

Figure E.24 - Air temperatures off Portland, MA (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC buoy 44007, position 43.53N 70.14W)

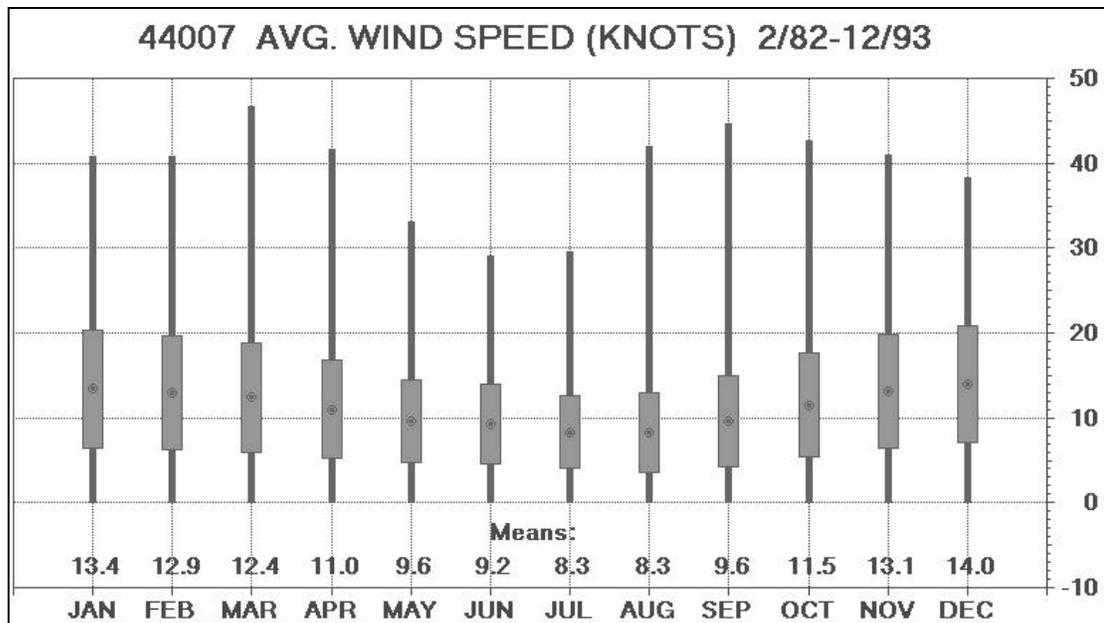


Figure E.25 - Wind speeds off Portland, ME (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC buoy 4407, position 43.53N 70.14W)

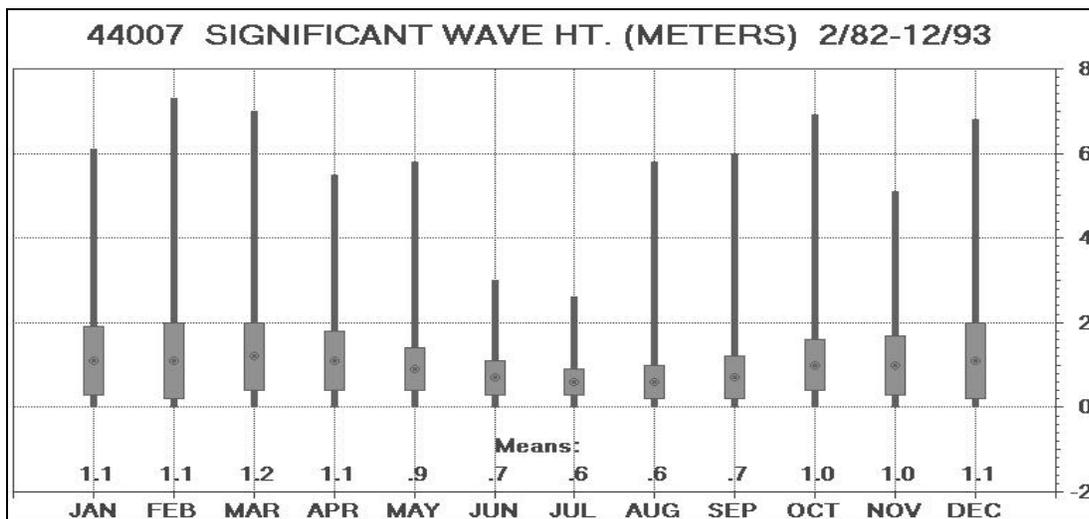


Figure E.26 - Wave heights off Portland, ME (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC buoy 4407 position 43.53N 70.14W)

