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# MONKFISH FISHERY MANAGEMENT PLAN

October 23, 1998

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and the  
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In coordination with the  
L MARINE FISHERIES SERVICE

Draft Submitted: February 20, 1997

Final submitted: September 17, 1998

Final rules published:

# **COVER SHEET**

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## **3.0 HISTORY AND DESCRIPTION OF ISSUES**

### ***3.1 Background***

#### **Initial concerns**

Recent U.S. landings of monkfish have increased dramatically in response to an increase in the market value of the species in combination with the decline in abundance of traditional target species. Most monkfish are taken as incidental catch (aka bycatch) in the Northwest Atlantic groundfish and scallop fisheries, although directed effort is increasing. Directed effort is occurring in both deepwater (100-150 fathoms) by otter trawls and in shoal waters by gillnets and scallop dredges.

When the Councils were first considering potential management steps for monkfish, landings of monkfish tails had increased markedly since the mid-1980s when they averaged 2.5 mt (5.5 million pounds, Figure 2). In 1992, the landings of tails increased to a record high 4.6 mt (10.3 million pounds, Figure 2). These high levels occurred because of increasing directed fishing effort and increasing fishing effort for groundfish and scallops which occurred throughout the mid- to late-1980's. Most landings (80%) come from bycatch in the groundfish and scallop fisheries. During the early phases of developing a management plan, increases in monkfish fishing effort pushed the directed catch to nearly 30% of total monkfish landings. This increase in directed effort has been observed in the 1990 data from both trawl and scallop dredges. The geographical range of directed effort by fishermen using these two gear types was different (Figure 1), but generally occurred in deeper waters. Directed fishing activity continued during the 1991-92 fishing season, abated during 1992 when prices fell, but then expanded as price increases resumed. Directed fishing with gillnets had also become more prevalent. Interest in fishing for monkfish was fueled by the valuable liver market (709,000 pounds at \$3.66 in 1992, Table 2) and increasing market acceptance of small monkfish tails. This trend was expected to continue, especially from fishermen seeking alternatives to the traditional scallop and groundfish fisheries that would be subject to new fishing regulations.

#### **Industry request for management action**

Fishermen and fish dealers related their concerns about the monkfish fishery to both the New England and Mid-Atlantic Fishery Management Councils during 1991 and early 1992. They cited the increasing amount of "small" and "peewee" category tails being landed, the more frequent gear conflicts between monkfish boats and other fishermen, and the expanding directed trawl fishery as problems.

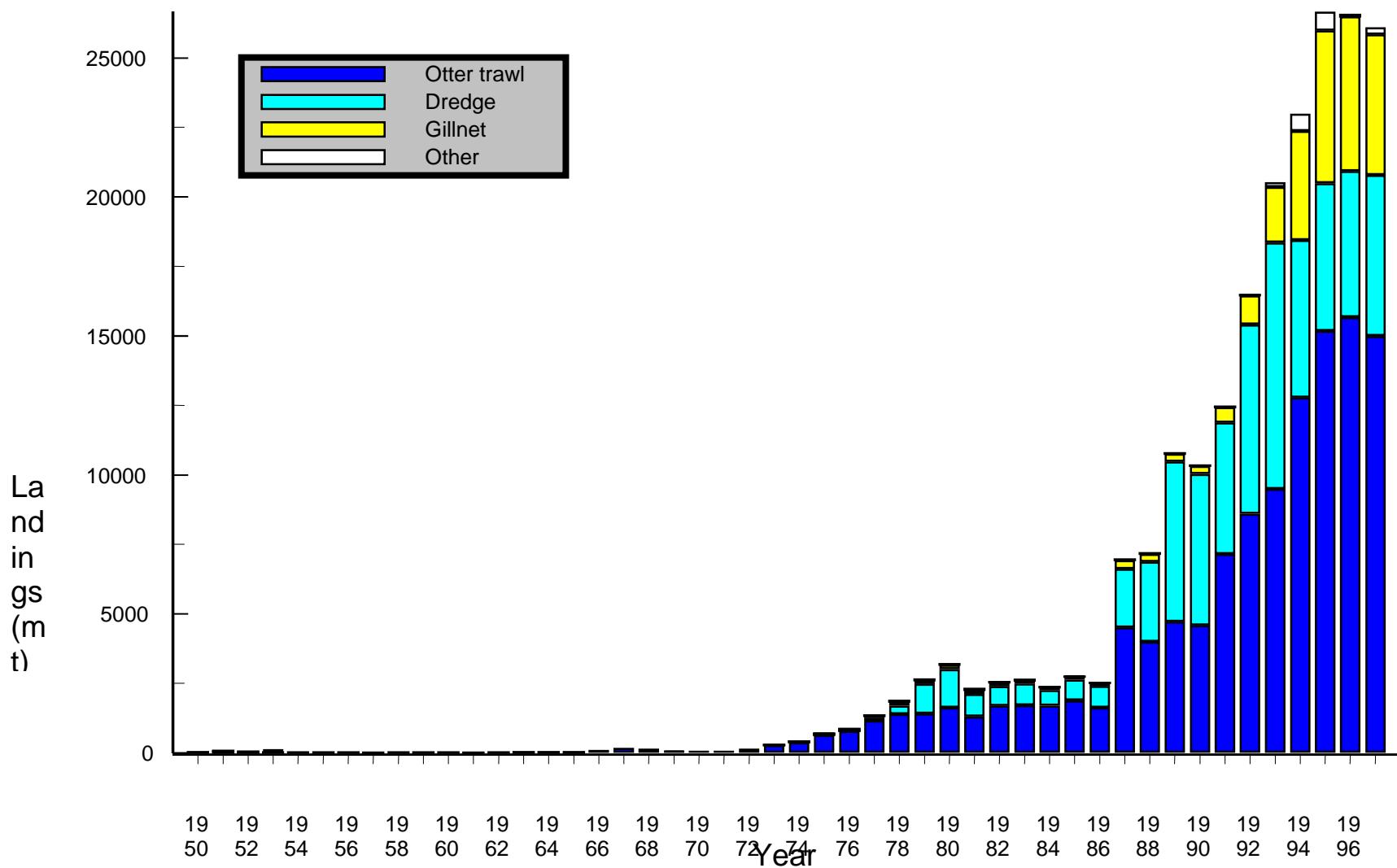


Figure 1. Monkfish landings (live weight) by major gear type, 1950-1997. Source: NMFS - <http://remora.ssp.nmfs.gov/commercial/landings/index.html> as of April 27, 1998.

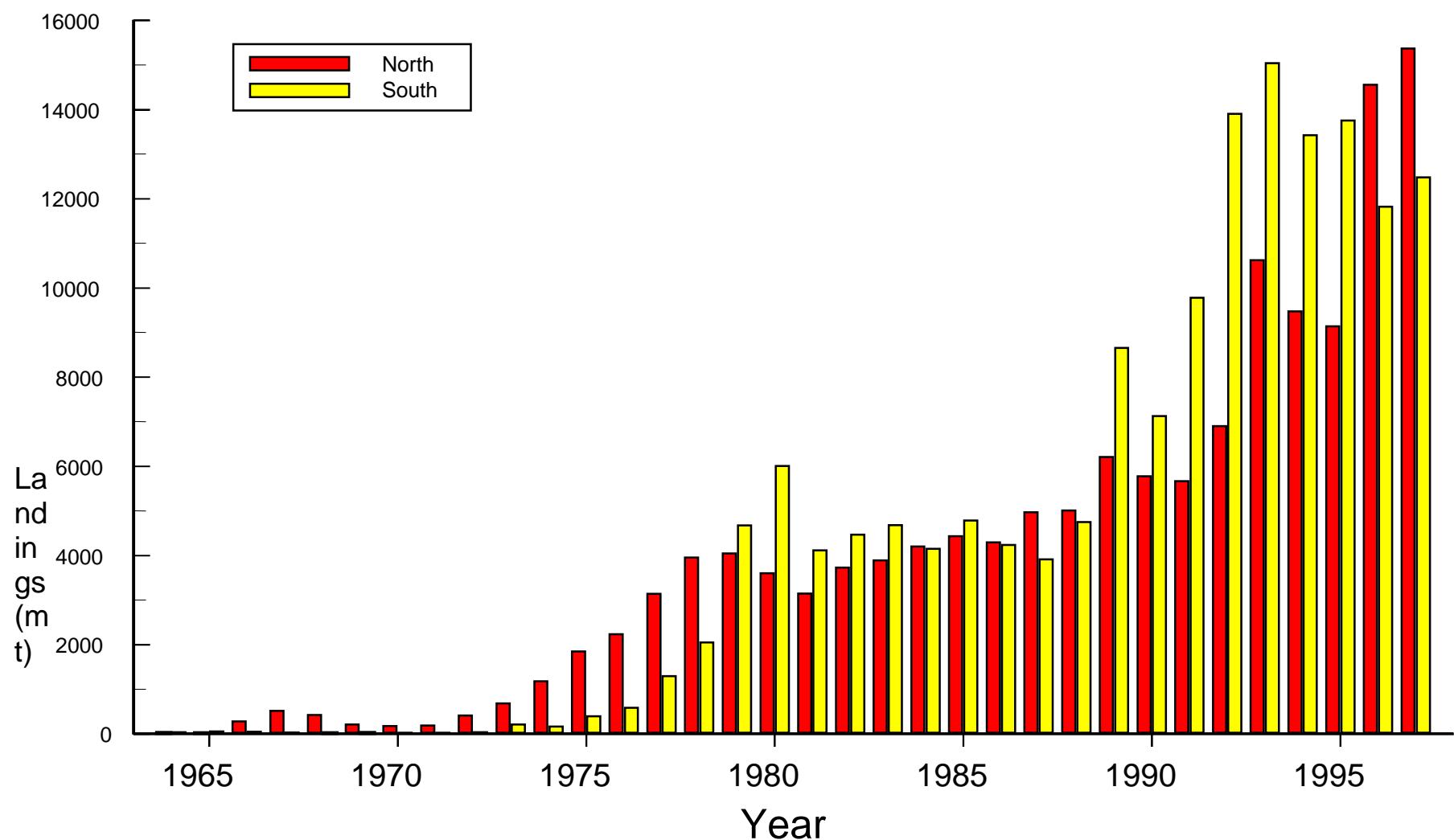


Figure 2. Monkfish landings by proposed management areas. Landings for 1997 are apportioned by the ratio of landings in 1996. Source: NEFSC 1997 for 1964 to 1995; landings from dealer data in 1996 was apportioned by reported landings by area fished from vessel trip reports.

