

4.0 DATA AND RESEARCH NEEDS

Adequate and comprehensive scientific information (both biological and socioeconomic) about the species and fisheries proposed to be managed under a Skate FMP is currently lacking. This information is critical to managing the northeast region's skate complex consistent with the Sustainable Fisheries Act. Without this information, uncertainty in the scientific data will constrain the ability of the Council to take appropriate management actions. In addition, effective monitoring and appropriate recommendations for management adjustments, especially for fisheries in which skates are caught incidentally, hinge on the availability of more comprehensive scientific information about these species. During SAW 30, the SARC identified the following sources of uncertainty relative to the assessment of the northeast region's skate complex:

- 1) The species composition and size structure of landings are unknown.
- 2) The true level of discards and the discard mortality rate are unknown.
- 3) A lack of information on the stock structure of the species in the skate complex has increased the uncertainty of conclusions about historical trends in abundance, recommendations of appropriate biological reference points, and conclusions about the status of barndoor skate relative to ESA listing factors.
- 4) Life history data are uncertain for winter and little skate and incomplete and totally lacking for five species.
- 5) Mortality estimates are based on equilibrium assumptions which are only partially met for these stocks. A preferable approach for future assessments would be an age-based method for determining mortality rates and estimates of longevity. This will require several years of future adequate length and age sampling, both from the commercial and research survey catches.
- 6) The proposed SFA biomass reference points are based on selected time periods of survey indices, but it is unknown how these relate to true estimates of B_{MSY} .

Based on the above sources of uncertainty, the SARC identified the following "research recommendations:"

- 1) The commercial fishery statistics sampling programs should be adapted to report skates landings by species.
- 2) Commercial fishery size composition data should be collected by species.
- 3) Sea sampling of directed skate landings and skate bycatch should be increased, and the identification of the species composition of the skate catch improved.
- 4) Age and growth studies, for all seven species in the complex, are needed.
- 5) Maturity and fecundity studies, for all seven species in the complex, are needed. Use of life history models requires these data and may prove useful in establishing biological reference points for the skate species.
- 6) Estimates of commercial and recreational fishery discard mortality rates, for different fishing gears and coastal regions and/or bottom types, for all seven species in the complex, are needed.

- 7) Studies of the stock structure of the species in the skate complex are needed to identify unit stocks. Stock identification studies, especially for barndoor, thorny, winter, and little skate, are needed.
- 8) Explore possible stock-recruit relationships by examination of NEFSC survey data. A simultaneous examination of the species in the complex may prove a useful first step.
- 9) Investigate trophic interactions between skate species in the complex, and between skates and other groundfish.
- 10) Further consideration of the validity of NEFSC trawl survey catchability conversion factors for skate species is needed (diel, gear, vessel).
- 11) Investigate the influence of annual changes in water temperature or other environmental factors on shifts in the range and distribution of the species in the skate complex. Establish the bathymetric distribution of the species in the complex off the U.S. Northeast coast.
- 12) Investigate the SEAMAP survey data for clearnose and rosette skate.
- 13) Investigate historical NEFSC survey data from the Albatross III cruises during 1948-1962 when they become readily accessible, as they may provide valuable historical context for long term trends in skate biomass.
- 14) Recalculate the error distributions of the survey indices using alternative distributions.

In addition to the above, the Skate PDT recommends the following:

- 1) Promote comprehensive reporting, including items discussed above as well as direct sales from bait to lobster fishermen.
- 2) Urge all dealers to use the species utilization code to better understand the total amount of skates sold for lobster bait.
- 3) Urge all processors to report production in the Processed Products Survey.
- 4) Urge states that report via the General Canvas to report landings by vessel permit number in order to better identify small businesses for the *regulatory impact review*.
- 5) Collect trade statistics (Q and V) – U.S. exports by country and U.S. imports by country.
- 6) Estimate production and/or cost functions for directed bait and wing fisheries.
- 7) Estimate price models for bait and wing landings using current data (assuming that reporting is more complete).

5.0 MANAGEMENT CONSIDERATIONS

This section serves as a general guide to the Skate Committee and the Council when considering how to approach the management of the northeast region's skate complex. To develop this SAFE Report, the Skate PDT examined existing data and collected additional (mostly qualitative) information on the skate fisheries. Much of this information had never been examined or considered before in the context of the northeast skate complex since these species currently do not fall under direct management. In preparing this SAFE Report, the PDT was able to identify some technical and policy issues that are likely to be critical in the context of developing a Skate FMP. These issues are discussed generally in the sections below and are intended to serve as preliminary guidance to the Committee. This section is essentially "scoping" from the Skate PDT perspective.