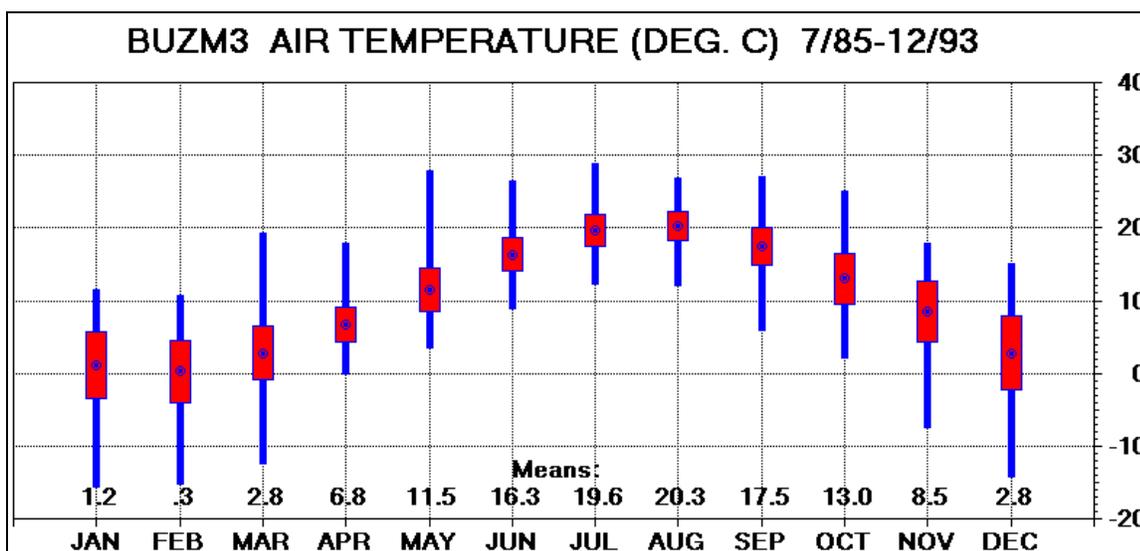


Figure E.27 – Air temperatures off Buzzard's Bay, MA (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC station BUZM3, 41.4° N 71.03° W)