**Table 1** Monkfish landings and revenue, 1964 to 1997. Source: NMFS weighout and dealer data.

Year	Total live weight (million lbs.)	Total live weight (mt)	Total ex-vessel revenue (million \$)	Price per pound (live weight)	Price per pound (tail weight)
1964	0.1	0.0	0.0	\$0.01	\$0.03
1965	0.1	0.0	0.0	\$0.01	\$0.03
1966	0.7	0.3	0.0	\$0.02	\$0.07
1967	1.2	0.5	0.0	\$0.02	\$0.08
1968	1.0	0.5	0.0	\$0.02	\$0.07
1969	0.6	0.3	0.0	\$0.02	\$0.06
1970	0.5	0.2	0.0	\$0.02	\$0.05
1971	0.5	0.2	0.0	\$0.02	\$0.06
1972	1.0	0.5	0.0	\$0.02	\$0.06
1973	1.9	0.9	0.1	\$0.03	\$0.11
1974	2.9	1.3	0.1	\$0.04	\$0.13
1975	4.7	2.1	0.3	\$0.06	\$0.20
1976	5.9	2.7	0.6	\$0.10	\$0.32
1977	8.8	4.0	1.0	\$0.11	\$0.36
1978	11.5	5.2	1.2	\$0.10	\$0.34
1979	16.3	7.4	2.0	\$0.12	\$0.40
1980	16.9	7.7	2.6	\$0.16	\$0.52
1981	12.2	5.5	2.2	\$0.18	\$0.60
1982	16.6	7.5	2.8	\$0.17	\$0.56
1983	17.6	8.0	2.8	\$0.16	\$0.53
1984	17.4	7.9	3.1	\$0.18	\$0.60
1985	19.3	8.8	4.3	\$0.22	\$0.73
1986	18.4	8.3	6.8	\$0.37	\$1.24
1987	19.2	8.7	9.6	\$0.50	\$1.67
1988	21.1	9.6	10.1	\$0.48	\$1.60
1989	32.4	14.7	12.8	\$0.39	\$1.31
1990	28.6	13.0	13.2	\$0.46	\$1.53
1991	34.2	15.5	21.8	\$0.64	\$2.11
1992	46.0	20.9	20.7	\$0.45	\$1.50
1993	56.7	25.7	21.7	\$0.38	\$1.27
1994	50.6	23.0	26.1	\$0.52	\$1.71
1995	58.8	26.7	36.5	\$0.62	\$2.06
1996	58.5	26.5	32.3	\$0.55	\$1.83
1997	57.5	26.1	NA	NA	NA

**Table 2.** Landings of monkfish livers, 1982 to 1997. Source: NMFS weighout and dealer data.

Year	Liver weight (million pounds)	Liver revenue (millions \$)	Liver price per pound
1982	0.022	0.0	\$1.00
1983	0.026	0.0	\$0.88
1984	0.055	0.1	\$1.15
1985	0.062	0.1	\$1.11
1986	0.08	0.1	\$1.65
1987	0.119	0.3	\$2.63
1988	0.249	0.8	\$3.37
1989	0.323	1.2	\$3.77
1990	0.396	1.6	\$4.03
1991	0.598	2.5	\$4.16
1992	0.709	2.6	\$3.66
1993	1.014	3.9	\$3.80
1993	1.014	3.9	\$3.80
1994	1.006	5.2	\$5.20
1995	1.102	5.5	\$5.00
1996			
1997			

### Early Council efforts

During 1991, both the Mid-Atlantic and New England Councils requested approval from the Regional Administrator to develop a management plan for monkfish. The Regional Administrator suggested that the Councils convene a joint committee to evaluate prospects for managing this fishery. That committee found that there were sufficient reasons for concern and that the Councils should jointly develop a management plan for monkfish. Those reasons included the recent declines in survey indices, the declining size of tails being landed, the potential for shifts in effort due to management restrictions on other species, evidence of an expanding directed fishery, and a rapidly growing market for monkfish tails and livers.

The Councils gave the joint monkfish oversight committee two charges: a) to work with the fishing industry to facilitate a resolution to the problematic gear conflict in Southern New England and b) to initiate the development of management measures for monkfish.

During 1992 and 1993, the Councils took steps to resolve the offshore gear conflicts between trawlers, many fishing for monkfish, and fixed gear fishermen, e.g. lobstermen. Several meetings with industry advisors led to a gear conflict resolution, in the form of a written voluntary agreement by fishermen in the offshore waters. This resolution had provisions for communicating at sea, returning gear that was inadvertently damaged, and setting aside areas for certain fishing gear on a seasonal schedule. After this agreement was developed, the gear conflict issue was transferred to a different Council oversight committee, so the monkfish committee could focus on developing management measures.

### Scoping hearings

While they worked on the gear conflict issue, the Councils also discussed the various problems and proposed various potential management responses. These problems and options were presented at scoping hearings

on February 11, 1993 in Warwick, RI and on March 2, 1992 in Philadelphia, PA. During these hearings, it was obvious that many management measures were unworkable because of insufficient data to define the proper limits or because the industry felt that they would be ineffective. There was, however, wide industry support for a minimum size to protect the resource and to improve the monkfish markets.

A number of fishermen also supported a limit to prevent fishermen from cutting livers from undersized fish. They indicated that conditions often varied, but a 20 to 30 percent limit compared to tail landings by weight was acceptable. These comments were considered by the Councils, and although the supported options would not fully protect the resource it was recognized that they would form a significant first step to management until other options were developed.

### **State management actions**

Many fishermen urged the Councils to quickly develop and implement simple management regulations to protect the resource. A minimum size limit was overwhelmingly supported during the initial scoping hearings. After discussing the options, the Councils decided that the states could implement landings regulations much quicker than the Councils could develop a fishery management plan and have an FMP approved by the Secretary of Commerce.

Because of the concern over rapid deterioration of the resource while these small fish were being caught, the Councils desired to implement some conservation measure using the most expedient procedure. Because of the lengthy FMP process and the reluctance of NMFS to promulgate emergency regulations for species which do not have governing FMPs, the Councils requested coastal states from North Carolina through Maine to implement landings and/or possession limits for monkfish that will dovetail with the management measures under development. This effort was seen as the most expedient way to improve conservation of monkfish while the more lengthy FMP development process was underway. To date, NJ, NY, CT, RI, MA, and NH have implemented an 11-inches minimum tail length (17 inches minimum whole fish length), and a 25 percent liver to tail landings ratio per trip restriction.

### **Draft Fishery Management Plan**

Although the Council met twice since scoping hearings to discuss and refine the management goals, strategy, and proposed measures, progress in developing this preliminary Monkfish FMP was hampered by Council progress on major amendments to the Multispecies, Atlantic Sea Scallop, and American Lobster FMPs. Nonetheless, a draft Monkfish FMP was developed by the joint monkfish oversight committee based on industry support for simple, effective management measures. The Council staff developed a draft document containing preferred and non-preferred alternatives and submitted it to the oversight committee on August 4, 1994.

The committee and advisors reviewed portions of the initial draft FMP, especially the objectives, the overfishing definition, the management measures, and their relation to measures recently implemented by the states. The committee determined that the goals needed a wider scope to address potential effort shifts from groundfish, scallops, and summer flounder. It was suggested that this effort shift might be alleviated and mortality reductions accruing from groundfish and scallop management could be justified if additional limits were added to the multispecies and scallop plans. These limits would prohibit vessels from using groundfish and scallop gear to fish for monkfish on traditional groundfish and scallop grounds unless they were fishing under the days-at-sea program.

The committee was also informed that, given the provisional definition of overfishing, that monkfish may be overfished. The committee determined that the proposed management measures may need to be revised if monkfish are overfished and that a planned review of the overfishing definition by the Groundfish PDT would provide guidance to the committee.

The Groundfish PDT reviewed the proposed overfishing definition for monkfish on September 13, 1994, but was unable make a specific recommendation at that time. While the PDT thought the proposed definition was viable, re-analysis under different assumptions and additional data was needed.

The PDT did, however, conclude that the management measures in the draft FMP were insufficient to prevent overfishing, even in the short-term. It concluded that a management plan that was not expected to prevent overfishing would violate National Standard 1 and it would not, therefore, receive favorable review.

### **Comprehensive plan/amendment**

The joint monkfish oversight committee met on September 26, 1994 and discussed the PDT's conclusion. It decided that a more comprehensive strategy was needed to manage monkfish and prevent overfishing.

To lay the groundwork for this expanded management program, the committee added an additional goal: to maximize the economic benefits to various fishery sectors. It also identified three FMP strategies that would apply under various resource conditions. When the monkfish resource was near full exploitation, increases in fishing mortality from directed fishing effort would be allowed to replace the observed reductions in fishing mortality caused by existing restrictions on the by-catch or mixed-trawl fisheries (scallops, groundfish, and summer flounder). Capping current directed fishing effort and achieving reductions in mortality through existing regulations on fisheries where monkfish was a by-catch would apply when the monkfish resource became overfished. If the resource was greatly overfished, the management strategy would be to reduce fishing mortality through reductions in the directed monkfish fishery.

Based on the above technical advice from the Groundfish PDT, the committee reviewed the full range of management measures that might apply to the monkfish fishery. A wide variety of management measures, either operating in isolation or combined with other measures was discussed (Section 6.2). The committee identified two preferred alternatives and directed the Council staff to analyze these measures for review. Both of these alternatives included the management measures that formed the preferred alternative in the previous draft FMP.

One preferred alternative that was identified had the following characteristics: a combined quota for by-catch or mixed trawl/dredge/gillnet fisheries and limited access to the directed fishery for monkfish. The by-catch or mixed species fisheries would also be controlled by a trip limit under the Monkfish FMP. All monkfish landings by vessels having a permit to participate in the directed fishery would be counted against the quota.

A second preferred alternative for the draft FMP and public hearing document was also identified as having a limited access program for the directed fishery and a directed fishery quota. All monkfish landings by vessels whose revenue derived from monkfish (tail and liver) landings exceeded a certain percentage of the total trip's value would be counted against the directed fishery quota, regardless of whether a vessel had a permit to participate in the directed fishery for monkfish. A trip limit would not apply to any fishery, however, until after the directed fishery quota was reached. Once that occurred, a trip limit would apply to all vessels fishing for other species.

### **Trip limit alternatives**

One of the early difficulties with the committee's proposal was how to segregate and manage fisheries that depended on monkfish as a targeted catch versus fisheries that had a monkfish bycatch. Although it was attractive to determine who was targeting monkfish by the proportion of total revenue from monkfish landings, the Councils recognized the problems with managing the fisheries on this basis. The obvious conclusion was to examine the landings of the various fisheries and define them by the amount of monkfish landed per unit of effort (trips or days-at-sea).