5.1 CURRENT MANAGEMENT PLANS AFFECTING SKATE FISHERIES

Because skate fisheries interact and overlap with so many other fisheries in the region, particularly fisheries on other bottom-dwelling species, it is important to consider skate management in the context of existing management plans and regulations that may already be indirectly affecting and/or constraining the skate fishery. Even without skate-specific management measures, some of the species caught in “directed” skate fisheries (little skate, for example) have either increased in abundance or remained relatively stable. This could be due to the indirect effects of management measures in other fisheries, as discussed below. Developing skate-specific management measures without considering existing management measures in other fisheries is not practical and would likely result in complex and conflicting regulations.

5.1.1 The Multispecies (Groundfish) FMP

The multispecies (groundfish) fishery and its regulations are likely to impact skates and skate fishing more than any other existing FMP. There is significant overlap between the groundfish and skate fisheries and the vessels that participate in these fisheries. It will, therefore, be extremely important to consider groundfish restrictions and their potential impacts when developing management measures for the skate fishery. The Council is currently in the process of developing Amendment 13 to the Multispecies FMP, which could implement substantial changes to the current groundfish management approach. These changes may (or may not) include new rebuilding timelines for overfished stocks, significant modifications to the groundfish year-round and rolling closures, a shift to an “area management” approach for groundfish, and/or allocation of resources to specific sectors of the fishery. As of the date of publication of this SAFE Report, the specific alternatives under consideration in Amendment 13 have not yet been identified. However, the details of Amendment 13 should be considered in the context of the development of the Skate FMP due to the significant interaction between the two fisheries.

One of the primary objectives for Amendment 13 is the development of rebuilding programs for those groundfish stocks that are overfished, and to reduce fishing mortality for stocks that overfishing is occurring. While the specific measures that will be adopted are not known at this time, meeting these objectives may necessitate changes that result in reduced groundfish fishing effort.

5.1.1.1 Multispecies DAS

The multispecies effort reduction program initiated in Amendment 5 and expanded in Amendment 7 requires vessels to fish under a multispecies days-at-sea (DAS) program. Multispecies DAS were initially allocated based on vessels’ groundfish fishing history; vessels had the option to either prove their history and receive an individual allocation of DAS or elect into the Fleet DAS category and receive a fleet average number of DAS. DAS were then reduced according to a schedule defined in Amendment 5, and then accelerated in Amendment 7. Ultimately, groundfish fishing effort was reduced 50% from the baseline levels that occurred before Amendment 5.

Current regulations require that any vessel fishing in the Gulf of Maine/Georges Bank and Southern New England Regulated Mesh Areas in federal waters with gear capable of catching multispecies must be fishing under a DAS unless it is fishing in an exempted fishery (see Section

5.1.1.5 for a discussion on applicable exempted fisheries). Some vessels target skates while fishing on a multispecies DAS because they are not fishing during a period or in an area of an exempted fishery. As a result, the multispecies DAS program directly restricts the time available for these vessels to fish for skates. Vessels fishing in the Mid-Atlantic Regulated Mesh Area are not required to fish under a DAS if they do not retain regulated multispecies.

