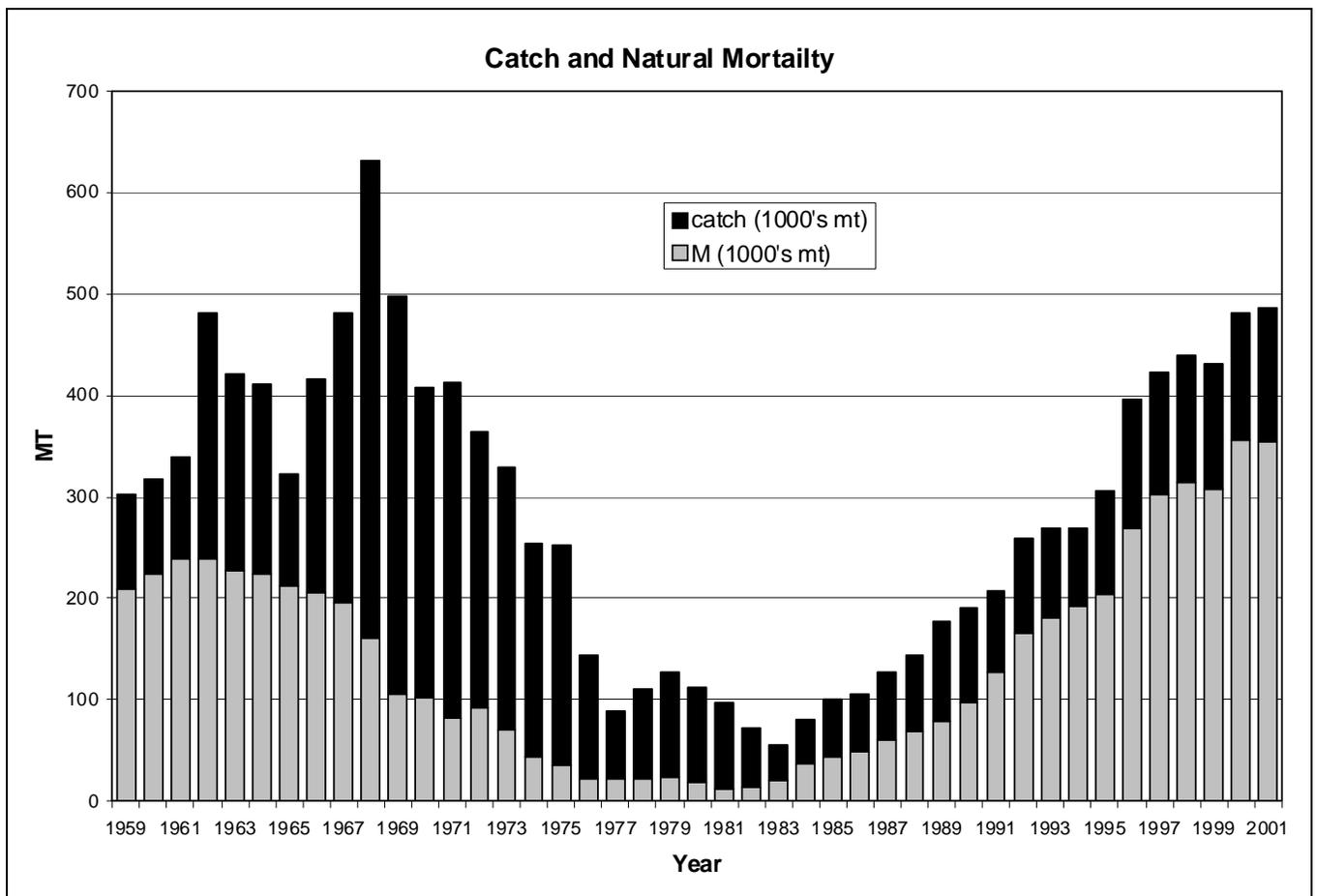
Potential Long-Term Impacts of Proposed MSY Proxy

The impact of various harvest strategies on long-term yield were not considered during the TRAC meeting in February 2003. However, if removals remain at or near current levels or increase to the OY of 150,000 mt in the future, there should be no deleterious impacts on the resource as a whole over the long-term. The average total landings of Atlantic herring during 1990-2004 was 108,000 mt, and landings averaged 127,000 mt during 1997-2001. During the 1990s, herring survey indices increased dramatically, indicating relatively high abundance and biomass, and the same trend has been evident from 2000-2004. At no time during 1990-2004 has there been any indication of a drop in herring abundance, even during 1997-2001 when landings averaged 127,000 mt.

If landings are increased above the 1997-2001 average of 127,000 mt in subsequent years and a significant change in herring biomass results, there is a good chance that it would be detected in either the spring or autumn monitoring surveys conducted annually, or in the hydroacoustic surveys conducted each autumn. A significant change would also be apparent in the growth rate of herring and also in the age structure of the stock complex. Both of these factors are monitored during the routine sampling of landings that occurs during every month of the year. If a significant change in herring biomass were detected, the annual specifications could be changed to adjust the catch back to a more appropriate level that would allow for increases in biomass.

The Herring PDT has concluded that the importance of herring as a forage species has been implicitly addressed through establishing a precautionary proxy for MSY and a buffer between MSY and OY, which is determined through the annual specification process. Even before setting these precautionary reference points, the amount of forage associated with natural mortality ($M = 0.2$, assumes 350,000 mt of forage) is believed to be within the range of what is consumed by predators on an annual basis (Figure 97). Additional information is needed to evaluate this conclusion in a more quantitative model over the long-term.

Figure 97 Herring Catch Relative to Removals from Natural Mortality (M)



Results from preliminary analyses (1959-2002) with the herring stock assessment model (forward projection analysis, FPA), with predation added in as an additional fleet, suggest that predation mortality rates (M_2 's) are time variant and can be much larger than the constant natural mortality (M) that is used in the current assessment. Current M_2 's however, are likely very low, perhaps less than 0.2, because herring biomass is relatively high. B_{MSY} may have to be increased, and MSY for the herring fishery would probably be more akin to the present OY, somewhere between 150,000-180,000 mt, if predation is included. This issue should be explored further in the next stock assessment for Atlantic herring.

The next TRAC stock assessment for the Atlantic herring complex is scheduled to occur in Spring 2006. If the TRAC reaches consensus regarding an appropriate value for MSY , the value proposed in this amendment will be updated to reflect the most recent scientific consensus, and TAC adjustments, if necessary, will be made accordingly during the Council's fishery specification process. All biological issues related to the specification of MSY will be explored during the upcoming TRAC assessment.

8.1.6 Impacts of Other Proposed Management Measures on Herring

This section discusses the impacts of other proposed management measures on the Atlantic herring resource. The management measures discussed in this section were identified in the Amendment 1 DSEIS as independent management measures, which have little to no interaction effects and could be combined with the final management alternative in any way. Unless otherwise specified below, the "no action" alternative for each of these measures maintains status quo conditions in the fishery and would not be expected to have any additional impact on the herring resource. The no action alternative for these measures is discussed in Section 5.1 of this document.