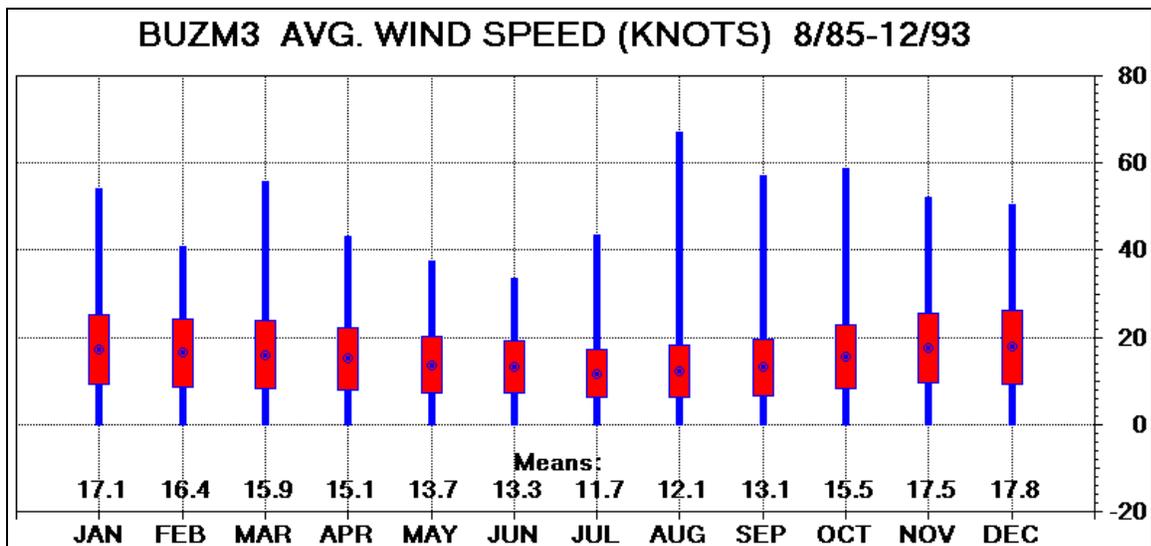


Figure E.28 – Wind speeds off Buzzard's Bay (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC station BUZM3, 41.4° N 71.03° W)

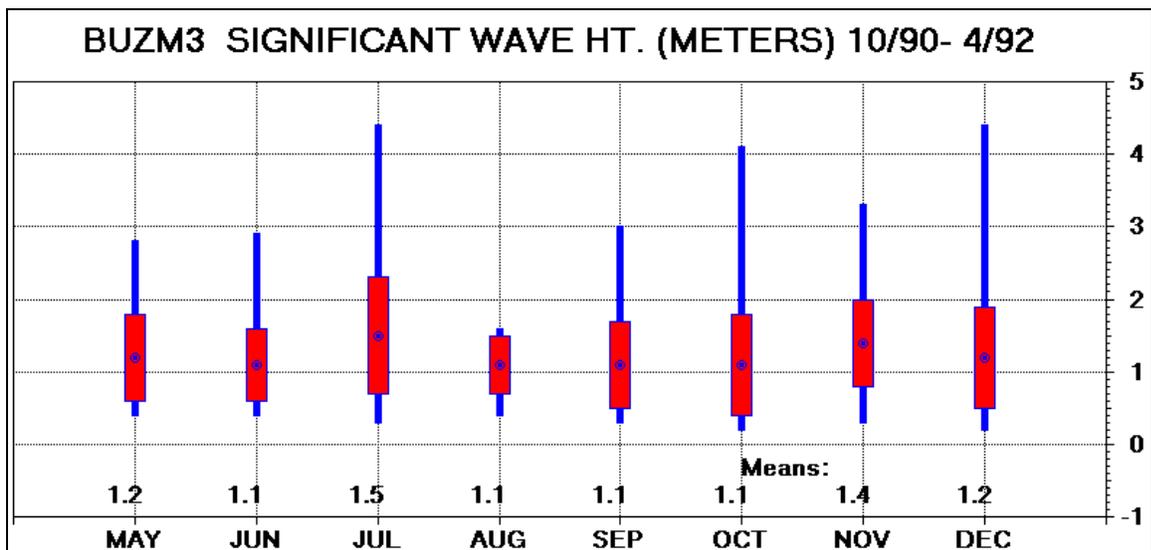


Figure E.29 – Wave heights off Buzzard's Bay (boxes indicate one standard deviation from the mean) (January through April not available) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC station BUZM3, 41.4° N 71.03° W)