The Councils examined the landings of monkfish by gear, area, and permit category to derive proposed trip limits for fisheries with monkfish bycatch. The purpose of these proposals was to discourage targeting of monkfish by vessels that relied on other species, and control the number of vessels and their monkfish catch in a directed fishery. Reductions in bycatch mortality would later be achieved in these fisheries through regulations intended to achieve effort and mortality reductions for groundfish, sea scallops, and summer flounder. The Councils also wanted to prevent extensive discarding resulting from abnormally low trip limits.

## **Public meetings**

Specific trip limits were proposed at the following three public meetings to seek industry comments on whether the trip limits would be sufficient to allow fishermen to land customary bycatches of monkfish, while discouraging targeting monkfish under a trip limit:

July 19, 1995 in Fall River, MA  
July 25, 1995 in Longbranch, NJ  
August 3, 1995 in Portsmouth, NH

Although there were some controversial issues raised (scallop dredge trip limits and mixed fishery trip limits), many fishermen and industry representatives believed the proposed trip limits were appropriate for monkfish landed as a bycatch. There was considerable disagreement, however, about when monkfish were targeted within a trip or when they were targeted as part of a catch of mixed species.

## **Restructuring Federal fishing regulations: Effect on monkfish management**

NMFS announced its intentions to streamline and condense Federal regulations governing fisheries during the late summer of 1995. These efforts were to reduce the number of Parts within 50 CFR by combining regulations for the fisheries in the Northeast region of the U.S. Some fishery management plans would be withdrawn from Federal management authority and additional species to be managed would, in the future, be included within existing FMPs.

At the September 1995 Council meeting, the Northeast Regional Administrator told the New England Council that management measures for monkfish should be appended to an existing plan. Although the RA thought that there would be benefits from using existing management measures, he advised that separate management measures would be acceptable to address issues unique to the monkfish fisheries.

Subsequently the Council concluded that it would be more appropriate to append monkfish management measures to the Multispecies FMP via an amendment to the plan. The new initiative, however, re-focused the Councils' attention on the relationship between monkfish management and the management of other, related fisheries. As a result, the alternatives that the Councils now propose include specific provisions to incorporate and benefit from existing regulations where monkfish is caught by presently regulated fishing vessels.

## **Submission of a monkfish overfishing definition**

When the groundfish plan development team made its recommendations, technical evaluations of various biological reference points were underway. Although an overfishing definition, based on these potential reference points, had not been recommended to the Council, it was clear that any reasonable benchmark would conclude that monkfish mortality was too high and that biomass was extremely low.

The Councils and the Northeast Fishery Science Center (NEFSC) continued to evaluate potential reference points through a more formal arrangement by forming a Technical Working Group (TWG). This sub-committee, composed of staff-members from the NEFSC, the NEFMC, and the MAFMC, was charged with recommending an overfishing definition to the Council and suitable TACs to prevent overfishing.

The TWG initially met on September 24, 1995 and examined historic data from the research survey and commercial landings to recommend a maximum mortality level and a minimum stock biomass for two monkfish management areas. It formally recommended an overfishing definition, based on the analyses it conducted, to the Councils on February 14, 1996.

The Councils raised several issues about the basis for the recommendation and asked the TWG to re-examine the issues raised. Additional TWG meetings were held and a revised recommendation was proposed to the Councils on May 2, 1996. Following a slight adjustment to the target reference points, the Councils submitted the overfishing definition on July 1, 1996 to the Regional Administrator for certification.

## **Management alternatives and public hearings**

The Councils further refined the proposed amendment to the Multispecies FMP. Three alternatives are now included, each affects the various fisheries in different ways. They are explained in more detail in Section 5.0. The Council has scheduled a series of public hearings from North Carolina to Maine and seeks your comments on these alternatives and the management options within them.

### **Issues identified at public hearings**

The public commented on the following issues when the Council proposed alternative 3 as a preferred alternative in January 1997. The page, table, and figure references in the following discussion of issues are for the February 1997 Public Hearing Document, the Draft Amendment 9, and in the Draft Environmental Impact Statement. The major issues were:

- 1. Should the range of the management unit coincide with the range of the monkfish stock(s) in US jurisdiction?** The public hearing document describes the management unit extending from the US-Canada boundary to the NC-VA border and from the shoreline to the 200-mile limit (page 3). The staff erroneously added this specific description of the management unit during the final editing stages. Previous drafts described the Southern Fishery Management Area as extending to the south and west of the line separating it from the Northern Fishery Management Area. The section on the "Scientific Basis for Management" (page 27) describes the management unit as extending from "Cape Hatteras, NC to the US - Canadian boundary, seaward to the 200 mile limit." Chang (1990) furthermore shows that the distribution of goosefish (commonly known as monkfish) is continuous to Cape Hatteras, NC. The analyses that support the draft amendment include fishery and biological data from statistical areas 635 and 636, although NC landings do not appear in the NMFS weightout data base.
- 2. Should the Council adjust the TALs to be consistent with the latest stock assessment?** The TALs would act as a guideline to determine whether alternative 3 is meeting its interim biological objectives. According to the schedule in Table 3 (page 15), the TAL would be 3,000 mt and 6,000 mt for the fishing year beginning July 1, 1997 for the northern and southern fishery management areas, respectively. The fishing mortality rate is expected to be 0.07 and 0.26 if the landings do not exceed these levels.

In the northern area, landings during the assessment period increased from 6,505 mt in 1989-93 to 9,124 mt in 1991-95. Fishing mortality decreased slightly from 0.17 to 0.15. The reference point stayed at 0.05, implying a higher TAL at the reference point, from 2,148 mt to 3,041 mt. Since the current schedule calls for a TAL of 3,000 mt, it suggests that the reference point would be achieved in the first year of implementation. Based on these latest figures, the amendment could allow for landings of 4,258 mt, equivalent to the original interim target fishing mortality rate, 0.07.

The assessment results for the southern area also suggest that the initial TAL could be increased and achieve the originally intended mortality rate. Landings during the assessment period increased by 25 percent, while mortality only increased by 13 percent. Unlike the northern area, however, the overfishing threshold declined from 0.22 to 0.14 due to adjustments in the measure of relative abundance during 1970-79. This change implies a lower TAL for the southern area, declining from 4,927 mt as estimated by the Technical Work Group to 3,612 mt based on the recent assessment. The first-year TAL, however, could be increased from 6,000 mt to 6,708 mt, equivalent to the original interim target fishing mortality rate, 0.26.

Area	Time period	Original TAL	Expected F	Expected F, SAW 23	Revised F	TAL @ revised F	Percent change
North	1991-95	6,505	0.17	0.15	0.15	9,124	
	1997-98	3,000	0.07	0.05	0.07	4,258	-53.3%

Area	Time period	Original TAL	Expected F	Expected F, SAW 23	Revised F	TAL @ revised F	Percent change
	Overfishing threshold	2,148	0.05	0.05	0.05	3,041	-66.7%
South	1991-95	10,488	0.45	0.51	0.51	13,157	
	1997-98	6,000	0.26	0.23	0.26	6,708	-49.0%
	Overfishing threshold	4,927	0.22	0.14	0.14	3,612	-72.5%

- 3. Is the rebuilding schedule (page 2) consistent with the amendment agenda?** The amendment calls for a stepped reduction in the TAL guidelines to not exceed the overfishing threshold by year seven. The rebuilding schedule is currently eight years, or two times the time it takes female monkfish to reach maturity. At face value, long-term increases in stock biomass cannot occur until the exploitation rate is less than the overfishing threshold. The Council does not expect to reach this goal until year seven. Rebuilding to the biomass target ( $B_{target}$ ) cannot occur in only one year.

The Magnuson Act requires the Councils to specify a time period for ending overfishing and rebuilding the fishery (Section 304(e)). It also mandates that this time period be as short as possible, but no longer than 10 years.

Resolution of this issue is necessary to prepare the net benefit analysis, comparing the proposed action to No Action. Delaying this decision will significantly impact our progress to finalize the amendment documents.

- 4. Should the reference points for the northern and southern management areas be adjusted?** It is difficult for many to understand why the overfishing thresholds are so disparate in the northern and southern fishery management areas. Until the most recent assessment, the overfishing definition required a 67 percent reduction in catch in the northern area, but only a 50 percent reduction of catch in the southern area.
- 5. Are the objectives consistent with the National Standards, especially with those added by the Sustainable Fisheries Act?** Several people have commented that the monkfish proposals will increase bycatch in an attempt to achieve plan objective 4 (page 2), violating the intent of National Standard 9. They also argue that objective 4 makes it difficult to address objectives 1 to 3 and achieve rebuilding. There is also confusion over what the Council means by incidental catch in objective 4 and bycatch in National Standard 9. Many use incidental catch and bycatch interchangeably.
- 6. Which alternative most closely resembles the one favored by the public comments?** When the public spoke favorably about one alternative over another, most supported alternative 3.
- 7. Which qualification criteria should be used to limit eligibility for monkfish-only days-at-sea?** Public comment on this issue was relatively light. Many assumed that the Councils would select option 3 to qualify vessels. Unless they started to target monkfish after the control date, fishermen thought they would qualify under this option. Small vessels that target monkfish and seldom land more than 750 pounds are discussed in item 8.
- 8. Should the Council adjust the limited access qualification criteria for small vessels that target monkfish?** The current proposal will exclude some small vessels that rely on monkfish. These vessels generally take short trips and land small volumes of monkfish on each trip. If the fish hold capacity is less

than 750 pounds, they would never accumulate enough trips to qualify under option 3a (page 13). The other qualification issue is that some vessels entered the monkfish fishery, unaware of the control date and their low probability of access after monkfish regulations are implemented. They claim that they were not notified of this possibility because they held no federal fishery permits (the official method of notification).

9. **Should there be limits on how multispecies vessels can use their days-at-sea to target monkfish?** People in the Mid-Atlantic region expressed concern that multispecies vessels could target monkfish with their unused days-at-sea, while other vessels that rely on monkfish would be denied access due to the control date and qualification criteria. Some stated that they would like the Councils to prevent multispecies trawl vessels from using gillnets to target monkfish.
10. **Should there be a size limit to protect juvenile monkfish and should the minimum size be 14" tail length?** About 75 percent of female monkfish are sexually mature when they yield a 14-inch tail. At a size that yields a 12-inch tail, 50 percent of females are mature in the northern area and slightly less than 75 percent of females are mature in the southern area (page 27). Two of the objectives are to maintain a healthy spawning stock and prevent increased fishing on immature fish. The most effective way of meeting these objectives is to reduce the catch of small, immature monkfish. The question is whether a size limit is an effective tool for achieving the objectives.