VMS Requirements and Vessel Upgrade Restrictions (Sections 4.1.4.3 and 4.1.4.2 respectively)

Because VMS requirements are intended primarily to address monitoring of the area-specific TACs and enforcement of the herring fishery regulations, they are not likely to produce any direct impacts on the herring resource. Similarly, these measures are not likely to significantly affect yield or catch rates in the herring fishery, so they are not likely to impact the amount of herring available for forage in the ecosystem. However, to the extent that these measures do improve real-time quota monitoring, there may be indirect positive impacts on the herring resource from preventing quota overages and further ensuring that the risk of overfishing individual stock components is minimized.

The short-term and direct impacts of upgrade restrictions on the herring resource are similar. However, to the extent that these measures help to prevent excess harvesting capacity in the fishery, particularly in fully-utilized management areas, there may be indirect positive impacts on the herring resource over the long-term.

Open Access Incidental Catch Permit (Section 4.2)

There are no impacts on the herring resource expected from the open access incidental catch permit proposed in this amendment. Open access permit holders catching more than 2,000 pounds of herring per week will continue to be required to report their catches on a weekly basis through the IVR reporting program, so catch by these permit holders will continue to be counted against the TACs for the herring management areas.

Adjustments to Management Area Boundaries (Section 4.3)

In 2003, the TRAC Assessment recommended consideration of three modifications to the current management area boundaries:

1. Moving the boundary between Area 1B and 3 to minimize reporting errors in these two areas and to better reflect spawning distributions;
2. Moving the Area 2/3 boundary from its current position (69° west) to 70° to better reflect the distribution and movement of spawning concentrations;
3. Including the Canadian portion of Georges Bank in Area 3 to better coordinate management of the transboundary resource.

While it is important for the Council to maintain a cooperative relationship for managing this resource with Canada, the Council does not support the third TRAC recommendation. Implementing this recommendation appears to be difficult from a practical and legal perspective, and there may be better ways to coordinate management with Canada. In addition, this approach appears to significantly complicate the monitoring of catches in Area 3 because there would be no mechanism to require Canadian vessels to report their catches in this area to the U.S.. As a result, the Proposed Action is based only on the first two recommendations from the TRAC Meeting.

The proposed changes to the management area boundaries are intended, in part, to better reflect the distribution of the spawning components of the stock. This is supported by recent hydroacoustic sampling of the offshore component of the resource (Figure 98, Figure 99).

Figure 98 Results of 2000 NMFS Hydroacoustic Survey Superimposed on Current Management Area Boundaries and Proposed Revisions to Area 3

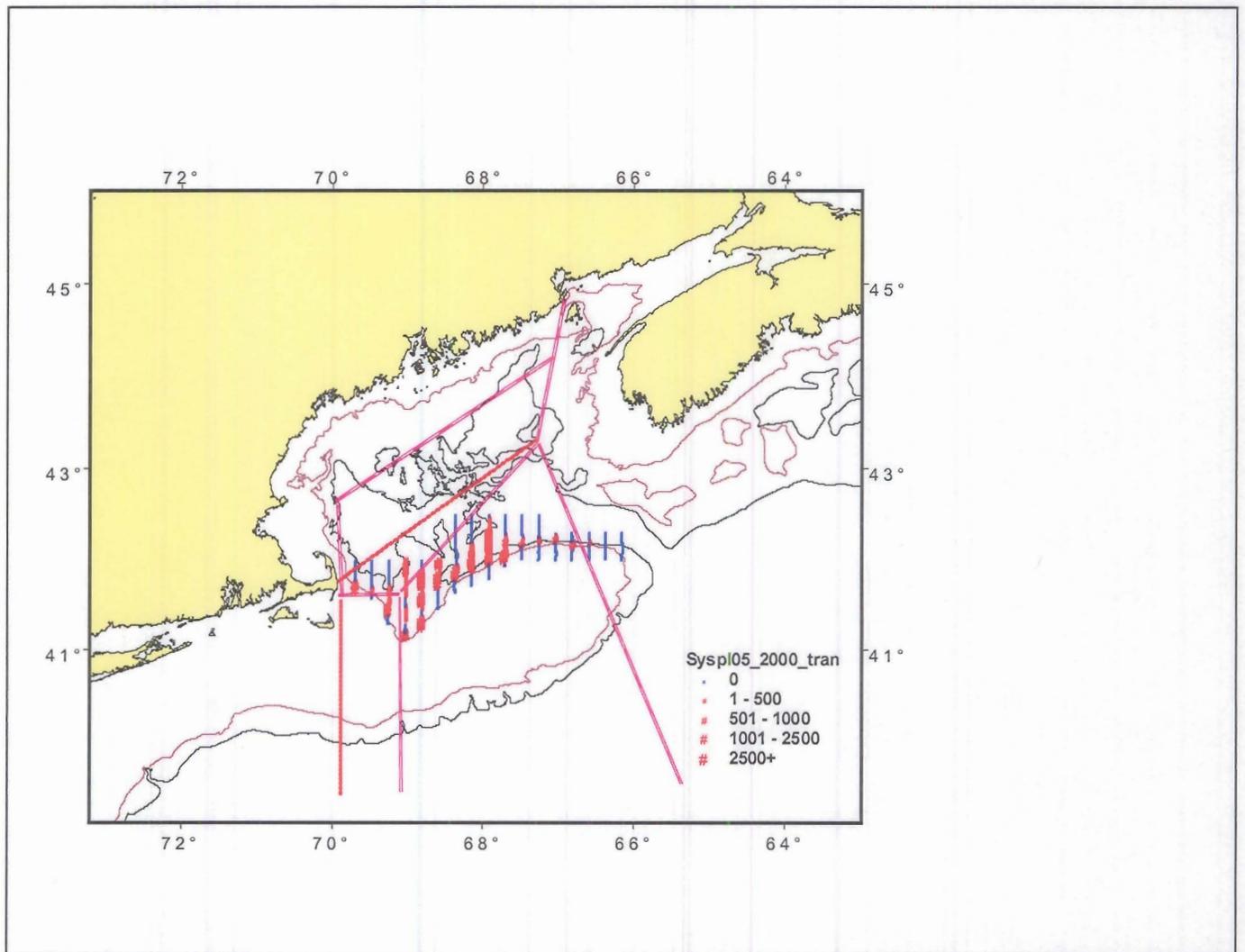
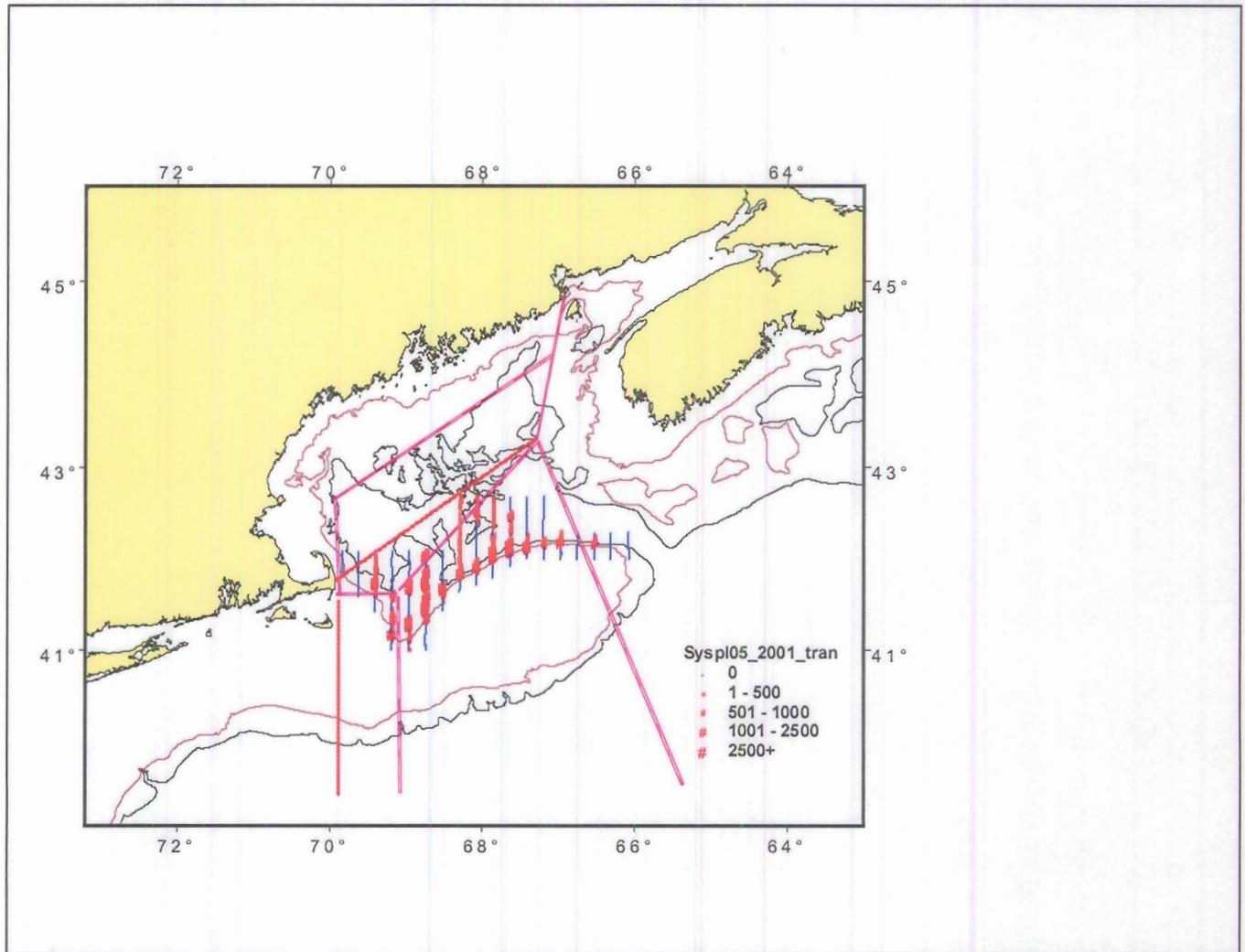