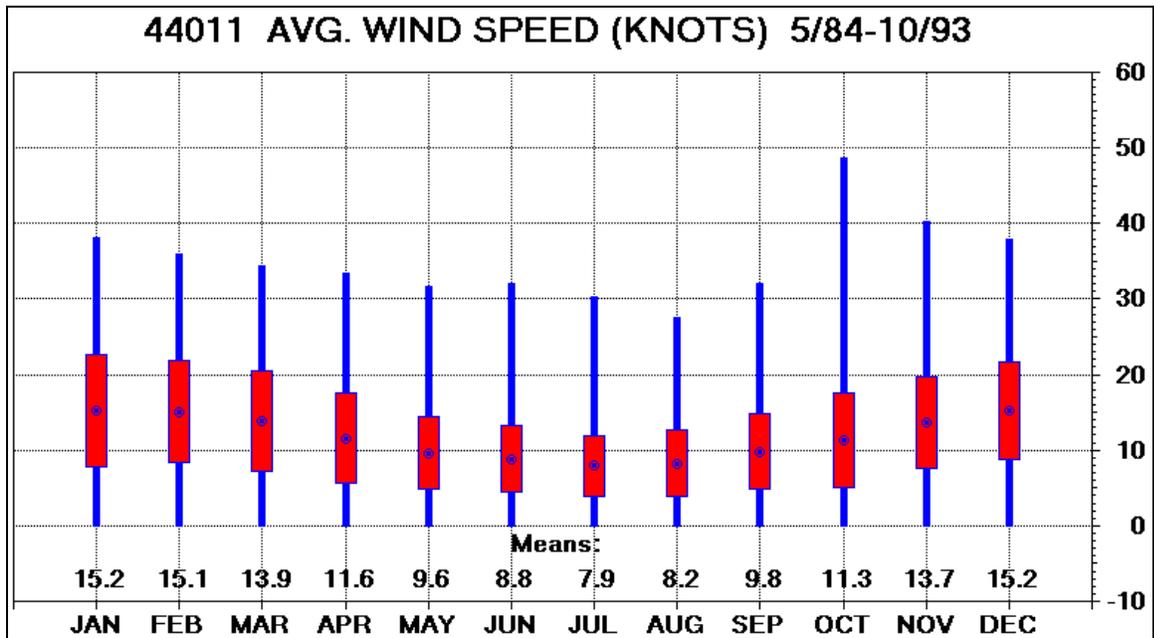


Figure E.30 – Average wind speeds on Georges Bank (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC buoy 44011, 41° 04'N 66° 34'W)

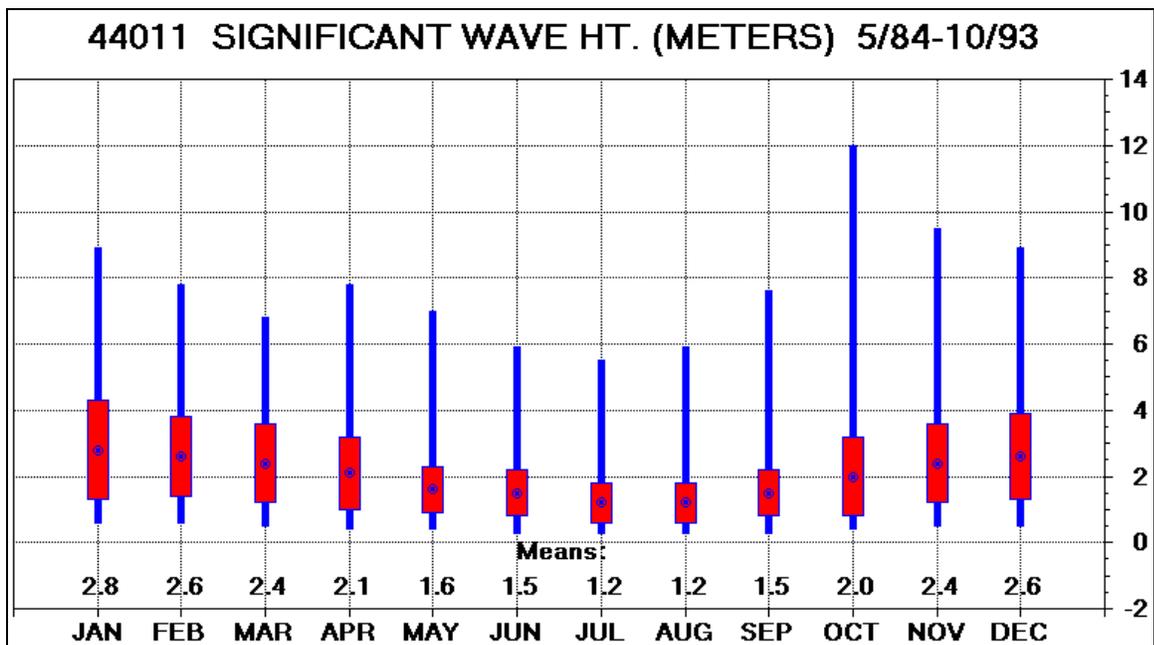


Figure E.31 – Wave heights on Georges Bank (boxes indicate one standard deviation from the mean) (Source: <http://seaboard.ndbc.noaa.gov/realtime.shtml>, NDBC buoy 44011, 41° 04'N 66° 34'W)