5.1.1.2 Groundfish Closed Areas

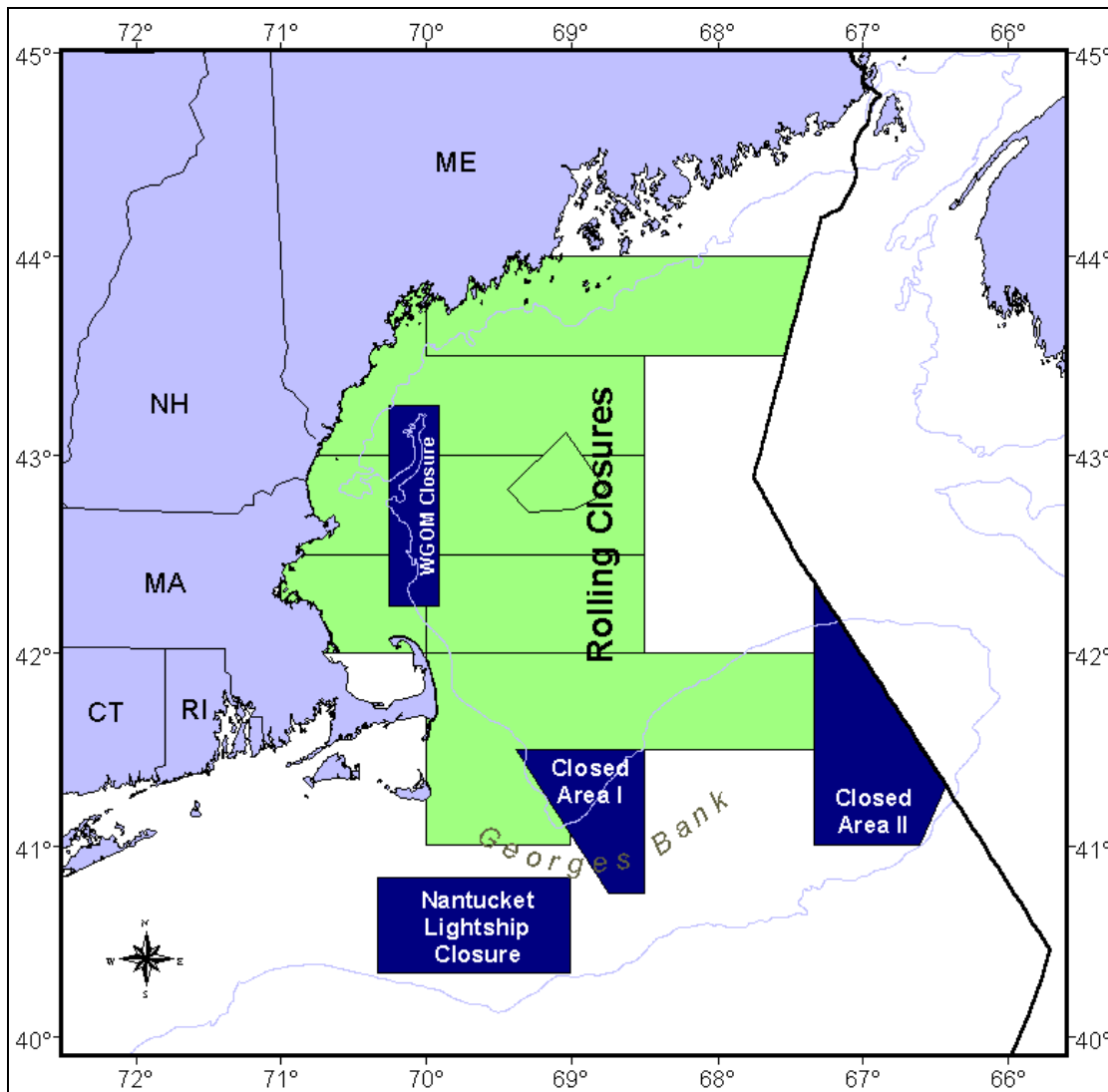
The multispecies FMP uses both seasonal and year round closed areas to reduce fishing mortality and protect spawning stocks of cod, haddock, and yellowtail flounder. The current primary year round closed areas are Closed Areas I and II on Georges Bank (CAI and CAII), the Nantucket Lightship Closed Area south of Cape Cod (NLCA), and the Western Gulf of Maine Closed Area (WGOM). CAI and CAII were first established as seasonal spawning protection areas under ICNAF, though the boundaries have changed over the years. In 1994, these areas were changed to year round closures in order to reduce fishing mortality. The NLCA was conceived as a closure to protect large concentrations of juvenile fish, but was also implemented as a year round closure in 1994. The WGOM was established in 1998 primarily to reduce fishing mortality on Gulf of Maine cod stocks. These area closures are illustrated in Figure 60. The year-round closures affect approximately 5,400 square nautical miles (sq. nm.).

This FMP also uses seasonal closures in the inshore Gulf of Maine to reduce fishing pressure on spawning components of groundfish, and to reduce overall fishing mortality. First implemented in 1998, the closures have been modified several times. These closures range in size from 600 sq. nm. to 5,400 sq. nm. Current closure boundaries are also shown in Figure 59. An additional seasonal closure on Georges Bank for one month in May closes approximately 4,800 sq. nm.

The existing groundfish closed areas provide a degree of protection to skates. The protection from the groundfish year round closed areas is likely to be more significant for skates than for most species because skates are relatively sedentary, similar to scallops. The seasonal closures are probably less effective at directly protecting skates. They do, however, also reduce fishing effort. To the extent skate are present during the closures, these areas probably provide some protection.

Figure 59 Current Northeast Multispecies Plan Closures

Rolling closures are seasonal; CAI, CAII, NLCA, and WGOM closures are year-round.



5.1.1.3 Multispecies Gear Restrictions

The Multispecies FMP uses a variety of gear restrictions. The primary gear measure is the specification of minimum mesh requirements for all gillnet and trawl gear. In the Gulf of Maine/Georges Bank and Southern New England Regulated Mesh Area, the minimum mesh size is 6 inch diamond or 6 and a half inch square mesh throughout the net. In the Mid-Atlantic Regulated Mesh Area, the minimum mesh size is 5 and a half inch diamond or six inch square throughout the net. In addition to mesh requirements, vessels that make day gillnet trips are limited to the number of nets fished. The maximum number of nets is 80 roundfish nets or 160 flatfish gillnets. Other gear restrictions include an area in the Gulf of Maine where trawl vessels may not use roller gear of more than 12 inches in diameter, and a limitation on the number of hooks used by hook gear vessels.

These regulations may have an impact on skate fishing mortality. Mesh size restrictions help to select fish of a certain size, and are usually designed to insure a certain percentage of fish of spawning age survive. While there are no known studies on the selectivity of mesh for skates, these restrictions undoubtedly have some impact on the size of fish caught. The restriction on number of nets used by day gillnet vessels may also limit the effort that is applied to the skate fishery. Finally, the roller gear restriction limits trawl vessels to certain bottom areas in the Gulf of Maine. The restriction is designed to make it difficult for trawl vessels to operate in areas with rocky or complex habitat. To the extent skates frequent those areas, this restriction may provide some protection to skate species distributed in the inshore Gulf of Maine (thorny and smooth skate).