Fishermen stated during scoping hearings that they would be able to avoid concentrations of small monkfish, but that these areas were not persistent from year to year. Many supported a minimum size to keep fishermen from targeting small monkfish that could not be landed because of the size limit and the Councils had broad support for a 12-inch size limit. Fishermen from Maine initially supported an 11-inch size limit and then later supported no size limit.

During public hearings, some fishermen favored the 14-inch or larger size limit. Others feel that the size limit is wasteful, creating regulatory discarding in violation of National Standard 9. The amounts of discard could be substantial (Section 11.6.6 in the DSEIS, pages 132 to 141), if fishermen do not change fishing behavior in response to the size limit. This response cannot be quantified, however. The more that monkfish contribute to bycatch, rather than a main component of the catch, the less likely it is that fishermen will change fishing behavior in response to the size limit. Fishermen that target monkfish are the more likely to avoid concentrations of small fish, but can do so more easily when small fish are abundant.

Based on the estimated growth parameters and natural mortality, positive benefits are expected if discard mortality is less than 40 percent (Figure 35, page 134). The maximum marginal benefit at the highest discard mortality rate occur with a 17-inch tail size limit.

Other comments pointed out that more monkfish could be targeted and landed due to highgrading imposed by the size limit. They also pointed out that the fishery would generate higher fishing mortality rates if it landed the TAL amounts.

11. **Should the liver to tail ratio be adjusted to more vigorously prevent highgrading?** The Councils proposed a 25 percent liver to tail ratio and a 10 percent liver to whole fish ratio, consistent with most state landings regulations. NJ adopted a 30 percent liver to tail ratio based on sampling that showed seasonal variation in monkfish liver yield that exceeded the 25 percent ratio. For all areas and seasons, the mean liver to tail ratio is about 18 percent and the mean liver to whole fish ratio is about 8 percent.

The rationale for the 10 percent and the 25 percent limits is explained in Section 11.6.9 of the DSEIS (page 154). It is the same rational that the Councils offered to the states for these limits. Under average conditions, fishermen would have opportunities to retain livers from undersized monkfish and discard dead monkfish. If they land whole fish, fishermen could increase their liver landings from the 8 percent average to the 10 percent limit. If they land monkfish tails, fishermen could increase their liver landings from the 18 percent average to the 25 percent limit.

On the other hand, seasonal and geographic variations in monkfish yield may cause situations when fishermen would be forced to discard livers in order to retain their monkfish catch. This problem becomes more frequent as the limit on the percentage of liver landings is reduced. If the limits are set at average levels, it would cause fishermen to discard valuable livers in order to retain monkfish on half of their fishing trips.

Some public comment suggested that the ratio should be based on a one-to-one count. It makes intuitive sense, but others have claimed that monitoring and enforcement would be difficult and burdensome. Livers are often bagged at sea and may break into large pieces during processing.

- 12. Are there uninvestigated ways to limit or reduce the bycatch of small monkfish?** Many people commented that landings restrictions (minimum size and trip limits) will not limit or reduce mortality on monkfish. These comments gave little credence to the limited access and effort restrictions as primary management measures to reduce mortality and instead focused on these landings limits. The intent of these limits was to prevent increased targeting of monkfish when they are normally an incidental catch and to prevent increased targeting on small monkfish.

On the other hand, the comments suggested that the Councils had not done enough to identify ways to reduce mortality with less size-selective gears. Some comments supported increasing the minimum mesh requirements to 12 inches for all vessels that target monkfish. One other comment suggested an unspecified incentive to encourage fishermen to target large fish through gear modifications. Few comments, if any, recognized that the stated purpose of the minimum mesh proposal was to minimize the bycatch of groundfish by monkfish vessels, not to improve size selectivity for monkfish. No one commented on the potential for area-gear closures, as analyzed in the DSEIS (Section 11.6.8.2, pages 145-150). Few comments were received on the potential for using foreign gear technology (Appendix III) to improve size selectivity in the directed monkfish fishery either.

- 13. Does the minimum mesh requirement for monkfish trawls apply throughout the net or only in the codend?** The minimum mesh proposal was initially intended to apply throughout the net, but just before taking the draft amendment to public hearing the Councils learned that it was not possible to rig square mesh in the trawl wings and extension. The Councils decided to make the proposal consistent with the multispecies mesh regulations.

The proposal taken to public hearing would require 10-inch square mesh or 12-inch diamond mesh in the codend and 12-inch diamond mesh in the remaining portion of the net (page 14). This treatment of the codend is consistent with the multispecies regulations that require large mesh in the codend for the exempted monkfish fisheries. The multispecies regulations, however, appear to allow these vessels to use 6-inch mesh in the remainder of the net.

- 14. What areas will be opened to fishing for monkfish with 10-inch or 12-inch mesh via the amendment? Alternatively, will the limited access vessels be required to petition the Regional Administrator for exemption from the multispecies days-at-sea regulations?** The documents are unclear on this point, since no areas are being proposed. The percent bycatch of other species on directed monkfish trips is given in Tables 51 and 52 (pages 173 and 174 in the DSEIS).

- 15. What should be the net limits for vessels using gillnets for monkfish? How should the net limit be administered and enforced?** The public comments confirmed the committee discussion over net limits. New England fishermen use considerably more nets than do Mid-Atlantic fishermen and the 80-net limit is prohibitively low for New England fishermen.

- 16. Should gillnet vessels be required to declare a specific amount of time out of the monkfish fishery? Can they fish other types of gillnets when they declare themselves out of the fishery?** Most comments opposed this proposed measure. The theory behind requiring gillnets to take a specific time out of the fishery is to make the days-at-sea limits have an effect on mortality (88 days would not impact fishermen that only target monkfish during the spring spawning season, 88 days allows day boats to make up to 140

trips per year based on 15 hour days), reduce mortality during spawning, and improve economic yield. Fishermen argue that this is the only time they can target monkfish, because they are targeting other species in the fall or the weather prevents them from fishing in small boats.

17. **When the fishery exceeds the monkfish TAL, should the Council mainly consider adjusting the regulations affecting the directed fishery, or should meeting the TAL guideline also be a factor for adjusting the multispecies days-at-sea allocations.** Is the status of monkfish separable from that for cod, haddock, and yellowtail flounder?
18. **What will be the expected catch by active multispecies vessels, i.e. will multispecies vessels use unused days-at-sea to target monkfish?** This issue has a large bearing on whether the amendment will be successful in meeting its biological objectives (see issue 8). The analysis of this issue requires access to the 1995 and 1996 landings data, effort data, and days-at-sea usage. The 1996 landings and effort data (Vessel Trip Reports, 1994-1996) are (at the time of public hearings) incomplete.
19. **What will be the effect of the buyback program on monkfish mortality?** Analysis of this issue requires someone to match the monkfish landings records with the permits of vessels in the buyback program. The Council (at the time of public hearings) does not have access to this data.
20. **What would be the net economic impact of the final amendment, if implemented?** The Economic Working Group could not forecast this value for the DSIES, because of the many options within the preferred alternative taken to public hearing in February 1997. NEPA and several other applicable laws require the Council to estimate the net economic effect of the proposed action.
21. **Is there balanced (northern area vs. southern area) representation on the monkfish committee?** This comment was made in several areas, including ports in the northern area, New Bedford, and the Mid-Atlantic.
22. **Who should monitor the status of the monkfish resource after implementation?** The Councils had not determined a process for monkfish monitoring in the preferred alternative, taken to public hearing in February 1997.

In addition to public comment, the Councils received comment in June 1997 from the Regional Administrator, identifying the shortcomings of preferred alternative 3. The major criticisms from NMFS were:

- the specification of a rebuilding schedule
- the equity concerns that result from alternative 3 qualification criteria
- the complexity of the preferred alternative

### **Second round of public hearings**

A second round of public hearings was necessary because the new preferred alternative was more restrictive than any alternative contemplated during the first public hearings in January 1997. The major changes in the plan were to limit the amount of multispecies and scallop days that vessels qualifying for monkfish limited access could use to target monkfish. In the new preferred alternative, all vessels that qualify would be able to use no more than 40 days-at-sea annually to exceed the bycatch allowances and target monkfish. The Councils also advanced the mortality reduction schedule to four years, rather than seven, to allow sufficient time to rebuild the monkfish resource in the mandated 10 year period. Moderate changes to the bycatch allowances and the gillnet limits were included in the new preferred alternative.

The major issues identified by the public at these hearings were:

- Equity between qualifiers and non-qualifiers and between residents of various states
- Discards caused by the proposed trip limits

- Discards caused by the proposed size limits
- Ability to comply with complicated regulations and enforcement costs

The Councils further refined the preferred alternative by modifying the proposed trip limits, advancing the timing of trip limits for limited access monkfish vessels when they are on a monkfish day-at-sea, and reducing the complexity of secondary management measures.