## **E.7.4.5 Alternatives Not Selected**

### **E.7.4.5.1 No Action (status quo)**

The social impacts of the no action alternative would result from the lack of protection this alternative offers to the resource. In particular, the possible negative impacts on individual spawning components could have severe negative impacts on communities that rely on herring. The major area of immediate concern is the inshore Gulf of Maine. The lobster bait and sardine industries have become dependent on a steady supply of herring. The lack of management controls in place has allowed many fishing vessels to meet this demand by focusing their efforts in this area. Increasing demand, primarily in the bait market, resulted in over 70,000 mt of herring caught in this area in 1996 and 1997. Unconstrained effort in this area could result in damage to or collapse of this resource. The likely result would be a lack of herring for the bait and sardine markets. As noted by Dyer and Poggie (1998), the sardine canneries are important elements of several isolated Maine communities. The lobster industry is woven into the very culture of all of coastal New England. Shortages of herring for these markets would have severe disruptive impacts on coastal communities.

In the absence of legislative action, the no action alternative would allow large domestic vessels to enter the fishery. The most likely role would be as processing vessels. While the impacts of allowing large domestic processors into the fishery are not clearly understood, they could result in displacement of shoreside processors that depend on herring and may limit the development of additional shoreside processing capacity. Another possible impact that could result is that the presence of processing vessels offshore would reduce the amount of herring landed for bait, disrupting the lobster industry and the numerous communities that depend on its income.

One possible benefit of the no action alternative is if large domestic processing vessels enter the fishery and hire local catcher vessels to supply them herring. The increased revenues from this activity could be a boon to communities suffering from reduced revenues caused by resource shortfalls and increasing regulation of the fishing industry. There may also be spillover benefits if transportation infrastructure develops to ship the products of these processors to other countries.

### **E.7.4.5.2 Controlled Access**

The impact of a controlled access system depend on the qualification criteria selected for entry. Some of the criteria under consideration would result in relatively few participants in the Gulf of Maine controlled access fishery. This will protect recent users and provide for the sardine canneries and bait markets. Development permits as well as conservation permits in areas outside the chosen Gulf of Maine limited access fishery will allow for development of the offshore resource. Benefits may accrue to fishing communities under stress through both conservation and development permits.

Conversely, if a very liberal qualification criteria is chosen for the Gulf of Maine controlled access area which allows a large number of entrants into the fishery, average revenues will be reduced. Those vessels that rely on the herring fishery for the majority of their income may be forced in other areas or possible in other fisheries. Their options may be limited, as most fisheries in the Northeast Region are controlled through limited access systems.

#### **E.7.4.5.3 Miscellaneous Management Alternatives**

The impact of quotas, closed seasons, days at sea limitations, gear restrictions or controlled access is presently difficult to assess. These options should be kept open as the present fishery develops to take advantage of the abundance of herring biomass. As capacity issues are resolved by the direction and magnitude of development strategies, the specifics of these options will become clearer. At present, the viability of the fishery represent an opportunity to maximize the human benefits of the resource in a sustainable fashion, with the challenge being to distribute benefits across the region and not allow the development of over capacity, potentially repeating the scenario of the groundfish fishery.

### **E.7.5 Cumulative Impacts of the Proposed Action in Concert with Other Laws, Regulations, or Plans on the Target Resource or Related Species**

#### **E.7.5.1 Canadian Herring Fisheries**

Canada has an extensive herring fishery from New Brunswick to Newfoundland that uses different gears to target several herring stocks. These fisheries land over 70 percent of the herring from the northwest Atlantic Ocean. Canadian management focuses on three general areas, with separate management plans for each: the Scotia-Fundy fisheries 4WX non-stock herring management plan, the Scotia-Fundy Fisheries 4VN herring management plan, and the Scotia-Fundy Fisheries 5Z herring management plan. Within the Gulf of Maine/Georges Bank region, the authorized gear types are purse seine vessels and weirs. Because the coastal stock complex of herring migrates into Canadian waters, the interaction of the U.S. and Canadian management plans must be considered.