5.1.1.4 Trip/Possession Limits

Possession limits are established for Georges Bank and Gulf of Maine cod, and Georges Bank Haddock. While these limits do not directly affect skate catch, one response of fishermen to the limits may help reduce skate mortality. Because possession limits are based on DAS use and are defined as a certain number of pounds allowed per DAS, some vessels start their DAS clock while still at the dock and let it run before beginning a trip. By "front loading" their DAS, these vessels can then retain more fish that are caught in a shorter period of actual fishing time. This has the effect of reducing the amount of time that gear is actually on the bottom, and may result in reduced bycatch of skates or other species. On the other hand, if fishermen react to the trip limit by targeting skates, or species that are co-located with skates, the trip limits may have the effect of increasing skate mortality.

5.1.1.5 Exempted Fisheries for Skate Fishing

Under the Multispecies FMP, an "exempted fishery" is one that the Regional Administrator has determined will result in a minimal bycatch of regulated multispecies and will not jeopardize fishing mortality objectives for multispecies. Specifically, the percentage of regulated multispecies bycatch must be less than five percent by weight of the total catch in the fishery. Exempted fisheries are exempt from one or more of the regulations specified in the Multispecies FMP (usually minimum mesh sizes and/or DAS usage). The fisheries listed below have met the exemption criteria and provide opportunities for skate fishing without requiring vessels to use a Multispecies DAS:

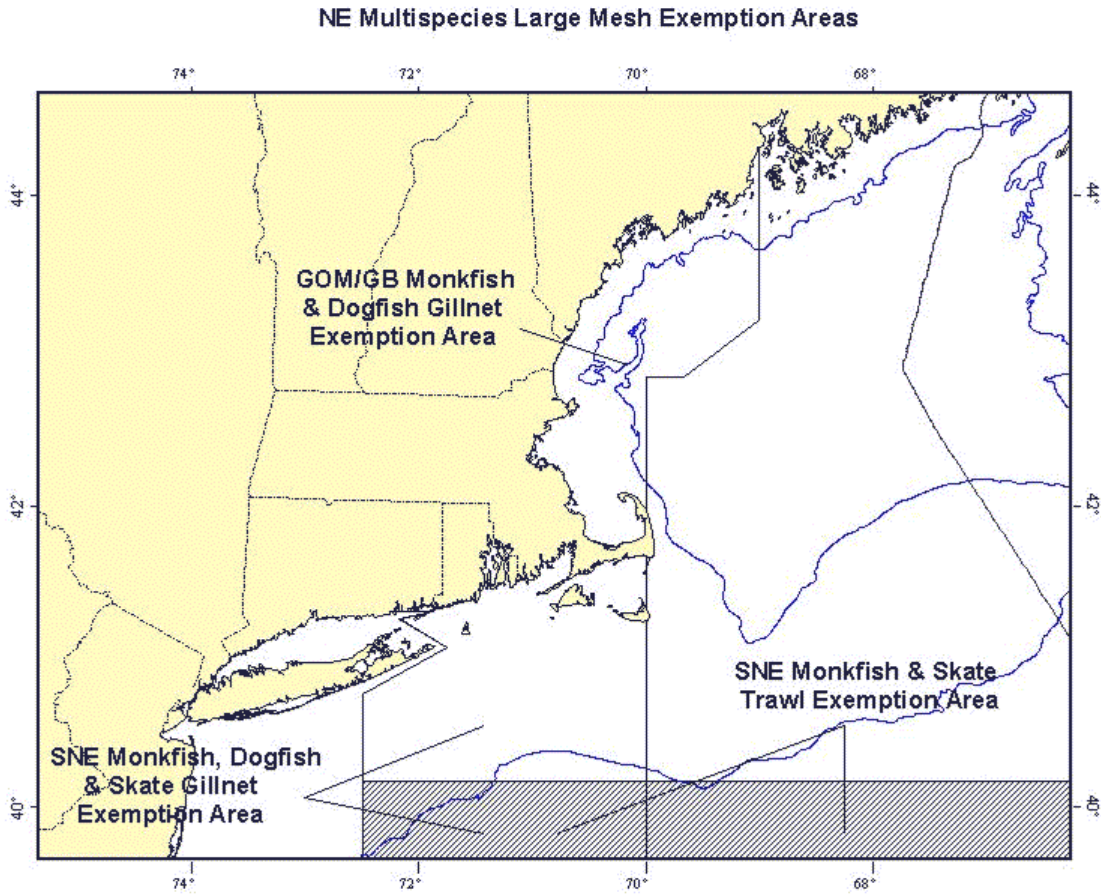
1. Southern New England Monkfish, Skate, and Dogfish Gillnet Exemption Area – allows a gillnet vessel to fish in the following area when not under a Multispecies DAS
 - Defined by a line running from the Massachusetts shoreline at 41°35'N latitude and intersection with the outer boundary of the EEZ, southwesterly along the outer boundary of the EEZ, and bounded on the west by the eastern boundary of the Mid-Atlantic Regulated Mesh Area (see Figure 60)
 - Gillnet gear only
 - Minimum mesh size of 10-inch diamond throughout the net
 - May fish for, possess, and land skates, monkfish, and southern New England exempted species and bycatch species. Southern New England exempted species include butterfish, dogfish (trawl), herring, mackerel, ocean pout, scup, shrimp, squid, fluke, whiting, and weakfish. Southern New England bycatch species include conger eels, sea robins, black