## **3.2 Areas of Concern**

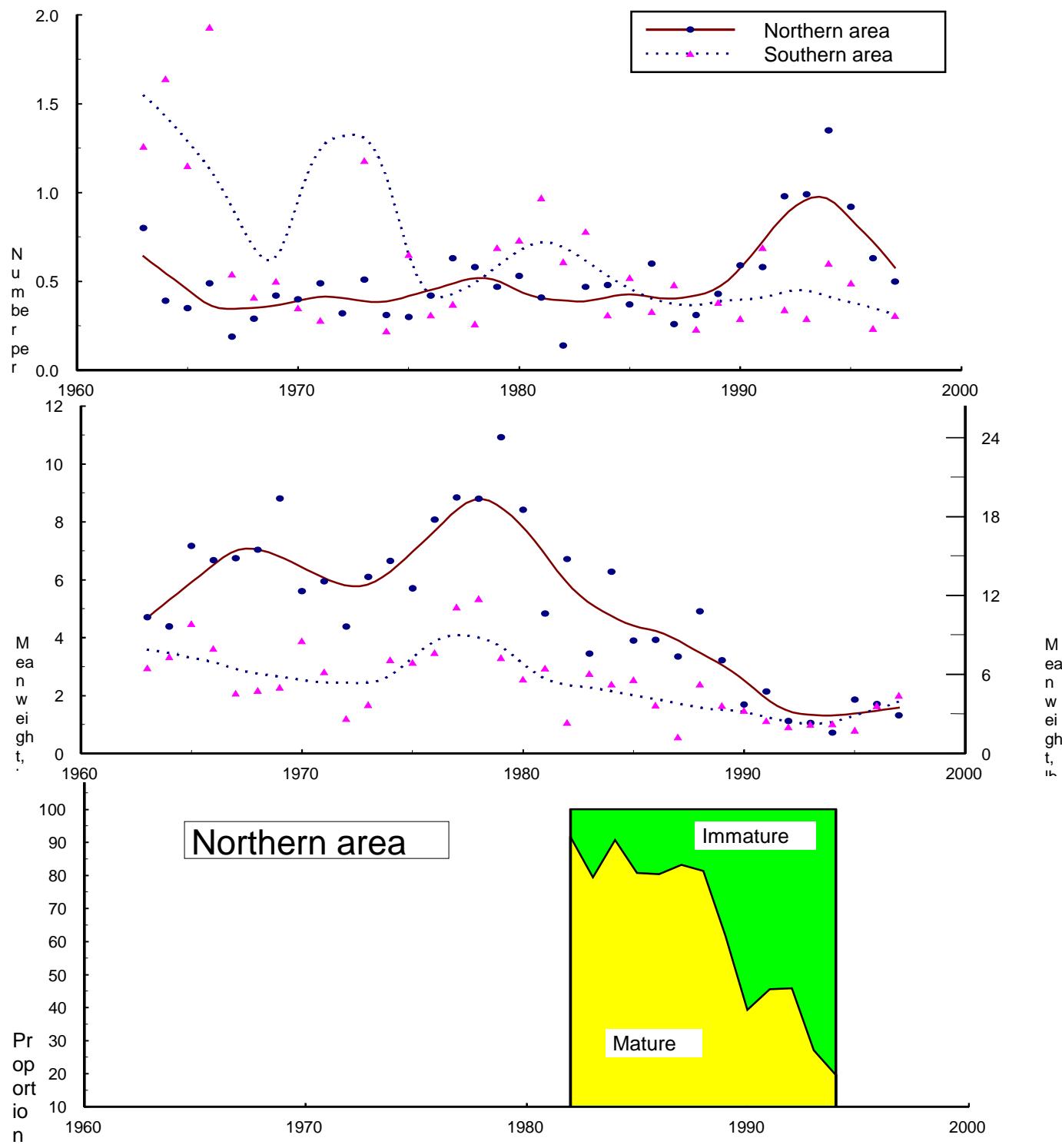
Monkfish mortality during 1990 - 1994 was the highest observed since 1963 -1967 and stock biomass is near the lowest in the 1963 - 1995 time series. Average fish weight has declined considerably during the late 1980s and the 1990s. Due to these circumstances, the northern and southern monkfish stock components are thought to be in an overfished condition and overfishing is occurring.

Although gains in yield per recruit can be achieved by improving size selectivity of the fisheries that catch monkfish, large reductions in catches are needed to reduce fishing mortality below a level believed to achieve population stability. Some mortality reduction can be achieved by discarding small fish, because a substantial fraction survive and may be later recaptured at a larger size. The discard survival rate appears to vary by season, gear, and possibly area.

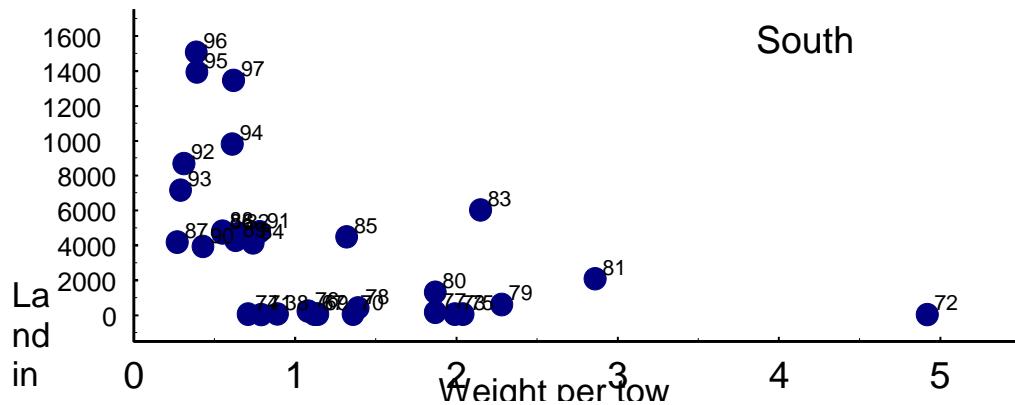
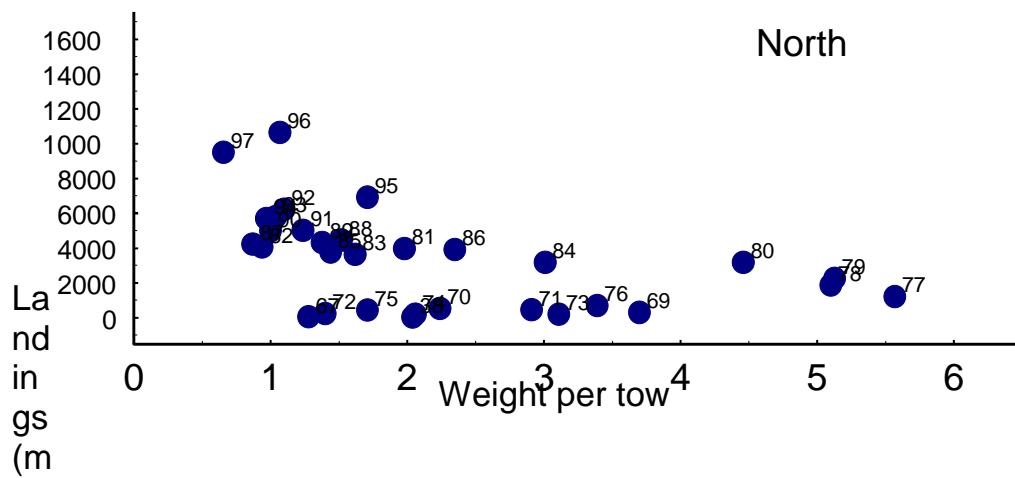
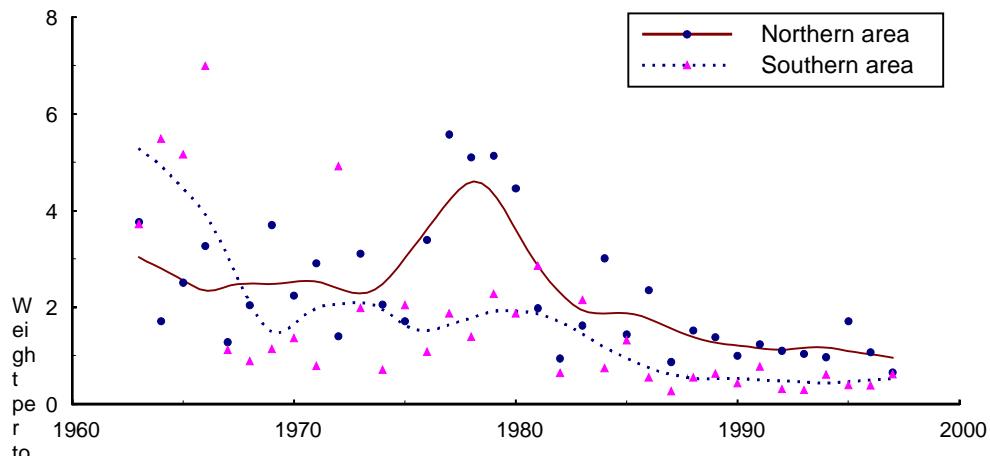
Fisheries that have significant monkfish bycatches are or will be under restrictive regulations on fishing effort to control mortality or produce rebuilding for target species. The planned effort reduction will reduce bycatch of monkfish in those fisheries, but without controlling increased targeting of monkfish, more of these fisheries' vessels will shift fishing effort to monkfish. The reductions in bycatch will help to reduce fishing mortality on monkfish, but not enough to stop overfishing. Catch restrictions for the directed monkfish fishery are, therefore, needed.

The small size of monkfish caught in the various fisheries is of concern and the proposed management measures are expected to improve yield per recruit and allow greater opportunity for monkfish to spawn. Assessment scientists have concluded that substantial gains in yield per recruit could be achieved by increasing the age at first capture. Another concern is the potential for expansion of the directed fishery if the monkfish resource is fully utilized. Rapid expansion of directed fishing for monkfish is expected under various proposed management alternatives for groundfish, scallops, and summer flounder.

Developing markets for monkfish tails and livers have allowed fishermen to profitably fish for and land increasingly smaller monkfish. Because of high prices for monkfish livers, fishermen can now land small fish under nearly all market conditions. In fact, dealers have been reluctant to take the small monkfish tails, but must do so in order to buy the livers. Landings of excessively small monkfish tails as small as nine inches, and occasionally as small as five inches, are a major concern. If these catches of small and immature monkfish increase, the Councils believe that monkfish will not be given sufficient opportunity to spawn and maintain current yield.



**Figure 3.** Number per tow, mean fish weight, and proportion of mature females from NEFSC autumn research surveys. The proportion mature represents the fraction of the catch that is over the L50 for female maturation.



**Figure 4.** Relative index of biomass from the NEFSC autumn research survey and its relationship to landings, 1963 – 1977.

### **3.3 Issues to be Resolved**

Fishing mortality is above the overfishing threshold and must be reduced to avoid continuing declines in stock biomass. The mortality levels during a period of population stability (1970-1979) were 68 and 78 percent lower than 1990-1995 levels in the Northern Fishery Management Area (NFMA) and the Southern Fishery Management Area (SFMA), respectively (Table 94 and Table 95). Without accounting for improved size selectivity, the total allowable landings would need to be reduced to 4,047 mt and 3,252 mt, respectively, to stop overfishing. The proposed management alternatives have complementary measures that will potentially improve size selectivity, but the magnitude of these improvements is difficult to quantify and depend on changes in fishing behavior. The Councils, therefore, propose a longer-term reduction in total allowable landings and to make adjustments to the TACs as future conditions change.

During the first fishing year beginning May 1, 1999, the Councils are proposing TACs of 5,673 mt and 6,024 mt in the NFMA and the SFMA, respectively (**Table 88**). The catch in the directed and bycatch fisheries has been estimated to be 7,968 and 9,097 mt in the NFMA and SFMA, respectively (**Table 70** and **Table 71**), exceeding these TAC specifications. The first year's limited access allocation would remain constant through year four. In the fourth year, the TACs would decline to 4,047 mt and 3,252 mt for the NFMA and the SFMA, respectively. The quantitative estimate from limited access, days-at-sea allocations, and trip limits in year four indicate that catches could be as high as 5,381 and 4,760 mt in the NFMA and SFMA, respectively (**Table 70** and **Table 71**). Subsequent mortality and TAC reductions may be necessary in years 5 through 9 to achieve the rebuilding biomass targets in year 10.