The 4WX non-stock herring management plan includes management measures for the New Brunswick weir fishery. This fishery targets juvenile herring believed to be part of the Gulf of Maine spawning component. For this reason, Canadian assessments do not include these catches in estimating the size of the 4WX stock. In 1997, this fishery landed 20,552 mt of herring, but the average catch for this fishery for the past 35 years was about 26,000 mt and exceeded 40,000 mt as recently as 1990. The 1997 catch was dominated by age 2 fish (61% by number, 43% by weight), with only a small proportion ages 4+. (DFO, 1998). This fishery is only restricted by the number of permits that are issued – there are no quotas or TACs. The number of permits issued is declining, as many former weir sites have been converted to aquaculture in recent years.

As described in section E.6.3.1.9, the New Brunswick juvenile harvest is included in the assessment of the coastal stock complex. It is included in the calculation of ABC and is considered in determining optimum yield and TACs. There is considerable opposition to allowing an unlimited catch by Canadian fixed gear fishermen to reduce the size of the TAC for U.S. fishermen. The FMP proposes to limit any allowance for the New Brunswick juvenile harvest to 20,000 mt. If Canadian catches exceed the 20,000 mt level by any significant amount or any length of time, the effect of this artificial limit is that the actual combined Canadian and U.S. harvest could exceed the ABC by the amount that the Canadian catch exceeds 20,000 mt. What exacerbates this problem is that the Canadian New Brunswick catch is believed to be primarily composed of Gulf of Maine fish and does not include significant catches from any other spawning component. Any excess over the TAC, then, may come from one spawning component rather than be spread among different components.

The FMP implicitly recognizes this problem in three ways. First, one of the objectives of the plan is to "promote U.S. and Canadian cooperation in order to establish complementary management practices." Throughout development of the plan, it has been recognized that cross-border cooperation will be necessary to effectively manage this trans-boundary resource. Second, in section 3.2, the Council and the Commission acknowledge that the Canadian harvest must be closely monitored relative to the U.S. catch to prevent damage to the resource. Finally, the amount considered for the Canadian catch can be adjusted through framework action if New Brunswick catches exceed 20,000 mt.

There is a similar situation with respect to the Management Area 3/Georges Bank fishery. Canada manages fishing in this area with the Scotia-Fundy fisheries 5Z management plan. Because there has been little Canadian catch from this area in recent years and Canadian concerns over the assessment of this resource, Canadian harvests are limited to 20,000 mt, with 5,000 mt available for over-the side sales. The management plan deducts 10,000 mt from the ABC for the Canadian Georges Bank catch before determining the U.S. catch, a number that exceeds recent Canadian harvests from this area. It is unlikely that Canadian catches will exceed the quota and result in a possible harvest above the ABC. Should Canada increase the quota for its vessels on Georges Bank, however, the approach of the management plan may need to be revisited. This is unlikely to be a serious concern in the near future because of the lack of catches on Georges bank and the current state of the resource. There have also been informal discussions between the industries of both countries that have resulted in an agreement that either country will notify the other when catches approach 20,000 mt in a year, so that there will be sufficient notice to consider management action if it is necessary.

The trans-boundary nature of the resource also makes it important that both countries reach agreement on the status of the coastal stock complex. Management measures in the two countries cannot be complementary if there isn't general agreement on the status of the stocks. Canadian scientists participated in the 27th Stock Assessment Workshop at both the working group and the SARC level. In addition, the National Marine Fisheries Service has discussed including herring in

a joint assessment with Canada's Department of Fisheries and Oceans. A joint assessment may be conducted as early as spring, 1999.