sea bass, red hake, tautog, blowfish, cunner, John Dory, mullet, bluefish, tilefish, longhorn sculpin, fourspot flounder, alewife, hickory shad, American shad, blueback herring, sea raven, Atlantic croaker, spot, swordfish, monkfish and monkfish parts – ten percent, by weight, of other species on board, and American lobster – up to ten percent, by weight, of other species on board or 100 lobsters for trips 24 hours or less and 200 lobsters for trips longer than 24 hours, whichever is less.

2. Southern New England Monkfish and Skate Trawl Fishery Exemption Area – allows a trawl vessel (otter trawl or beam trawl) to fish in the following area when not under a Multispecies DAS
 - Defined as the area bounded on the north by a line extending eastward along 40°10' N latitude and bounded on the west by the eastern boundary of the Mid-Atlantic Regulated Mesh Area (see Figure 60)
 - Trawl vessels only, otter trawl or beam trawl
 - Minimum mesh size of 8-inches square or diamond applied throughout the codend for at least 45 continuous meshes forward of the terminus of the net (all nets with smaller mesh must be properly stowed)
 - May fish for, possess, and land skates, monkfish, and southern New England exempted species and bycatch species (listed above).
3. Mid-Atlantic Regulated Mesh Area – Vessels fishing in the Mid-Atlantic Regulated Mesh Area are exempt from the 5% bycatch criteria and may therefore fish in any fishery without using Multispecies DAS, provided that they do not possess or land any regulated multispecies.

It is important to note that there may be vessels fishing in the above exempted fisheries without *any* federal permits. This is because skates currently are *not* federally-managed species, and vessels are therefore *not* required to possess a specific permit to fish for and/or land skates (see Section 3.2.1 for additional discussion of this issue). Vessels fishing in the Southern New England Monkfish, Skate, and Dogfish Gillnet Exemption Area, for example, would be required to obtain federal permits to possess monkfish and dogfish, but not skates. If a vessel wanted to fish exclusively for skates in this exempted area, it could do so without any federal permits, provided that it does not possess any federally-regulated species. It is unknown if any vessels are currently fishing exclusively for skates without any federal permits in these exempted areas, but this serves as one example as to why the VTR data is more likely to underestimate actual skate landings than the dealer weighout data.

Figure 60 Map of Current Skate Fishery Exemption Areas in Southern New England



5.1.2 The Lobster FMP

As previously discussed, activity in the directed skate fishery is linked to activity in the lobster fishery in that skates are a primary lobster bait, especially in offshore and southern New England regions. The industry has indicated that the demand for skates as lobster bait has increased over time and that the market could absorb additional landings of skates, as demand for skates as lobster bait is never fully satisfied. However, increasing restrictions in the lobster fishery could indirectly affect the skate fishery to the extent that the need for skate bait decreases. It is still too early to quantify the true impacts of recent lobster restrictions (discussed below) on the skate fishery, but it is important to consider these restrictions and their potential impacts when developing management measures for the skate fishery.

Current regulations for the lobster fishery include limited access permits, a minimum lobster carapace size, prohibition of the possession of certain lobsters (such as V-notched, berried or scrubbed lobsters) or parts (detached tails, etc), trap specifications (size, escape vents, marking, and tags), and landing limits for non-trap harvests. Of particular relevance to the skate fishery are some of the lobster management measures which were implemented in 2000, including the establishment of six lobster management areas and their associated restrictions. There is a maximum carapace size of five inches for lobsters harvested from Management Area 1, which is the inshore area from approximately Provincetown, MA north. In contrast, there is no maximum carapace size limit associated with the other management areas such as the large offshore area (Area 3), or other relatively nearshore areas. Vessels which indicate to NMFS that they intend to use traps to fish for lobsters must designate one or more EEZ management areas in which they intend to fish traps. The various management areas have different trap limits (maximum number of traps allowable) associated with them. The nearshore management areas have relatively low trap limits associated with them (800 traps in Area 1 versus 1,800 traps in Area 3). A vessel owner may designate several management areas in which to fish, but must then abide by the most restrictive trap limit of the areas designated (regardless of where the fishing occurs).