Figure 99 Results of 2001 NMFS Hydroacoustic Survey Superimposed on Current Management Area Boundaries and Proposed Revisions to Area 3



During the development of Amendment 1, the Council also considered an option that would modify Area 3 and eliminate the Area 1A/1B boundary, creating three management areas in total. The Herring PDT cautioned the Council about the potential impacts of this option on the inshore component of the resource. To account for the likelihood that most of the Area 1 catch would come from the inshore stock component under this option (because vessels would likely fish closer to shore and not in the current Area 1B unless fish are not available inshore), area-specific TACs would likely be different than they are currently. For example, if Area Option 3 is implemented, the total Area 1 TAC would likely not equal the current Area 1A TAC plus the Area 1B TAC. The impacts of fishing closer to shore under this option and the resulting area-specific TACs would be analyzed during the fishery specification process. It is possible that a trade-off would be required to ensure that overfishing does not occur on the Gulf of Maine spawning component.

Measures to Determine the Distribution of TACs (Section 4.6)

Measures to determine the distribution of area-specific TACs are primarily related to the process by which the Council selects specifications for the Atlantic herring fishery, so they are not likely to produce any direct impacts on the herring resource. However, to the extent that the specification process can be improved by providing more flexibility for the Herring PDT and the Council to consider and respond to dynamic stock and fishery conditions, there may be indirect positive impacts on the herring resource. For example, under the Proposed Action, the PDT and the Council may utilize an approach to analyze various TAC options that better accounts for varying conditions among the stock components and further minimizes the risk of overfishing any individual stock component. Similarly, the Council could utilize an approach that better accounts for the role of herring in the ecosystem, should such an approach become available. One such approach that the PDT could consider under the Proposed Action is described below.

This approach was developed by the PDT during the Amendment 1 process, primarily in response to advice from the Council's SSC to conduct a relative risk assessment when determining the aerial distribution of catches in the herring fishery, and was utilized, in part, during the process for determining the 2005 fishery specifications. While the Herring PDT would have flexibility in its methodology for conducting a catch scenario analysis, the approach can be generally summarized as follows:

1. Calculate average historical removals of the inshore component. The time period for estimating historical removals of the inshore component could be determined by the PDT, provided the PDT justifies its selection. The PDT would utilize fishery-independent indices (trawl surveys, acoustic surveys) in addition to landings data to determine an appropriate historical reference time frame.
2. Evaluate a reasonable range of options for TAC distributions (including the status quo) using a relative catch scenario analysis.
 - a. The assumption about how much of the inshore component of the resource will be taken by the New Brunswick (NB) weir fishery would be re-evaluated periodically by the Herring PDT and adjusted as necessary, especially if landings from the NB weir fishery increase or decrease significantly in the future and/or if the Downeast ME fixed gear catch is included in this assumption. The current assumption of catch from the NB weir fishery is 20,000 mt.
 - b. The assessment would evaluate relative risk associated with the TAC options by producing estimates of removals from the inshore component under a range of mixing scenarios, which would be compared to average historic removals under the same range of mixing scenarios.
3. The Council, in consultation with the Commission, would select TACs for Areas 1A, 1B, 2, and 3 based on choices regarding both the risk of overfishing the inshore component (relative to historical removals) and issues/tradeoffs associated with allocating the catch of the inshore component of the resource between Areas 1 (primarily 1A) and 2.