This estimation, however, only takes into account the expected impacts of limited access, days-at-sea allocations, and trip limits. Other factors that could not be analyzed (e.g. changes in fishing strategies caused by requiring multispecies and scallop vessels to take their monkfish days-at-sea simultaneous to the multispecies and scallop days-at-sea) and other measures that could be estimated independently (e.g. size limits and area closures) account for the quantitative difference. The biological, economic, and social impacts of these measures and the cumulative impacts associated with other plans and regulations are discussed in the Environmental Impact Statement.

Another issue is the acceptance of small monkfish tails in domestic and foreign markets, fishermen will increase fishing effort on the immature fish. The Councils intend to limit the landings of these small fish so that new markets do not develop. In addition, fishermen have stated that, if there were no market incentive to land these fish or the landings were prohibited, they could avoid concentrations of small fish and search for larger fish. This potential change in fishing behavior caused by a minimum size limit is a major conservation benefit of the management program because of high discard mortality. If fishermen continue to fish in these areas, however, a minimum size will be ineffective to control fishing mortality on small fish.

Discarding of small fish to obtain valuable livers is another problem that will occur with a minimum size in place. Because other restrictions on fishing are unlikely to efficiently control the fishing mortality on small monkfish, the Councils are proposing a minimum size. This approach presents an obvious problem because most monkfish are processed at sea, with monkfish tails and livers being landed as separate products. A minimum size, by itself, would allow fishermen to cut the more valuable livers from undersized fish and discard the remaining carcasses, thus mitigating the benefit of the management program. To resolve this problem, the Councils propose a cap on the possession and landings of livers as measured against the amount of monkfish tails landed. This cap is designed to allow the normal prosecution of the fishery and rarely would force fishermen to discard livers from fish over the legal limit. This approach, of course, also requires a liberal limit that fishermen would seldom exceeded unless they were flagrantly discarding small, undersized fish, a situation that the Council wants to avoid.

Another issue is the poor quality of data now being collected. Because of the low value of monkfish tails compared to the livers, significant landings of monkfish tails are sold through untraditional channels and are therefore not reported. It represents a significant data gap when trying to estimate the importance of the fishery and when estimating fishing mortality rates. The Councils are proposing that the mandatory data collection program that exists for other species include monkfish to correct this problem. This reporting requirement would be coupled with a permit requirement for dealers and fishermen to ensure reporting. At-sea processing of monkfish presents another

problem to obtaining size frequency data to assess the resource. The FMP for monkfish, therefore, calls for significant increases in sea sampling to collect the necessary data.

### **3.4 Management Objectives and Intent of the FMP**

The Councils adopted four management goals for monkfish to compliment those required under 50 CFR § 602.11, which address overfishing. The management standard to prevent overfishing is contained in section 4.1 within this document. The Councils intend to address the following goals through implementation of initial management measures to limit mortality and improve size selectivity, where technically feasible:

- 1) To end and prevent overfishing; rebuilding and maintaining a healthy spawning stock
- 2) To optimize yield and maximize economic benefits to the various fishing sectors
- 3) To prevent increased fishing on immature fish
- 4) To allow the traditional incidental catch of monkfish to occur.

These four goals would ensure adequate spawning and highest possible yields without radically altering the fisheries that target other species or causing extensive regulatory discarding. In addition, they address immediate problems caused by intensified fishing effort for small monkfish.

#### **3.4.1 To end and prevent overfishing; rebuilding and maintaining a healthy spawning stock**

The biological objective for monkfish is to lower exploitation so that the resource is no longer overfished ( $F_{target}$ , Section 3.4.1.1) and then to rebuild biomass to levels that can produce maximum sustainable yield (MSY). The rebuilding goal is  $B_{target}$ , a desirable level of total biomass that would produce significantly higher sustainable landings at a much lower exploitation rate. The biological yield that can be produced at this minimum target biomass and maximum target fishing mortality rate is the optimal yield for monkfish.

$B_{target}$  is equal to the median of the three-year moving average autumn survey weight per tow observations during 1965 to 1981 (Section 3.4.1.1). The domestic fleet often discarded monkfish during this period and the then-active foreign fleet retained all monkfish catches. Once the stock recovers to  $B_{target}$  (about three times the current level), the fishery yield could approximate current landings with exploitation at about one-third of the current rate. Catches that the domestic fleet discarded and the foreign fleet landed could be harvested by the domestic fleet for modern markets.

The Councils also adopted a schedule for achieving these objectives. There is considerable uncertainty in the biological parameters, future recruitment, and discard mortality. Taking these factors into consideration, the Councils propose to implement a reduction of fishing effort and improvements in size selectivity to eliminate overfishing in no more than four years. These fishing effort reductions would be achieved by a schedule of TAC (total allowable catch) reductions scheduled over the four-year period. The TACs would serve as a milestone and as a surrogate measure of exploitation, since exploitation rates are difficult to measure and time-consuming to estimate. Section 8.1.5.1.1 (EIS) discusses the TACs and their derivation in more detail.

The Councils adopted a rebuilding schedule to achieve these targets in 10 years. Achieving these targets depends on a number of factors including, but not limited to, favorable recruitment and the efficacy of the management measures. These factors are either out of the Councils control or difficult to predict. Future adjustments to the proposed management measures will undoubtedly be necessary to achieve the management targets.

### 3.4.1.1 Overfishing Definition

All federal fishery management plans must have a definition of overfishing for each species. Most common reference points ( $B_{MSY}$ ,  $F_{MSY}$ ,  $F_{max}$ ,  $F_{20\%}$ , etc.) that are suitable for other species are problematic for monkfish due to poor data. In the absence of reference points that require high-quality data, the Monkfish Technical Working Group recommended biomass targets and thresholds, based on the survey time series, and fishing mortality rates that existed prior to the rapid increase in monkfish landings. The choice of these reference points is explained below. The New England Council's Overfishing Definition Review Panel (Applegate et al. 1998) furthermore reviewed the proposed reference points.

There are usually two basic ways to define overfishing: methods based on stock abundance ("minimum level of stock biomass") and methods based on threshold mortality rates ("maximum level of fishing mortality"). The minimum stock abundance approach suggests that when a stock falls below a threshold, the risk is unacceptably high that recruitment would be depressed. The threshold mortality rate is based on allowing a minimum proportion of spawners to survive to the following year.

The only data available to support a definition based on a minimum stock level are from fishery-independent surveys. A few state-supported surveys exist, but the most comprehensive are the bottom surveys conducted by NMFS. There are problems because the surveys do not encompass the entire range of the monkfish resource. No samples are taken offshore of the Continental Shelf edge where monkfish are known to occur. These surveys do, however, provide a reasonable estimate of stock abundance for that portion of the population occurring in coastal and shelf areas.

This method utilizes relative abundance to define when a stock is overfished. The survey data is the most complete source of information currently available. A measure of a minimum number or biomass is an attractive definition. On the downside, fishermen often distrust survey data and the survey is subject to interannual changes in availability. The latter may not be problematic for monkfish given its wide range and the extent of the survey, but it does argue for a longer-term approach than action based on one year of survey data.

Often a short-term moving average is compared to a percentile of observations to determine when a population has become depressed. Three criticisms of this approach are generally that overfishing will occur 25% of the time when the lowest quartile is used, that it is reflective of other conditions besides fishing, and that it is reactive rather than proactive. The first is misleading. In actuality, a population must fall below the 8th percentile for its three-year moving average to fall below the 25th percentile. Other relationships exist for various lengths of moving averages. The second criticism is accurate, but the 602 guidelines require management action "whether these trends are caused by environmental changes or by fishing effort." The third criticism may be accurate under certain circumstances. If a stock declined to overfished levels due to high exploitation, that level of fishing mortality probably existed for a significant period of time before the stock reached such low levels. Alternatively, if the stock declined due to other factors, it might not be appropriate to reduce fishing mortality until the population fell below the threshold.

The Council has adopted an overfishing definition that used two indicators, stock biomass and fishing mortality, to determine when monkfish are overfished. The stock would be declared to be overfished when either one of the indicators breaches the established threshold. In addition to thresholds to define overfishing, the definition also incorporates biomass and mortality targets to act as warning milestones when stock conditions should be closely monitored and when more conservative regulations are needed. The Council's monkfish overfishing definition reads as follows:

*Monkfish in the northern and southern management areas are defined as being overfished when the three-year moving average autumn survey weight per tow falls below the 33rd percentile of the time series, 1963-1994, or when fishing mortality exceeds  $F_{threshold}$ . Monkfish are in danger of becoming overfished when the three-year moving average autumn survey weight per tow falls below the median of the three-year moving average during 1965 - 1981 and when fishing mortality is between  $F_{target}$  and  $F_{threshold}$ .*

*For the northern and southern areas,  $F_{threshold}$  is based on conditions of stock stability at high abundance, calculated at the fishing mortality rate that prevailed during 1970-1979.  $F_{target}$  for the southern area is  $F_{0.1}$ . For the northern area,  $F_{target}$  is currently undefined.*

This definition is one of the first that incorporates the advice given by the NMFS report, "Scientific Review of Definitions of Overfishing in U.S. Fishery Management Plans" and complies with the new Sustainable Fishery Act requirements and National Standard 1 guidelines. It describes overfishing thresholds that should be avoided and management targets to be achieved. The Councils believe that the definition is consistent with National Standard 1 and establishes a management system that will not jeopardize the long-term capacity of the resource and will produce MSY on a continuing basis.

The Councils recognize that the proposed overfishing definition differs slightly from that proposed by the monkfish technical working group. The Council changed the initially recommended target biomass objective from "*the median of observations during 1963 - 1981*" to "*the three-year moving average during 1965 - 1981*" because the original target level appeared to be unachievable. The technical working group recommended (memo dated May 2, 1996) a target biomass level of 2.58 kg/tow and 1.87 kg/tow in the northern and southern management areas, respectively. The joint monkfish oversight committee noted that the three-year moving average was below the target level in the northern management area for 12 of 17 possible years between 1965 and 1981. The three-year moving average fell below the target level in the southern management area for 9 of 17 possible years during the same period.

The committee, therefore, changed the target biomass level to the median of the three-year moving averages. This change lowered the target from 2.58 to 2.29 kg/tow in the northern management area and from 1.87 to 1.84 kg/tow in the southern management area. In the northern area, the three-year moving average fell below its median for 8 of 17 possible years. Similarly, the three-year moving average fell below its median for 8 of 17 possible years in the southern management area, although this event occurred in different years compared to the northern area. In accordance with the Council's objective of managing monkfish in the Gulf of Maine (aka northern area) separately from monkfish from Georges Bank to NC (aka southern area), the overfishing thresholds would be defined individually for each stock component.