#### **E.7.5.2 ASMFC Amendment One to the Atlantic Herring FMP**

The Atlantic States Marine Fisheries Commission coordinates management of fishery resources in state waters. The Commission recently adopted Amendment One to its management plan for Atlantic herring. As noted above (section 3.12), the Council worked closely with the Commission to insure that management of Atlantic herring in state and federal waters would be complementary. During development, the Commission's Herring Section and the Council's Herring Committee always met together, as did the Council's PDT and the Commission's TC. The same industry advisors were used by both bodies. One public hearing document was developed for both plans to simplify public input and to emphasize the links between them. Finally, the language of each document is nearly identical, particularly for the descriptions of the management measures. Given past history, this coordination was essential to make certain that the resource was protected as the fishery develops.

The key links between the two management plans are that both have adopted the same overfishing definition and both adopt the same TAC system for controlling catches. All landings, in state and federal waters, both adult and juvenile, will count towards the TAC. Because the Commission has adopted the TAC system as a compliance criteria, when the TAC in an area is reached the directed fishery will close in both state and federal waters. This close coordination between the two bodies will result in a management scheme that is consistent in both state and federal waters, avoiding problems experienced in the early 1980's when different interpretations of the quota system led to withdrawal of approval of the Herring FMP.

#### **E.7.5.3 Other Northeast Region Fisheries**

There has been considerable discussion that the current robust nature of the herring resource provides an opportunity for fishermen. Indeed, one of the plan goals is to provide controlled opportunities for fishermen and vessels in other mid-Atlantic and New England fisheries. As discussed in the Fisheries Impact Statement (section 6.0), a number of these fisheries are for overfished species and are being managed under programs that restrict fishing effort in order to rebuild the resource. In the scallop fishery, for example, the proposed regulations to rebuild the resource are expected to prevent some vessels from earning enough revenues to cover costs in the early years of the rebuilding program.

The existence of an open access fishery for an under-utilized resource is likely to attract at least some of the vessels in these other fisheries to fish for herring. At least initially, there is an opportunity for this to occur without causing too many management problems. Over the long term, there is the potential that open access will lead to over-capitalization in the herring fishery. One of the possible impacts of this influx of effort is to increase the likelihood of a "race for fish", with the result the TACs will be reached early in the fishing year. This is a particular concern for

many of the historical participants in the inshore Gulf of Maine. The restrictive TAC in this area, coupled with new participants entering the fishery, could result in an early attainment of the TAC and a closure of the directed fishery. Some of the vessels that have fished in this area for a number of years may be too small or not possess the equipment necessary to move operations into the offshore areas.

One possible result of this increase in effort is that it is likely that in the near future, there will be additional interest from some participants for a limited or controlled access system for herring. Such a system may be considered either for the entire range of the fishery, or for the Gulf of Maine areas only. If adopted, the addition of new participants attracted from other fisheries will complicate the decisions on who will be allowed into the limited access fishery. Any vessel that spends a significant amount of money to convert to the herring fishery will not want to be eliminated from the fishery after only a few years participation. The question of who gets continued access to the resource will not be easily resolved.

Over time, the rebuilding strategy of the Northeast Multispecies plan, as well as efforts to protect several species of marine mammals, could have an impact on the herring resource. Cod, whiting and haddock are important herring predators. Herring are an important part of the diets of harbor porpoise in the fall (Gannon et al. 1998), and are also consumed by finback, humpback, and pilot whales (Overholtz et al. 1990). As these stocks rebuild, increased abundance and the resulting predation may impact the herring stock biomass. How these interactions will affect the resource is not clearly understood. While stock size is likely to decline from current historic high levels, it is unclear if there will be changes in the distribution of herring as well. These uncertainties argue for the cautious approach taken in the setting of specifications for the initial years of the plan.

### **E.8.0 Rationale for the Proposed Alternative**

The preferred alternative establishes a management plan for an under-utilized species, as required by section 314(c) of the Magnuson-Stevens Act. It will facilitate the development of a sustainable herring fishery that targets the resource throughout its range while preventing overfishing. The selected management measures are designed to protect individual spawning components of herring while keeping overall fishing mortality below acceptable levels.