One benefit of this approach may be that it accounts for uncertainties related to stock mixing by not relying on one specific mixing scenario. Instead, potential removals from the inshore component of the resource are estimated based on a range of possible mixing scenarios. Consequently, a range of projected removals under each TAC option that is evaluated would result from the catch scenario analysis described above. The inshore component of the resource has been identified by the Herring PDT as the limiting factor when allocating catches by management area. The intent of this approach would be to minimize the relative risk of overfishing the inshore component of the resource under a total MSY and OY that are not expected to compromise the health of the resource as a whole.

Adjustments to the Timing of the Specification Process (Section 4.7)

This measure is primarily administrative in nature, so it is not likely to produce any direct impacts on the herring resource. Impacts on the herring resource (biological, ecological) would be analyzed for the proposed time frame as part of the EA for the specification package under any of the measures.

Research Set-Aside Process (Section 4.8)

The TAC set-aside process for research is primarily administrative in nature and relates to actions that may be taken in the future during the specification process, so it is not likely to produce any direct impacts on the herring resource. The impacts of specific TAC set-asides for research, should they be established in the future, will be discussed in the environmental assessment (EA) associated with the fishery specification package. To the extent that these measures promote and support research on the Atlantic herring fishery and resource, there may be indirect positive impacts on the herring resource, particularly as new scientific information contributes to effective management.

Measures to Address Fixed Gear Fisheries (Section 4.9)

Measures proposed in Amendment 1 to address fixed gear fisheries include an authorization to include the Downeast ME fixed gear fishery catch in the assumption about the NB weir fishery catch that is used in the fishery specification process as well as an Area 1A TAC set-aside of 500 mt for fixed gear fisheries. The ASMFC recently implemented Amendment 2 to the Interstate FMP for Herring, which requires fixed gear fishermen to report herring catches on a weekly basis through the IVR reporting program. This requirement is essential to ensure the effectiveness of the measures proposed in this amendment.

The rationale for the measure related to the assumption about the NB weir fishery catch is based on the proximity between the Downeast Maine fixed gear fishery and the fixed gear fishery occurring in New Brunswick. Both fisheries operate very close to each other and catch the same fish if/when they move inshore. If the Area 1A TAC is reached by the time the fish move inshore, then the Downeast Maine fixed gear fishermen lose access to the fishery, but the NB weir fishermen (only about 20 miles away) continue to catch the fish. This measure is associated with actions that would be taken in the future through the fishery specification process and will therefore not have any direct impacts on the herring resource. However, there could be indirect negative impacts on the resource in the future if catches from both the Downeast ME fixed gear fishery and the NB weir fishery are not monitored closely. From 1993-2002, the NB weir fishery catch averaged 19,605 mt, consistent with the current 20,000 mt assumption used when calculating area-specific TACs. The NB weir fishery is not restricted by TACs in Canada, and landings from this fishery could increase in the future.

An adaptive approach would be helpful so that the previous year's catch in these two fisheries could be accounted for when calculating TACs for the following year, especially if average catch in either the NB weir fishery or the Downeast Maine fixed gear fishery increases. This adaptive approach is embedded in the Council's proposed adjustments to the methods for determining the distribution of area-specific TACs during the fishery specification process (Section 4.6).

The proposed TAC set-aside for fixed gear fisheries in Area 1A is primarily administrative in nature and relates to action that will be addressed further in the future during the fishery specification process, so it is not likely to produce any direct impacts on the herring resource. It also does not affect total removals from the resource or more specifically from the inshore component. Any additional impacts of a TAC set-aside for fixed gear fisheries in Area 1A will be discussed in the environmental assessment (EA) associated with the fishery specifications package. Impacts on the herring resource (biological,

ecological) from the yield associated with the TAC set-asides would be considered further, as necessary, in the analysis of the fishery specifications.

Measures to Address Bycatch (Section 4.10)

Measures to address bycatch were separated from Amendment 1 and submitted in February 2006 as Framework 43 to the Northeast Multispecies FMP. The Framework 43 document should be referenced for additional information and analyses of impacts.

Measures to Modify the Regulatory Definition of Midwater Trawl Gear (Section 4.11)

Because this measure is intended primarily to improve enforcement of midwater trawl gear's regulatory definition and perceptions of how the gear is intended to be fished, it is not likely to produce any direct impacts on the herring resource. Similarly, this measure is not likely to significantly affect yield or catch rates in the herring fishery, so it is not likely to impact the amount of herring available for forage in the ecosystem.

Proposed changes to the gear definition will improve its enforceability and are expected to reduce the incidence of bottom contact by midwater trawls, but should not significantly affect the amount of herring removed from the resource by fishing (direct effect) or stock size (indirect effect). There may be less fishing for herring in deep water over mud and sand bottom areas, particularly during the winter fishery in southern New England, but it is likely that any "lost" near-bottom catches would be made up by increased midwater fishing. It is therefore unlikely that any reduction in the catch of the magnitude caused by effectively stopping midwater trawling near or on the bottom would have any negative effect on stock size. Stock size is affected not only by catch levels, but is also subject to a variety of natural factors that affect recruitment and natural mortality.

Additional Measures That Can Be Implemented Through a Framework Adjustment to the Herring FMP (Section 4.12)

This action simply identifies management measures that can be implemented through a framework adjustment to the Herring FMP in the future, or the fishery specification process in some cases, whichever is most expeditious. The action proposed in this amendment relative to the measures that can be implemented through a framework adjustment is not expected to produce any impacts on the Atlantic herring resource. Impacts associated with specific measures that may be implemented in the future through this process will be analyzed in accordance with applicable law as part of the framework adjustment and/or specification process.

8.1.7 Summary of Impacts on Atlantic Herring

The overall conclusion is that the direct impacts of the management action proposed in this amendment on the Atlantic herring resource – the biological impacts – are not likely to be significant, but there should be long-term benefits to the resource resulting from the Proposed Action. Similar to the seven management alternatives that were considered in the Amendment 1 DSEIS, the Proposed Action would not affect the amount of total removals from the fishery, an outcome that would be most likely to directly result in impacts on the herring resource. Therefore, no additional impacts on the herring resource overall are expected from the Proposed Action when compared to the management alternatives that were considered in Amendment 1. The Atlantic herring fishery will continue to be managed by quotas ("hard" TACs) under all of the limited access alternatives, which restrict total removals to levels that are intended to prevent overfishing.

As discussed in the impact analyses, more restrictive limited access programs that effectively prevent overcapacity could increase long-term benefits for the resource. However, the specifics of any particular impacts of the measures under consideration cannot be predicted with accuracy, nor can the impacts of the management alternatives relative to the herring resource be compared at present. There are too many variables that could influence the outcome under any of the management alternatives that were considered by the Council in this amendment – changes in fishing patterns/behavior, variations in fish availability, uncertainty about stock mixing ratios, and a general lack of biological/ecological information specific to the inshore component of the resource at this time. As noted in the impact discussion, management measures within the alternatives (Proposed Action, Alternative 7) that could cause a substantial shift of fishing effort in Area 1A to later in the fishing year could cause concern for the inshore component of the resource, assuming that the currently-assumed mixing ratios are accurate. Tagging and morphometric studies will help answer this question in the future.