### Biomass thresholds and targets

Two reference points are established for stock biomass. The median of the research survey index of relative biomass<sup>1</sup> for 1963 - 1981 would be used as a target value. Biomass levels below this median would serve as a warning indicator, when more conservative management measures might be needed. This target survey value is 2.29 kg/tow for the Gulf of Maine and 1.84 kg/tow for the Southern New England/Mid-Atlantic strata. A second, less conservative reference point would be used to declare the stock component to be overfished. This reference point is the 33rd percentile of all weight per tow values in the time series, 1963 - 1994. This threshold survey value is 1.45 kg/tow for the Gulf of Maine and 0.75 kg/tow for the Southern New England/Mid-Atlantic strata. Current

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<sup>1</sup> Excludes inshore, coastal strata where the survey catches of monkfish are considerably less frequent.

values (1995) are 0.94 and 0.61 kg/tow, respectively. The current three-year moving averages are 1.01 kg/tow and 0.41 kg/tow, respectively.

### Fishing mortality thresholds and targets

Two reference fishing mortality rates (i.e. exploitation) are also established for the overfishing definition. The intent is to propose one value as a target for management that is lower than a second overfishing threshold. This approach would allow a buffer between the goal for management, and a level that should not be exceeded so that recruitment overfishing is prevented. For the southern area, the Council adopted  $F_{0.1}$  (0.10) as the target for management. This measure of exploitation would be used as a warning indicator, especially at low or medium levels of stock biomass. For the northern area, the target for management should be less than the  $F_{0.1}$  value (0.09), because of the low threshold fishing mortality rate for that area. This target value for the northern area is currently undefined.

Threshold fishing mortality rates are proposed as estimates of  $F_{rep}$ , the fishing mortality rate that results in long-term replacement of the stock. These threshold values are estimated as the average mortality rate for a period when monkfish in the two management areas were relatively abundant and stable. Based on biological data from the research survey, the working group recommended that this period should be 1970-1979, the same as was recommended for the TACs calculations. During this period, the average fishing mortality rate for the northern area was 0.051, and for the southern area F was 0.217.  $F_{rep}$  would be expected to vary between areas because of differences in stock-recruitment relationships between areas. Lower values of  $F_{rep}$  for the northern area could arise from a variety of factors, including higher predation rates on eggs, larvae or juveniles; greater advective losses of eggs or larvae; lower fecundity of spawning adults; or differential cannibalism, for example. It is currently unclear which particular factors are most important in controlling the respective stock-recruitment relationships.

One method of determining fishing mortality for monkfish with existing information is based on numbers at size in NMFS autumn surveys and growth parameters for monkfish in the two areas. This method relies on the number of fish at length captured by fishery-independent survey gear. To estimate fishing mortality, the working group analyzed data in five-year blocks from 1970-1994. Annual surveys within each time period were combined to increase the sample sizes of numbers at length, and to minimize the influence of annual variability in recruitment and catchability. Steeper declines in the number of fish at size translate into higher fishing mortality rates within a given area. The decline in numbers between areas should not be directly compared, because the fishing mortality calculations take into account differential growth parameters. SAW 23 estimated fishing mortality for the latest five-year period, 1991-1995, to be 0.15 for the northern area and 0.51 for the southern area.

Apart from this method, other important indicators of fishing mortality and size-specific pattern of exploitation are available with which to monitor the stock. This method relies on the number of fish at size in sea sampling data. This data is useful to estimate the exploitation pattern and therefore equilibrium biological reference points. The proportion of sexually immature animals comprising the commercial catch is partially a function of the overall exploitation rate. Higher exploitation leads to increasing fractions of immature animals. The expected proportion at each reference point was determined by applying the exploitation pattern, derived from sea sampling data for 1992-1993, and the reference mortality rate at equilibrium. The current proportion of immature monkfish in the catch was estimated by post-stratified expansion of sea sampling observations. This value differs from the expected proportion at status quo because of non-equilibrium considerations. Sampling intensity during this period was barely sufficient to allow the estimation of immature fish in the total commercial catch. Although confidence intervals around these estimates are not currently available, considerable increases in the sampling frequency of at-sea observations would be required to improve this estimate.

Improvements in the analytic basis for mortality rate measurements are contingent upon the development of consistent catch-at-length and associated age data. Very limited historical length and age-composition data are available, owing to the difficulty in sampling landings and discards of monkfish.

## **Control law**

The following diagram helps clarify the structure of the overfishing definition and explains the management advise arising from the overfishing definition when monkfish fall within one of the nine classifications:

**Table 3.** Monkfish overfishing classifications, risk of recruitment failure, and recommended management actions.

		Stock biomass (minimum):			Threshold: 33rd percentile, 1963 - 1994
		Target: Median 1963 - 1981			
Fishing mortality (maximum):	Stock condition	Stock biomass (minimum):			Threshold: 33rd percentile, 1963 - 1994
		High biomass	Medium biomass	Low biomass	
		Management advice	Reduce mortality to below $F_{threshold}$	Reduce mortality below $F_{threshold}$ and to $F_{target}$	Reduce mortality to well below $F_{target}$ until stock recovers <sup>2</sup>
			Medium	High	Very high
		Management advice	Maintain mortality below $F_{threshold}$ , improve yield per recruit	Maintain mortality below $F_{threshold}$ and reduce $F$ to $F_{target}$	Reduce mortality below $F_{target}$ until stock recovers <sup>3</sup>
			Low	Medium	High
	Low exploitation	Management advice	Maintain mortality below $F_{threshold}$	Maintain mortality at or below $F_{target}$	Maintain mortality below $F_{target}$ until stock recovers <sup>3</sup>
		Risk of recruitment failure	Low	Low	Medium

<sup>2</sup> Stock recovery includes other indicators as noted in text, including proportion of sexually mature fish in the stock, related to age structure.

Although, the monkfish overfishing definition does not contain a formalized control rule that specifies a fishing mortality management strategy, it does have a framework that defines when action should be taken. The shaded areas in the table above represent conditions when the stock would be considered overfished according to the following proposed definition. An overfished condition would require immediate and possibly drastic action to reduce the risk of stock collapse. The area to the right and above the dotted line (at medium exploitation and medium abundance) would be in danger of becoming overfished. Under these conditions, management should take timely but less drastic action to avert overfishing and move back toward the targets.

Monkfish in the Gulf of Maine are at high exploitation levels relative to the mortality threshold and at a low biomass relative to the survey threshold value. Monkfish in Southern New England and the Mid-Atlantic are also at high exploitation levels relative to the mortality threshold and at a low biomass relative to the survey threshold value. Both would therefore be considered overfished. The management advice would be to reduce fishing mortality to well below  $F_{target}$ , to allow stock rebuilding, and to close fisheries that catch a high proportion of immature fish.

#### 3.4.1.2 Rebuilding Schedule

Monkfish would be considered to be 'rebuilt' when the stock biomass is above the 1965-1981 average and when fishing mortality is below  $F_{target}$ . This condition is determined by the overfishing definition when monkfish would no longer be considered to be "in danger of becoming overfished."

Considering the advice of the TWG and the life history parameters for monkfish, the Councils believe that a rebuilding schedule of ten years can be achieved with the proposed action. Monkfish mature in approximately four years and live to 15-20 years. The TWG furthermore recommended that rapid rebuilding was possible, especially in the Northern Fishery Management Area where high recruitment levels have been recently observed from research survey data. Given the rapid rate of growth early in their lifespan and the recently high recruitment, the Council believes that it is possible to attain a 'rebuilt' status over two times the maturation time, or eight to ten years.

#### 3.4.2 To optimize yield and maximize economic benefits to the various fishing sectors

Optimum yield will be consistent with the definitions under development for the Multispecies FMP. Long-term optimum yield will be the calculated based on the target fishing mortality rates and target biomass levels specified in the overfishing definition. Annual optimum yield targets will be updated annually and calculated according to the following formula as the product of the target fishing morality rate in the overfishing definition times the current stock biomass:

$$OY_t = F_{target} * \bar{B}_t$$

#### 3.4.3 To prevent increased fishing on immature fish

Increased fishing pressure on immature fish would prevent the plan from achieving optimum yield and jeopardize recruitment. Female monkfish mature over a protracted time. Fifty percent of female monkfish mature at about 3 to 4 years of age, having an equivalent tail-length of 11 to 12 inches. Nearly all female monkfish are mature at 6 to 7 years of age, having and equivalent tail-length of 16 to 19 inches. While recruitment in the Northern Fishery Management Area has recently been good, the Councils are concerned about the low fraction of mature females in the monkfish population, which has been estimated as low as 20 percent in the northern area. Higher fishing mortality on immature fish

would allow fewer monkfish to become sexually mature and spawn. Considerable loss in yield-per-recruit would also occur if the fishery targeted smaller fish (NEFSC 1992).

### **3.4.4 To allow the traditional incidental catch of monkfish to occur**

Many vessels in the northeast region target a mixed group of species, of which monkfish is a component. While it is attractive to reduce mortality by inducing effort shifts away from monkfish in these mixed-species fisheries, it is not always possible. These fisheries are likely to continue fishing for the other target species and discard monkfish, unless the reduced monkfish landings made these mixed trips uneconomic. The Councils intent for the FMP is to accommodate these mixed-species fisheries as much as possible within existing regulations, thereby minimizing regulatory discards.

## **3.5 Purpose and Need**

The purpose of the proposed action is to initiate management of monkfish (*Lophius americanus*) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MFMCA) of 1976 as amended. On September 30, 1997, the monkfish fishery was determined to be overfished on the basis of inadequate stock level. The Council must therefore prepare and submit a FMP by September 30, 1998 that will stop overfishing and rebuild the monkfish stock within 10 years or less.

Section 304(e) of the MFMCA requires the Secretary of Commerce to annually review “the status of fisheries within each Council’s geographical area of authority and identify those fisheries that are overfished or are approaching a condition of being overfished.” If the Secretary of Commerce determines that a fishery is overfished, he must “notify the appropriate Council and request that action be taken to end overfishing in the fishery and to implement conservation and management measures to rebuild affected stocks of fish.” Upon notification, the appropriate Council must within one year prepare a fishery management plan, plan amendment, or proposed regulations to address these two issues (overfishing and rebuilding). If the Council fails to act, the Secretary of Commerce must prepare a plan or plan amendment to stop overfishing and rebuild the affected stock of fish.

Fishermen and dealers initially became concerned in 1992 about the landings of small fish and requested the Councils to implement management measures to prevent this activity. The Councils’ early effort was to develop a management plan to address those concerns. While the Council was working on that plan, it became apparent that the fishing mortality rate was at unsustainable levels and that the stock biomass was very low, compared to the levels observed in the 1960s and 1970s.