The most likely means by which lobster regulations may have an indirect effect on the skate fishery is that a change in fishing patterns in the lobster fishery caused by lobster regulations could cause a change in the patterns of use of skate as a bait for lobster traps. If recent restrictions in the number of lobster traps cause a reduction in the total number of lobster traps fished, then it is possible that such a reduction could result in a decreased demand for skate used for bait in the lobster fishery. This potential effect on the skate fishery is indirect and dependent upon a reduction in numbers of lobster traps which are baited with skate.

5.1.3 The Atlantic Sea Scallop FMP

The bycatch of skates in the sea scallop fishery may be a concern, especially for larger-sized species occurring in offshore regions (winter, barndoor, and thorny skates). In this context, it is important to consider existing scallop management measures that reduce the amount of bycatch in the sea scallop fishery. These measures are not directed at reducing skate bycatch specifically, but to the extent that overall bycatch in the scallop fishery is reduced, skate bycatch is likely to be reduced similarly. The following list describes existing management measures in the Sea Scallop FMP that are designed to reduce bycatch:

- The FMP has reduced fishing effort from 51,000 DAS in 1991 to 27,000 DAS in 1998 and remains at low levels to promote scallop rebuilding. The decrease in DAS reduces total fishing effort which, in turn, reduces total bycatch. According to the estimates in Framework Adjustment 12, the projected DAS use in 1999 was 24,800 DAS without access to Closed Area II and 19,600 DAS with access. The reduction in DAS use is related to the automatic 10-day accumulation for Closed Area II trips (i.e. tradeoff).
- Mesh in twine tops (one of the primary modes of finfish escapement) has increased from 5-inches in 1991 to the current 8-inch regulation. In December 1999, the minimum twine top mesh increased from 5½-inches to 8-inches in all areas, specifically to reduce bycatch and partly compensate for the expected bycatch increase in the Georges Bank closed groundfish areas. From a limited study on bycatch reduction, Henriksen et al. (1997) estimated a 34-41 percent reduction in yellowtail flounder bycatch, with little reduction in scallop catch. Other reductions in finfish bycatch, especially other flatfish, were noted but not estimated. The larger minimum mesh remains in effect in all areas. In the Georges Bank groundfish closed areas, the minimum twine top mesh increased to 10-inches, an increase made possible because large scallops in the closed areas are less likely to escape the dredge like the smaller scallops in open areas would do. DuPaul (1999) studied the effects of using 12-inch twine tops, but not 10-inch twine tops. Bycatch reduction was significant, but there were considerable reductions in scallop catches as well. Henrickson et al. (1997) estimated a reduction of 30 to 63 percent in yellowtail flounder bycatch, but also a considerable reduction in scallop catch. This research was conducted where scallops were smaller than those expected by Framework Adjustment 11 in Closed Area II, however.
- Amendment 4 (1994) also reduced the use of chafing gear (cookies, donuts, etc.) in the dredge and increased ring size from 3-inches to 3½-inches. Both changes make the dredge lighter and offer more opportunity for escapement by finfish and small scallops.
- Although not formally part of the Sea Scallop FMP, the limited ability to fish in the groundfish closed areas and the inaccessibility of the Habitat Area of Particular Concern (HAPC) for cod, measures that are implemented via the Multispecies FMP, may have significantly reduced the bycatch of important groundfish species and possibly monkfish and skates. On the other hand, these closures intensify scallop fishing effort elsewhere making other finfish (including some groundfish species) more susceptible to scallop fishing because their distribution lies outside of the closed areas.

Although bycatch and bycatch mortality reduction are difficult to quantify, the effects of the above management measures should not be underestimated. Since sea sampling on scallop fishing vessels is rare, it has been impossible to monitor and estimate the cumulative effect of these changes on bycatch and bycatch mortality reduction. However, these changes are likely to have had significant effects that should be recognized for their value in reducing bycatch and bycatch mortality.

In addition to existing management measures, the Council is considering an area rotation strategy for future sea scallop management. This strategy could be incorporated into Amendment 10 to the Sea Scallop FMP. An area rotation approach to managing sea scallops, by itself, could have a conservative effect and reduce total bycatch in the scallop fishery. In addition to increasing yield-per-recruit, area rotation is expected to increase the density of scallops in areas where

fishing occurs. This, in turn, would reduce the amount of fishing effort associated with the target fishing mortality rates in the FMP. As a result, the amount of time actually fished under an area rotation strategy could be less than that conducted without area management. It will be important to monitor the progress of Amendment 10 and the potential shift to an area management approach.

5.1.4 The Monkfish FMP

Because monkfish is harvested with the same types of gears as skates and groundfish, there is an unknown degree of overlap between the skate fishery and the monkfish fishery. Table 38 – Table 42 suggest that the discard of skates in some monkfish fisheries may be substantial. It is therefore important to consider existing management measures in the monkfish fishery that are designed to reduce fishing effort and the bycatch of both target and non-target species. To the extent that these management measures are effective in reducing overall effort and bycatch, skate bycatch in the monkfish fishery should be reduced similarly. It will be important to consider these management measures and their potential impacts when developing specific management measures for the skate fishery.