The Atlantic herring fishery will continue to be managed by area-specific TACs (quotas) that are established in a manner that is intended to prevent overfishing on the resource as a whole as well as the individual spawning components. For the most part, given market conditions (for example, summertime demand for lobster bait) and fish availability observed in Area 1A in recent years, it is unlikely that the Area 1A TAC would not continue to be fully utilized. This conclusion is somewhat less certain relative to Alternative 7 as well as the Proposed Management Action, however, which both establish a purse seine/fixed gear-only area in all of Area 1A from June – September, the peak season for lobster bait demand. Purse seine vessels are generally limited to fishing during the night hours, so depending on fish availability, weather conditions, and ASMFC restrictions (days out, spawning restrictions), the chance of not fully utilizing the Area 1A TAC are higher under the Proposed Action and Alternative 7 relative to the other alternatives under consideration in Amendment 1. While this may be beneficial for the inshore component of the herring resource, it could result in negative social and economic impacts on the herring and other fisheries, and it may be inconsistent with the amendment's objective to achieve full utilization of OY in this fishery.

Establishing a purse seine/fixed gear-only area in the inshore Gulf of Maine could affect access to the herring fishery for some midwater trawl vessels and could produce changes in fishing patterns, but the specific biological impacts resulting from purse seine/fixed gear measures cannot be predicted with any degree of certainty. However, the Council believes that the measures proposed in this amendment, especially the purse seine/fixed gear only area, will produce indirect biological benefits to the herring resource and the Gulf of Maine ecosystem that may not be quantified in the Amendment 1 impact analysis. These impacts stem from managing the inshore component of the resource in a precautionary manner and restricting concentrations of fishing effort by midwater trawl vessels in the inshore Gulf of Maine during the summer months, some of which are spawning months for the inshore stock component. These impacts are generally not quantifiable at this time due to a lack of information, but they are related to the importance of maintaining a sufficient abundance of herring as prey in this area for other important fish species, marine mammals, and seabirds. The Council views this measure as part of a precautionary and proactive approach to ensure that the risk of overfishing the inshore component of the resource is minimized.

In general, measures that affect total removals from the fishery would have the greatest biological impacts and related impacts on the availability of herring as forage. Since none of the measures contained within the Proposed Action are likely to change total removals from the fishery (because the fishery is managed through hard TACs that are established and analyzed during the fishery specification process), the overall impacts on herring as forage are not likely to be significant. Although small-scale impacts cannot be predicted at this time, it is recognized that significant changes in fishing patterns could impact the seasonal availability of herring for forage (for example, if fishing patterns changed such that the majority

of fish from Area 1A are caught during June/July). Fishing patterns, particularly in Area 1A, should be monitored closely following the implementation of Amendment 1.

8.2 IMPACTS ON PROTECTED RESOURCES

The impacts of the herring fishery on endangered and threatened whales, sea turtles and fish have been discussed in the Biological Opinion prepared for the Atlantic Herring FMP in September 1999 and additional informal consultations conducted by NMFS in accordance with Section 7 of the Endangered Species Act. Environmental Assessments prepared for each framework adjustment and/or specifications package have similarly addressed the impacts of the fishery and any new management actions on marine mammals and listed species. Recognizing that additional information from the agency may be available as it prepares materials as part of its ESA responsibilities for this action, the conclusions stated below are based on the information currently available and summarized in other sections this document.

The following discussion addresses the impacts of the Proposed Action as well as other alternatives and measures that were considered in the Amendment 1 DSEIS on the protected resources described in Section 7.2 of this document.

The herring fishery is prosecuted by midwater trawl gear (single), paired midwater trawls, purse seines, stop seines and weirs. A full description of the gear used in the fishery is provided in Section 7.4.1 of this document. Only the first three are considered to be primary gears in the Atlantic herring fishery. Weirs and stop seines are responsible for a only a small fraction of herring landings (see Section 7.4.1.2.2.2), operate exclusively within State waters and are not regulated by the Federal FMP, and therefore will not be discussed further in this document relative to protected species. It should be noted, however, that both gear types have accounted for interactions with protected species, notably right, humpback and minke whales, and harbor porpoise, as well as harbor and gray seals. Animals, particularly pinnipeds, may be released alive. Both fisheries are classified as Category III in the NMFS *List of Fisheries for 2005* – fisheries with a remote likelihood of incidental mortality and serious injury of marine mammals.

The same *List of Fisheries* places the herring midwater trawl fishery, which includes “pair trawls,” in Category II, denoting a fishery that has been determined to have occasional serious injury and mortality of marine mammals. The purse seine fishery is considered to have a remote likelihood of interactions and, similar to stop seines and weirs, is listed in Category III. The Amendment 1 discussion will focus on the proposed measures and associated midwater trawl activities, while purse seine fishing will be discussed as appropriate.

Overview of the FMP

When implemented, the Herring FMP was assumed to be beneficial to threatened, endangered and other protected species by imposing a regulatory framework on the fishery in 1999. The fishery is now managed through quotas, or hard TACs, which restrict total removals of fish from all management areas and ensure that adequate levels of prey are provided for protected and other species inhabiting the management unit. Recognizing that takes of protected species will still occur, these particular benefits are likely to continue with the addition of limited or controlled access in the herring fishery, restricted gear areas and the addition of new stock information as it becomes available.

Forage Discussion

Areas of controversy and uncertainty associated with the Proposed Action and relative to the value of MSY are discussed in this document in Sections 6.6 and 11.1.3. Briefly, according to the results of the U.S. stock assessment, the supply of herring to feed predatory fish and marine mammals is sufficient, but according to the most recent Canadian assessment, the supply is deficient. The discussion adds that because the herring resource is not fully utilized in all management areas, a greater quantity of herring could be available as food for predators than is provided by the natural mortality “reserve” described in the narrative. Because of the uncertainty associated with the conflicting stock assessment estimates, however, the amount of surplus herring biomass that is currently available as forage for predators is unknown at this time. Consequently while management overall has been viewed as a benefit to protected resources inhabiting the herring management unit, the impact of the fishery relative to prey availability is not quantifiable until an analytical estimate of MSY for the herring stock complex becomes available.