The Council considered a number of alternative management strategies. Section E.5.2 describes the major alternatives considered (no action, open access, or a limited entry/controlled access system). The Council rejected the no action alternative because the lack of an existing management plan would allow the development of the herring fishery without any controls to prevent overfishing. Without any controls on fishing mortality, the fishery is likely to continue to concentrate effort in inshore areas (particularly the inshore Gulf of Maine), resulting in an unacceptable risk of overfishing or damage to individual spawning components.

The Council also rejected a limited entry or controlled access system to manage the herring fishery (section E.5.2.2). Under this proposal, participants in the herring fishery would be limited

to those who met a specific qualification criteria. The criteria could be selected to match fishing effort to the available resource. A number of criteria were considered that would have resulted in either a very restrictive set of participants or an extended group that included most vessels in other northeast region fisheries (sections E.5.2.2.3.1 and E.5.2.2.4). The proposal included options to allow some temporary participation in the fishery during periods of abundance while not encouraging the development of excess capacity. The program could be implemented in different management areas at different times to account for the level of exploitation in each area. The Council rejected the limited entry/controlled access approach because it did not meet some of the plan goals. In particular, the Council was concerned that the establishment of a limited entry system would deter further development of the fishery, which is presently under-utilized. The ability of vessels to shift from over-exploited fisheries into the herring fishery would be hampered by the establishment of a control date before they had the opportunity to participate.

The Council's preferred alternative is an open-access system that controls mortality through the use of area-specific TACs. This system allows new entrants into the fishery, providing an opportunity for vessel in other fisheries. At the same time, the TACs, adjusted on an annual basis, will control fishing mortality to levels allowed by the overfishing definition (section 2.6). The area specific TACs and the mandatory days out of the fishery will also encourage the expansion of the fishery into other areas. For example, the recommended first year TAC for Management Area 1A is roughly 64 percent of the 1997 catch in Management Area 1. Vessels will be forced to fish in other areas if they want to maintain their catches at comparable levels. This will benefit the resource, as fishing effort will be spread over different areas and time periods rather than concentrated on the inshore Gulf of Maine just prior to spawning. The spawning closures will also protect individual spawning components.

The preferred alternative imposes restrictions on vessel size for catching, taking, or harvesting herring, and limits processing by large domestic vessels to an amount specified on an annual basis. These two restrictions are intended to provide some control over the development of excess fishing capacity in the region, and to take into account the concerns of fishing communities and historic herring fishery participants. For the first year of the plan, the recommended specification for large at-sea domestic processors is 0 mt. This is a precautionary approach that will give the Council time to evaluate the impacts of the management program before introducing large domestic processors into the fishery. This measure explicitly considers the concerns of those communities in the northeast region that are dependent on the herring fishing industry and the possible impacts that may result from the uncontrolled entry of large domestic processors.

The permitting and recordkeeping requirements will improve the information available to manage the herring fishery. As described in section E.6.1.6, the lack of an existing requirement for permits or logbooks results in uncertainties over the number of participants and landings in the fishery. These requirements will improve the information available to manage herring in the future. The requirement for a processor report will also assist the Council in making allocation decisions connected with the specification of USAP.

The preferred alternative takes into account the uncertainties in knowledge of the resource and the fishery. The recommended TACs for the first year of the plan are based on the estimate of MSY rather than current stock size due to uncertainties in the exact estimate of current biomass. The plan also includes a wide variety of possible management measures that can be implemented through a framework adjustment process, providing flexibility to react to changing conditions in the fishery or with the resource.

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#### **E.10.0 EIS Circulation List**

A copy of the EIS is being forwarded to the individuals representing government agencies and industry organizations as shown on the attached distribution list. Copies are also being forwarded to Council members, the Council's panel of industry advisors, and the PDT. Other interested parties may obtain a copy from the New England Fishery Management Council, 5 Broadway, Saugus, MA 01906 (telephone 781-231-0422).

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#### **E.11.0 Public Comments**

Comments received from the public are included in Appendices VII and VIII.