The monkfish fishery is predominately a bycatch fishery. According to the EIS prepared for the fishery management plan in 1998, 70 percent of monkfish landings are on trips where monkfish contributes less than 50 percent of total trip revenues. For the remaining trips (where monkfish contributes more than 50 of trip revenues), skate bycatch amounted to 4.1 percent and 1.2 percent of total landings in the Northern Fishery Management Area (NFMA) and Southern Fishery Management Area (SFMA), respectively, during the 1991-1994 period, according to NMFS weighout data. The Monkfish FMP, which took effect in November 1999, implements a rebuilding program that consists of:

- a limited entry program
- DAS limits (40)
- trip limits (including on directed trips in the SFMA)
- minimum mesh sizes (10 inch diamond and 12 inch square on trawls, 10 inch gillnets)
- limits on the number of gillnets, and
- default measures in Year 4 (2002) calling for zero monkfish DAS, unless modified by framework action.

While current estimates of skate bycatch on monkfish trips are not available, the overall impact of the management program under the FMP should significantly reduce the amount of skates caught.

5.2 MANAGEMENT CONSIDERATIONS FOR DEVELOPMENT OF A SKATE FMP

The Skate PDT identified some issues to consider while developing appropriate management measures for a Skate FMP. These issues are discussed generally below.

Overfishing Definitions: Developing overfishing definitions for the northeast skate complex consistent with the Sustainable Fisheries Act will be a challenge for the Skate Committee and the Council. The data and research needs identified in Section 4.0 illustrate how important it is to obtain more detailed, comprehensive biological and commercial fishery data for each of the seven species in the northeast complex. Currently, the species composition and size structure of landings are unknown. The true level of discards and the discard mortality rate are unknown. Life history data are uncertain for winter and little skate and incomplete and totally lacking for five species. A lack of information on the stock structure of the species in the skate complex has increased the uncertainty of conclusions about historical trends in abundance and recommendations of appropriate biological reference points. Age-based methods for determining mortality rates and estimates of longevity for each of the species are preferred, but such an approach will require several years of future adequate length and age sampling, both from the commercial and research survey catches.

Currently, it is not possible to develop fishing mortality and biomass-based overfishing definition reference points for each of the seven species in the northeast complex. The proposed SFA biomass reference points developed by the SARC at SAW 30 are based on selected time periods of survey indices, but it is unknown how these relate to true estimates of B_{MSY} . Until more complete scientific information is available for each of the seven species in the northeast complex, the Council may want to consider alternative, yet precautionary approaches to developing overfishing definition reference points. Such approaches may include exploration of an aggregate, survey-based abundance threshold for the complex (possibly coupled with minimum thresholds for each species), reference points for small-sized skates and large-sized skates, or reference points for northern skates (little, winter, thorny, smooth, barndoor) and southern skates (clearnose, rosette). None of these approaches have been fully considered to date, and any alternatives that the Committee or Council explores would need to be assessed by the PDT and would be subject to scientific review (possibly through the SARC or SSC).

Bycatch Issues: Preliminary assessment of available fishery data suggests that the decline in abundance of some species of skates may be the result of bycatch mostly in non-directed skate fisheries. Little skate, winter skate, thorny skate, and to a lesser degree, barndoor skate are known to be caught in at least one directed skate fishery (winter skate is caught in both directed fisheries for skates). Sharp declines in abundance are evident across the survey time series for barndoor and thorny skate, and this is likely due (in part) to the biological characteristics of the larger-sized skates (slower growth rates, lower fecundity, etc.). Downward trends in abundance of these two species were occurring during the 1970s and 1980s before the fishery for skate wings expanded. The abundance of another large-sized species, winter skate, increased to peak levels during the 1980s (as groundfish effort increased to peak levels), and then declined significantly during the 1990s. Recently, however, winter skate abundance has been increasing, even as effort in the directed skate fisheries has reportedly remained stable or perhaps increased.

The decline of one species in particular can possibly be attributed to bycatch. Smooth skate, a small-sized species, is not known to be targeted in any directed skate fisheries, nor is it known to be a component of the commercial skate landings. The abundance of smooth skate was highest during the early 1960s and late 1970s and was relatively consistent between 1985 and 1995.

Recently, smooth skate abundance has decreased to levels below the proposed biomass threshold, indicating that the stock is overfished. Since it is not landed as a component of any directed fishery or as incidental catch in non-directed fisheries, it can be assumed that the decline in biomass of smooth skate is, at least in part, due to bycatch.