Additional concerns have been raised about localized depletion of herring in the inshore Gulf of Maine and its potential impact on the whales, dolphins, seals and other species that utilize the herring resource as forage. Section 8.1 also discusses this issue, a portion of which is repeated here:

- There is no specific scientific information that suggests that localized depletion of herring is occurring in the inshore Gulf of Maine.
- There appears to be no scientific evidence either local or world-wide, that midwater trawling or purse seining causes any long-term dispersal of herring.
- Aside from the diurnal differences in fishing practices (purse seines fish primarily during the night, while midwater trawl vessels are capable of fishing during the day and night), there is no information available to suggest that midwater trawling is any more or less capable of causing localized depletion events than purse seining. If a significant number of midwater trawl vessels rigged over to purse seining because herring were more abundant in a purse seine/fixed gear-only area, it is reasonable to assume that a localized depletion event could still occur just from a significant amount of fishing pressure applied to a localized area in a short time frame. Again, these events and their associated impacts are very difficult to predict at this time.
- In general, measures that affect total removals from the fishery would have the greatest impact on the availability of herring as forage. Since none of the measures contained within the management alternatives are likely to change total removals from the fishery (because the fishery is managed through hard TACs), the overall impacts on herring as forage are not likely to be significant as compared to no action. Although small-scale impacts cannot be predicted at this time, it is recognized that significant changes in fishing patterns could impact the seasonal availability of herring for forage (for example, if fishing patterns changed such that the majority of fish from Area 1A are caught during June/July). Fishing patterns, particularly in Area 1A, should be monitored closely following the implementation of Amendment 1.

8.2.1 Protected Species Interactions

Species with documented interactions in the herring fishery include the long-finned pilot whale, Atlantic white-sided dolphin and harbor porpoise. Short-finned pilot whales may also interact with the fishery, but the possibility is more remote since the fishery occurs from Cape Hatteras north to the Gulf of Maine and the boundary between the two pilot whale species is the New Jersey/Cape Hatteras area. According to Waring et al. (2004), pilot whales are distributed along the continental shelf in winter and off the northeast coast in early spring. White-sided dolphins are also distributed offshore on the continental shelf, but seasonally move into the Bay of Fundy and Gulf of Maine. Based on observer data, both species have been taken in the herring midwater trawl fishery. Eleven pilot whales were taken in vessels operating in a 2001 joint venture. During the same year, two white-sided dolphins were taken by vessels during foreign fishing operations. NOAA Fisheries Northeast Fisheries Science Center incidental take reports indicate a number of takes of white-sided dolphins by midwater pair trawls in 2005. Interactions between each of these species and the herring fishery are most likely to occur in Areas 1B, 2 and 3, given their offshore distribution.

Harbor porpoise and both gray and harbor seals are distributed inshore during the period of highest activity in the herring fishery, from May through October. Interactions are most likely to occur in Area 1A, although porpoise are also be found in the Bay of Fundy and less frequently on the northern edge of Georges Bank. As mentioned earlier, all three of these species have been documented in the herring purse seine/fixe gear fishery, but animals, if observed, are often released alive. Few instances of documented takes of harbor porpoise in midwater trawl gear exist, possibly an artifact of the low observer coverage in this fishery. Recent increases in coverage, however, should yield better information on interactions in the future.

With respect to recently available information, none of the of the three species discussed above were observed taken in midwater trawl gear, according to the 2005 NEFSC Incidental Take Reports published on the Northeast Fisheries Science Center website - <http://www.nefsc.noaa.gov/femad/fishsamp/fsb/>.

Despite the relatively sparse information available, concerns over the bycatch of marine mammals in midwater trawl gear are based on a number of studies of bycatch in pelagic fisheries both in the U.S. and in Europe. Waring et al. (1990) discussed a significant number of takes of pilot whales and common dolphins by foreign vessels operating in the Distant Water Fleet Atlantic mackerel and squid fisheries between 1977 and 1988. The authors attributed the timing and location of the interactions (mid-winter to late spring) to their seasonal distribution, which is concentrated along the southern New England shelf edge and coincident with the operation of these fisheries. A more complete discussion of this issue is provided in the 1999 Herring FMP and Environmental Impact Statement.

8.2.2 Impacts of the Proposed Action on Protected Resources

This discussion focuses on the proposed limited access program and purse seine/fixed gear-only area, the two measures that comprised the management alternatives in the DSEIS for Amendment 1. Discussion of the impacts of other proposed management measures is provided in subsequent subsections of this document.

Although it qualifies the least number of vessels for the limited access directed fishery (34), the Proposed Action may result in increased capacity in Area 1 where the TAC is fully utilized and may be more restrictive in Areas 2 and 3 where TACs are not fully utilized. While there is an overall reduction in the number of vessels that qualify for limited access directed fishery permits relative to other alternatives, that effect is primarily due to a reduction in the number of vessels that receive limited access directed permits for Areas 2 and 3. The Proposed Action, therefore, appears to limit harvesting capacity in Areas 2 and 3 and increase capacity in Area 1, where the TACs are fully utilized. Nevertheless, the program is still more restrictive than the open access scenario under No Action with 34 qualifying vessels, although potentially less beneficial when compared to more restrictive alternatives, such as 7.

This outcome may be mitigated by the inclusion of a purse seine/fixed gear area during the June 1-September 30 period when interactions in Area 1A overall are most likely to occur. It is unknown how many midwater trawl vessels might switch to purse seine gear but it is established that while purse seine gear has documented interactions with protected species, animals are often released alive. Risks of interactions could increase outside of the June 1-September period in Area 1 if effort shifts occur as a result of vessels riggering to purse seines.

Increased midwater trawl effort in Areas 1B, 2 and 3 during the June 1-September 30 period, if it occurs, may have its own set of outcomes if interactions with protected species increase accordingly. The species most likely to be affected, however, white-sided dolphins and pilot whales, are likely to be distributed over a much larger area relative to 1A. Similarly, fishing effort also will likely occur over a much greater area so that the impact of effort shifts might be reduced when compared to inshore areas where porpoise and seals are seasonally abundant. When considered in relation to the No Action Alternative described in the next subsection, the Proposed Action is still likely to provide increased benefits to protected species with the addition of limits on harvesting capacity and other program elements versus an open access fishery.

8.2.3 Impacts of No Action Alternative on Protected Resources

Under the no action or status quo alternative, impacts to the herring resource would remain largely unchanged from the present. TACs would continue to be used in the four management areas to minimize the risk of overfishing individual stock components. This scenario, however, does not take into account the rate at which fish are caught in a particular area or catch-at-age/maturity at which the fish are taken, a source of potential negative impacts to protected resources if forage is affected by the controversial issue of localized depletion. Without limited access, capitalization of the fleet would continue, the increased use of large midwater trawl vessels and pair trawling would be allowed to continue unfettered, with unknown but potentially negative impacts to protected species if interactions were to increase, and catches from Areas 2 and 3 would also increase without controls. Recent increases in observer coverage will enhance information on marine mammal/fishery interactions, but little data is currently available to make conclusive statements at this time. Measures in the Proposed Action would address this shortcoming. More details are provided below in the discussion of the seven alternatives and independent measures that were considered in the Amendment 1 DSEIS.

8.2.4 Impacts of Alternatives 1-7 (Non-Preferred) on Protected Resources

The numbers of qualifying vessels discussed below were specified in the DSEIS. Calculations based on subsequent Council decisions on qualification criteria are included in other sections in the Final DSEIS and may slightly alter some of these numbers discussed in this section, but do not significantly change the conclusions.

Alternative 1

This package is essentially the no action alternative, with the same unknown but potentially negative consequences for protected species. However, it allows the addition of any of the independent measures that are presented exclusive of the seven “packages.” Impacts are identical to taking no action, a dynamic that would change only if one or more of the independent measures were to be adopted and resulted in discernable impacts on protected resources. Most independent measures that were considered in the Amendment 1 DSEIS have impacts that are either positive or neutral with respect to protected species. Their impacts, as they relate to the Proposed Action, are discussed below.

Alternative 2

This proposal would implement two limited access programs in the herring fishery, while Alternatives 3-7 present variations on the controlled access theme ranging from restrictive programs in all management areas to a delay in limiting access until a trigger is activated once a percentage of the TAC is caught. While benefits are likely to accrue to the fishery overall through greater economic and social stability, the effects of this and the following alternatives on protected species appear to be minimal given that total herring removals from the fishery will still be controlled by the area-specific TACs implemented to minimize the risk of overfishing individual stock components. This is currently accomplished through an annual specification process.

Elimination of the open access fishery and the institution of a limited access program could provide benefits to protected species given the recent increases in midwater and pair trawling --- gears with documented interactions with both cetaceans and pinnipeds --- by restricting the number of vessels participating in the fishery. Shifts in effort are still possible, particularly into Area 1A under some scenarios (should vessels re-rig from midwater trawl gear to purse seine gear), but will be difficult to predict given the number of variables that affect fishing patterns. The limited access incidental catch permit in this and the other alternative would allow better monitoring of the catch in this fishery, an indirect benefit to protected species when considering possible localized depletion and forage issues. The package does not contain a purse seine/fixed gear only area – a potentially positive feature of Alternatives 3, 4, 6 and 7 if risk reductions result from the elimination of midwater trawl effort during the June – September period .

Alternative 3

The same statements made above in Alternative 2 apply to Alternative 3 concerning the proposed limited access programs. Distinguishing the impacts of the various limited access alternatives on protected resources is difficult given that changes in fishing patterns and shifts in gear type are dependent on a number of factors that are not easily predictable. Further, numbers of vessels that are eligible to fish under the alternatives vary, but not dramatically between alternatives. In terms of all qualifiers, Alternative 3 qualifies the most vessels (57) and Alternative 5 the least (42). Alternatives 2, 4 (after the trigger is reached), 6, and 7 qualify 45 vessels. It is important to note here that the number of permits is not absolute at this writing, but are provided here and in other sections for comparative purposes. With

the exception of Alternative 1, all alternatives have potential landings from active qualifying vessels that range from 166,000 mt to just under 205,000 mt – not a significant decrease from the status quo.

From these and a number of scenarios provided in the document, there appear to be few discernable differences in impacts to protected resources between the limited access programs with respect to overall herring effort. That feature of the management plan is still controlled by the area-specific TACs. The more restrictive limited access programs can produce long-term benefits to the herring resource, and indirect benefits to protected species, however, by limiting number of permits and vessels involved in harvesting relative to an open access fishery. Potentially offsetting this benefit is the possibility that current participants in the herring fishery that do not meet specific qualification criteria may elect to fish in other fisheries or in other areas that have greater impacts on protected species.

Recent landings data show that midwater trawl vessels are active in the eastern portion of Area 1A during June-September. Still recognizing takes of protected species in herring purse seines and fixed gear, establishment of a purse seine only area during the summer months as outlined in Alternatives 3, as well as in Alternatives 4, 6 and 7, could result in positive benefits to marine mammals by removing the midwater trawl effort during the period when these species are most abundant in the inshore areas of the Gulf of Maine. Again, enhanced observer coverage will help to clarify the issue of the level of marine mammal interactions with midwater trawls versus purse seines and fixed gear.

Alternative 4

While fewer vessels would qualify than would remain fishing under Alternative 1, the document notes that the vessels that would likely fish under Alternative 4 are the most active and productive in the fishery, most likely resulting in little overall changes in effort. Midwater trawl fishing would be reduced in Area 1A, east of 69° during the same June 1 through September period as described in Alternative 3, with some possible benefits to protected species if, in fact, the impacts are less severe in the purse seine/fixed gear fishery than in the midwater trawl fishery.

Alternative 5

Effort is likely to be more restricted in Alternative 5 relative to the status quo as the result of the qualification criteria for the limited access program, with a potential 18 to 20 percent drop in landings when compared to No Action. Excluded vessels would likely shift their activities to Areas 2 and 3, but depending on species distribution and abundance, it is difficult to estimate whether this change would have positive or negative impacts on protected species. If effort shifts from inshore areas during the summer months, protected species interactions might be reduced. The purse seine/fixed gear only measure is not included in this package so the potential benefits associated with that measure would not be realized.

Alternative 6

The limited access criteria defined in this alternative results in the second lowest potential catches in Area 1, but one of the highest in Areas 2 and 3. If densities of protected species are higher in Area 1, which is the case at least seasonally, this alternative would provide positive benefits to animals inhabiting that region during the herring fishing season. The same potential benefits that accrue as a result of the purse seine/fixed gear only measure in Alternatives 3,4, and 7 (the exclusion of midwater trawl gear), with caveats, are true of this alternative.

Alternative 7 (Preferred Alternative in DSEIS)

This alternative is the most restrictive with respect to gear types that interact with protected species because of the inclusion of a proposed purse seine/fixed gear only area in all of Area 1A (and not just the portion east of 69°). This alternative could result in potentially greater reduced risks from midwater trawl gear than Alternatives 3, 4 and 6, which also seasonally curtail midwater trawl gear activities, but in a smaller area. Added to this possible benefit is the fact that Alternative 7 has the lowest potential catch in Area 1 and the highest in Areas 2 and 3. Overall, 45 individual vessels (all qualifiers) may fish under this alternative, similar to the total number of vessels qualifying in every alternative except Alternative 3, which has 57 vessels qualifying. If the same rationale is used with respect to protected species distribution in the inshore Gulf of Maine during the June through September period as discussed above, effort will shift from Area 1 to Areas 2 and 3, possibly reducing risks in areas of seasonal high use. Marine mammals outside of the purse seine/fixed gear only area would also be subject to risks although distribution is not as dense as in the inshore areas. The status quo contains none of the potential benefits described in this alternative, which is identical to the Proposed Action with respect to the purse seine/fixed gear only area (applying to all of Area 1A).

8.2.5 Impacts of Other Proposed Management Measures on Protected Resources

This section discusses the impacts of other proposed management measures on protected resources. The management measures discussed in this section were identified in the Amendment 1 DSEIS as independent management measures, which have little to no interaction effects and could be combined with the final management alternative in any way. Unless otherwise specified below, the “no action” alternative for each of these measures maintains status quo conditions in the fishery and would not be expected to have any additional impact on protected resources. The no action alternative for these measures is discussed in Section 5.1 of this document.