Available information about the skate wing fishery suggests that not only do some vessels target skates for wings on a seasonal basis, but also that a significant component of the fishery is an incidental catch fishery. While fishing for groundfish, monkfish, and scallops, for example, vessels may keep the larger skates they catch incidentally to cut and sell the wings (depending on the market and the price). Smooth skate, distributed primarily in the Gulf of Maine, is likely to be caught incidentally in these fisheries. Because of its small size, its wings are not large enough to be cut for the wing market. Low prices make keeping small skates for the lobster bait fishery not profitable enough for vessels that catch a small amount of them incidentally. The directed skate bait fishery is primarily a southern New England fishery anyway, and the distribution of smooth skate prevents it from being a significant component of the bait skate catch.

In summary, most of the current overfishing problems associated with the northeast skate complex are in the Gulf of Maine. This is the region in which it is assumed that a significant component of the wing fishery is occurring. The wing fishery is, in part, an incidental catch fishery for vessels targeting groundfish, monkfish, or scallops. Smaller-sized species like smooth skate, whose wings are too small for the market, are likely to be discarded in both the directed and non-directed skate wing fishery in the Gulf of Maine. Rebuilding smooth skate will likely require, to some extent, reducing its bycatch. This should be explored in more detail as the Committee develops management measures for a Skate FMP.

Small Skates/Big Skates: For the most part, skates are thought to be particularly vulnerable to exploitation because of their large size, slow growth rates, late maturity, low fecundity, and large size at birth. These life history traits result in low rates of reproduction and low potential rates of population increase, as illustrated by the consistent downward trends in abundance across the time series for species like barndoor skate.

Some studies of skate complexes in other regions have observed declines in the abundance of larger-sized species accompanied by increases in the abundance of smaller-sized species. As an aggregate, the abundance of the complex may appear stable, masking the decline of some of the larger-sized species. One theory for this phenomenon is that once the larger-sized skates are removed from the population, the smaller-sized skates can flourish due to increased food availability (Dulvy et al, 2000). This has also been cited as one reason for the overall shift from a finfish (groundfish) dominated ecosystem to an elasmobranch dominated ecosystem in the northeast region (Gulf of Maine and Georges Bank).

Taken as a group, the skate biomass for the seven species in the northeast region is at a medium level. For the aggregate complex, the NEFSC spring survey index of biomass was relatively constant from 1968 to 1980, and then increased significantly to peak levels in the mid- to late-1980s. The biomass of large-sized skates has steadily declined since the mid-1980s. The recent increase in aggregate skate biomass (since 1995) has been due to an increase in small-sized skates, primarily little skate. Significant additional work needs to be completed to fully

understand skate feeding preferences and the dietary overlap of species in the northeast complex as well as other finfish species in the Gulf of Maine/Georges Bank/southern New England ecosystems. However, it will be important to consider the shifts in species composition of the northeast complex and monitor the status of each of the seven species individually to ensure that a significant decline in the population of one species is not masked by an increase in the population of another species of skate. This will be particularly critical for the larger-sized species.

Limited Access: Fishery managers consider limiting access to fisheries when fishing effort jeopardizes high levels of sustained yield. High industry profits or diminished options in other regulated fisheries attracts vessels into a fishery until vessel profits there decline and fishery resources are depleted. Limited access regulates the number of vessels in a fishery in order to avoid this eventuality. Fishermen without a limited access permit are excluded from the fishery unless there is some mechanism, such as market sales, that allows for transfers or exchange (turnover). Experience in the groundfish, sea scallop, monkfish, and spiny dogfish fisheries demonstrates how delays in limiting access to a fishery can affect the bottom line for individual fishermen when regulations that meter out fishing opportunities are allocated.

Limited access is but one tool for fishery managers, and it is not a panacea. A drawback of relying solely on limited access to regulate against overfishing is that fishermen can “stuff” labor, gear, and other capital on vessels in order to increase their fishing power. This behavior causes managers to react with a host of regulations such as effort controls, crew size limits, and area closures which as supposed to constrain fishing effort.

The directed skate bait fishery is a legitimate candidate for limited access. There also appears to be a small directed skate wing fishery that targets skates for at least part of the year. Limited access is not a viable option where skate catches are truly incidental (as opposed to an intended target in a mix of species).

Individual Fishermen’s Quotas (IFQs): IFQs take limited access a step farther by allocating a share of total allowable landings (TALs) to fishermen in the limited access fishery. Although still controversial, IFQs are finding greater support among fishermen, regulators, and politicians around the U.S. after being favorably reviewed recently by the National Academy of Sciences. NMFS has endorsed Council use of IFQs provided that Councils take measures that preclude both concentration of landings shares among few fishermen and monopoly (e.g., fishermen) or monopsony (e.g., processors) power in dockside and other fish markets. In addition, Councils should consult interested parties on allocation and transferability issues.

Although not inconceivable, IFQs have not been implemented to regulate the incidental harvest of species in any U.S. fishery. If implemented in directed skates fisheries, quota holders could sell or lease amounts to fishermen in other fisheries where skates are caught incidentally. This is an alternative to using inflexible bycatch limits and would result in a more efficient outcome for all fisheries concerned. A significant impasse to this policy at this time, however, is the need to calculate skate TALs, possibly on a species basis.