VMS Requirements and Vessel Upgrade Restrictions (Sections 4.1.4.3 and 4.1.4.2 respectively)

VMS Requirements – Direct impacts to protected species are not likely to be evident if this measure is implemented, but any improvements to enforcement and monitoring generally produce indirect positive results to protected species in the form of enhanced information about where the fishery operates. More information versus less in the No Action alternative would be distinctly positive in view of the lack of information on marine mammal interactions in this fishery.

Vessel Upgrade Restrictions – This measure is intended to prevent excess harvesting capacity and is not expected to result in any impacts to protected resources given that it will have little impact on overall yield and catch rates. Although the measures would limit harvesting capacity to some degree, the outcome is not quantifiable and is not expected to differ significantly from the status quo.

Open-Access Incidental Catch Permit and Possession Limit (Section 4.2)

Few impacts, either positive or negative, are likely to occur as a result of this proposed measure, given that the area-based TACs established during the specification process would account for the level of herring allocated to any open access incidental catch permits. A permit process, however, might allow better tracking of landings by the vessels holding those permits and perhaps lead to better estimates of herring fishing mortality. This information might be useful in efforts to calculate the amount of herring available as forage versus that which is utilized in the fishery. The absence of such a permit, as would be the case under No Action, however, has not resulted in impacts to protected resources that can be quantified.

Adjustments to Management Area Boundaries (Section 4.3)

As measures that reflect and accordingly protect spawning components of the herring resource, the proposed adjustments will very likely enhance fishery management efforts. In turn, such efforts could contribute to a well-managed fishery that also appropriately accounts for herring as a forage species. As such, the potential impacts on protected resources would be positive at best, or at least neutral.

Proposed MSY Proxy (Section 4.5)

Given the scientific uncertainty associated with both proxies for MSY, a conservative approach is likely to produce the most benefit to protected species in the management unit. The literature concludes that minke whales, harbor porpoise, and white-sided dolphins are major predators on Atlantic herring as indicated by the high proportion of herring in their diet, whereas fin and humpback whales consume large quantities of the fish to sustain large body mass (Read and Brownstein, 2003). Given that other marine mammals, including seals, utilize herring as a forage species to a greater or lesser extent, the Council's proposed proxy for MSY (220,000 mt) may be a more appropriate course of action versus the less precautionary No Action alternative (317,000 mt).

Measures to Determine the Distribution of TACs (Section 4.6)

An improved process to determine area-specific TACs would likely result in positive benefits to protected species from a forage perspective by better accounting for varying conditions among the stock components, assisting in minimizing the risk of overfishing any individual stock component. The No Action alternative, on its face, does not appear to have negative impacts, but simply continues the status quo which has had no discernable impacts.

Adjustments to the Timing of the Specification Process (Section 4.7)

The proposed measures are administrative in nature and are not likely to create any discernable impacts on protected resources. Similarly, the current timing of the specification process has no identifiable impacts given that the prosecution of the fishery is generally unaffected by the publication of this information.

Research Set-Aside Process (Section 4.8)

TAC set-asides have no direct benefits to protected species, but as funding vehicles, they can provide the resources to undertake projects that might lead to a greater understanding of the role of protected species in the ecosystem, including forage requirements and interactions with fishing gear. No action on this measure would continue the status quo with research funded through existing institutions.

Measures to Address Fixed Gear Fisheries (Section 4.9)

The measures proposed in this amendment to address fixed gear fisheries are related to fishery allocation issues and do not affect the amount total removals of herring. Therefore, they are likely to have few impacts, either positive or negative, on protected species. Although the herring in the Downeast area or in Area 1A will be taken in the fishery, some slight and indirect benefits might accrue to marine mammals in that region if prey availability is enhanced. The results of taking no action will not differ significantly from the Proposed Action, however.

Measures to Address Bycatch (Section 4.10)

Measures to address bycatch were separated from Amendment 1 and submitted in February 2006 as Framework 43 to the Northeast Multispecies FMP. The Framework 43 document should be referenced for additional information and analyses of impacts.

Measures to Modify the Regulatory Definition of Midwater Trawl Gear (Section 4.11)

If approved, the proposed measure will affect vessels that do not meet the requirements of the new definition of a midwater trawl. Economic impacts of such a change could occur, but these should not translate into impacts on protected species, i.e. significantly affect effort. Few impacts have been associated with the status quo.

Additional Measures That Can Be Implemented Through a Framework Adjustment to the Herring FMP (Section 4.12)

This action simply identifies management measures that can be implemented through a framework adjustment to the Herring FMP in the future, or the fishery specification process in some cases, whichever is most expeditious. The action proposed in this amendment relative to the measures that can be implemented through a framework adjustment is not expected to produce any impacts. Impacts associated with specific measures that may be implemented in the future through this process will be analyzed in accordance with applicable law as part of the framework adjustment and/or specification process.

8.3 IMPACTS ON THE PHYSICAL ENVIRONMENT AND EFH

This section discusses the impacts of the Proposed Action and the management alternatives/independent management measures that were considered in the Amendment 1 DSEIS on the physical environment and particularly EFH. The physical environment and EFH are described in detail in Section 7.3 of this document.

The EFH components of the Atlantic Herring FMP were developed as part of an Omnibus Amendment prepared by the New England Fishery Management Council for all NEFMC managed species (NEFMC 1998). The EFH Omnibus Amendment was approved for Atlantic herring by the Secretary of Commerce on October 27, 1999. The final rule implementing the Atlantic Herring FMP to allow for the development of a sustainable Atlantic herring fishery was published on December 11, 2000 (65 FR 77450).

An assessment of the potential effects of the directed Atlantic herring commercial fishery on EFH for Atlantic herring and other federally-managed species in the Northeast region of the U.S. was conducted as part of an EIS that evaluated impacts of the Atlantic herring fishery on EFH (NMFS 2005). (This analysis is included in Appendix VI, Volume II of this FSEIS) and determined that midwater trawls and purse seines do occasionally contact the seafloor and may adversely impact benthic habitats utilized by a number of federally-managed species, including EFH for Atlantic herring eggs. However, after reviewing all the available information, *if* the quality of EFH is reduced as a result of this contact, the impacts are minimal and/or temporary and, pursuant to MSA, do not need to be minimized. This conclusion also applies to pelagic EFH for Atlantic herring larvae, juveniles, and adults and to pelagic EFH for any other federally-managed species in the region.

Based on the conclusions in the 2005 Atlantic herring EFH EIS, development or consideration of measures to minimize, mitigate or avoid impacts of the fishery to essential fish habitat in Amendment 1 to the Herring FMP was not necessary or warranted. This analysis therefore is limited to the possible habitat impacts of the non-habitat-related management measures included in the Proposed Action.