The 1997 landings reached an all-time high at 57.5 million pounds, whole weight (or 17.3 million pounds tail-weight). The average tail weight in the landings had declined to 0.9 pounds during 1995-1996. If the mean size of landed monkfish had not appreciably changed in 1997, then about 19 million fish were landed by the commercial fishery. Sea sampling observations, weighted by gear and area, indicate that about 54 percent of the monkfish stock was landed during 1995-1996, or about 16 percent by weight. If the earlier rate of discarding continued in 1997, then about 35 million fish were caught during 1997. The most recent stock assessment (NEFSC 1997), estimated that fishing mortality for monkfish was 0.15 in the Northern Fishery Management Area and 0.51 in the Southern Fishery Management Area, well over the overfishing levels of 0.05 and 0.14, respectively.

Given the rapid increase in landings, the decline in survey biomass indices, and the high exploitation rate compared to the reference points, the Councils are concerned about the status of this resource, because greater fishing effort and the practice of fishing for small fish cannot co-exist. The Councils, therefore, have developed this FMP to stop overfishing within four years of implementation and promote rebuilding to the biomass targets in 10 years, consistent with the new MFMCA requirements.

### **3.6 Best Scientific Information**

National Standard 2 of the Magnuson Act requires the Councils to develop conservation and management measures based on the best scientific information available. Normally, the Councils are able to use existing information about the fishery that is 1 to 1½ years old. Recent changes to management measures have required NMFS to drastically change their data collection system. The Councils have experienced delays in updating this data because of inevitable problems with implementation and execution of the new data collection requirements. The following summary describes the information used to evaluate the proposed management measures and how newer information may affect the results.

The most recent detailed stock assessment was conducted by SAW 23 (NEFSC 1997) during the fall of 1996. This assessment used fishery-dependent and survey data through the end of 1995 to evaluate the status of the monkfish resource. The estimates of fishing mortality trends from 1963 to 1995 were analyzed in five-year blocks to smooth the interannual variation that occurs in a randomized survey. Adding 1997 data would not radically alter the estimates of fishing mortality, although the proportion of monkfish at larger size may still be declining.

In addition to the above survey-based estimates, the 21st SAW included monkfish within its comprehensive assessment of the northeast demersal finfish complex. Most of the analyses in the comprehensive assessment were intended to show broad, long-term trends that were consistent across species. The monkfish indices were not classified by management area, but showed a decline to low levels of biomass through 1987. Since that time, biomass has fluctuated without trend at low levels, while abundance has increased in the Northern Fishery Management Area. The more recent information does not contradict the conclusion of SAW 23 that monkfish are at least fully-exploited and might be over-exploited.

Any biological analyses that depended on gear, time, or area fished were based on dealer, sea sampling, and day-at-sea usage data from 1995-1996, the latest information available. Landings and effort (gear, time, and area fished) data for the commercial fishery are current through 1996. Total landings data included 1997, but detailed information was not yet available to include in many of the impact analyses. The biological model assumed that a multispecies or scallop vessel would use the same number of days in the future as the vessel used during the 1996 fishing year (beginning May 1 for multispecies and March 1 for scallops), unless the 1996 day-at-sea use would exceed future allocations of days. In the latter case, the Councils assumed that the days-at-sea used by a multispecies or scallop vessel would equal its annual allocation, i.e. it would have no unused day-at-sea to target monkfish and would have to forego targeting multispecies or scallops when monkfish fishing is more lucrative.

Since the implementation of mandatory logbooks in 1994, effort data are collected via a different source. When this document was drafted, NMFS had processed the 1994 logbook data. Before releasing the preliminary data for general use, NMFS conducted a comprehensive review through the SAW process to evaluate its consistency with earlier forms of data collection, general accuracy, and utility for stock assessment. SAW 22 raised broad and serious concerns over the accurate representation of the information submitted on the logs. It further recommended that NMFS initiate a process of verification and recovery of the 1994-1996 logbooks.

NMFS has completed its verification and recovery of 1994 to 1996 logbook data, and these data have been used to estimate area fished, amount of gear in use, and soak time. Since 1993, regulations for other species have greatly affected the fishery. These regulations and the decline of other species caused fishing effort on monkfish to intensify and a new evaluation of trip limits would, in some cases, indicate that higher trip limits were necessary to accommodate monkfish catches in mixed fisheries. Bycatch estimates for monkfish, on the other hand, are less sensitive to shifts in fishing effort and may be unaffected by the newer data.

Analyses of the limited access qualification options did not require knowledge of the gear, time, or area fished. When setting the control date for monkfish (February 27, 1995), the Councils considered the impacts of various limited access options with landings (dealer) data through 1994. Since the initial evaluation, landings data were updated and the Council used weightout and dealer data from February 28, 1991 to February 27, 1995 (four years) to determine vessels that would automatically qualify for limited access.

The change in the data collection and processing at NMFS has also affected the processing of data from different sources. Some of the options in this proposed amendment require an analysis of length data from monkfish landed by the commercial fishery. Monkfish are most frequently landed after onboard processing and this makes it difficult for port agents to collect size data. The main source of commercial monkfish size data is from sea sampling. When this document was drafted, sea sampling length data was current through 1996.

Growth rates and maturation information was obtained from Armstrong et al. (1992) and Almeida and Harris (1995). Other life history data included total length to tail length and weight conversions, obtained from Lyons and Creaser (1986) and Wilk et al. (1987), respectively. No information is available for monkfish selectivity in gear with mesh larger than six inches.

Northeast region permit data from NMFS was used to estimate qualification (since vessels with multispecies day-at-sea permits had different criteria) and to evaluate potential impacts. The permit data were current through February 1998 when the Council conducted the biological impact analyses. The benefit-cost analysis (Section 8.1.6) and the analysis of significant action (Regulatory Flexibility Act, Section 1.1) were conducted a little later than the biological analyses and some 1997 data were used in these analyses. During the second round of public hearings, the Councils were given data for New Bedford, MA fishing industry by Dr. Daniel Geogianna. This information was considered when assessing economic and social impacts. There do not appear to be any substantial changes in fishing activity during 1997 that had not been taken into account by the analyses of 1995 and 1996 data.

## 4.0 PROPOSED MANAGEMENT ACTION

The proposed management action is the Councils' preferred alternative and includes the following primary measures:

- a) Qualification criteria for limited access, allocations of days-at-sea to vessels that qualify for limited access
- b) Trip limits for vessels on a monkfish day-at-sea, bycatch allowances for vessels not on a monkfish day-at-sea
- c) Minimum size limits
- d) Gillnet limits
- e) Mandatory time out of the fishery during the spawning season
- f) A framework adjustment process

Secondary management measures included in the proposed action are:

- a) Two management areas for setting biological reference points and implementing differing management measures
- b) Restrictions on liver landings to prevent high-grading
- c) A "running clock" procedure to administer trip limits without forcing vessels to discard excess monkfish
- d) Minimum mesh restrictions to reduce bycatch of groundfish and other species
- e) Permitting and reporting requirements (for dealers and limited access vessels)
- f) Other measures to ease administration and enforcement

### 4.1 Limited Access

A moratorium on vessel permits will be implemented effective as of the control date, February 27, 1995. Some vessels will qualify to target monkfish and exceed any applicable bycatch trip limits, based on the vessel's landings history prior to the control date. The Councils intention is to implement the monkfish limited access program as soon as practical, but no later than May 1, 1999, which is the start of the next fishing year. NMFS is encouraged to implement limited access as soon as possible, but the

Councils recognize that it is likely to start on May 1, 1999 due to administrative procedures. As of May 1, 1999, a vessel must have a monkfish limited access permit and operate during a monkfish day-at-sea to retain monkfish above the trip limits defined in Sections 0, 4.5.3, 4.6.2, or 4.6.3. Vessels whose qualification criteria are under appeal or official review may also operate for no more than 40 monkfish day-at-sea during a fishing year until their appeal is concluded.

Vessels that do not qualify may target monkfish (i.e. landings predominately composed of monkfish) as long as they do not exceed the bycatch trip limits that apply in Section 0, 4.5.3, 4.6.2, or 4.6.3. Since there are bycatch allowances for all non-qualifying vessels and more liberal qualification criteria for small vessels, there will be no exceptions to the limited access program. After the monkfish stock has rebuilt to target biomass levels, the Councils may consider recommending the issuance of additional permits for monkfish limited access.

**Rationale:** It is necessary to control the number and characteristics of vessels in the monkfish fishery to ensure that the day-at-sea allocations effectively control fishing effort. If the number of vessels that can target monkfish increases or the fishing power of the vessels increases, fishing mortality would rise above the overfishing targets and thresholds. As a result, the Councils would be forced to reduce the annual monkfish day-at-sea allocations to levels that might be uneconomic to individual vessels.

#### **4.1.1 Control Date And Qualification Period**

On February 27, 1995, the Councils published a notice in the Federal Register announcing that new vessels in the monkfish fishery would not be guaranteed future access to the fishery. This notice was necessary to prevent speculative entry into the fishery while the Councils deliberated on a management system that included limited access. Any vessel that had insufficient landings history to indicate that it targeted monkfish and derived significant economic benefit from monkfish will not be allowed to exceed the applicable bycatch allowances defined in Section 0, 4.5.3, 4.6.2, or 4.6.3.

The beginning of the qualification period is February 28, 1991, four years prior to the control date. A four-year qualification period was chosen because it encompassed the development of the directed monkfish fishery and included a sufficiently broad time period so that it was unlikely that a vessel could not qualify due to equipment malfunction, extended maintenance, or illness. The qualification criteria were furthermore chosen such that any vessel that targeted monkfish on even a seasonal basis would be likely to qualify for limited access.

#### **4.1.2 Limited access criteria and qualification procedure**

Vessels will qualify for monkfish limited access based on the vessel's (or a replaced vessel's) historic participation from February 28, 1991 to February 27, 1995 (the monkfish control date). This time frame is defined as the "qualification period". Vessels could automatically qualify based on official (NMFS or state) weighout or dealer reports. Other vessels will be allowed to substantiate other data to qualify during a verification period described in Section 4.1.2.3.

##### **4.1.2.1 Landings requirements**

All vessels will qualify, subject to the guidelines explained below, for limited access and be eligible to receive annual monkfish days-at-sea allocations if the vessel landed more than 50,000 pounds tail-weight (166,000 pounds whole-weight) during the qualification period. Vessels that do not have a multispecies or scallop limited access permits and qualifies according to this criterion will receive a "Category A" monkfish limited access permit (Table 4). Vessels that have a multispecies or scallop limited access permit and qualifies according to this criterion will receive a "Category C" monkfish limited access permit.

Vessels that are less than 51 gross registered tons (GRT) and all vessels with a multispecies day-at-sea permit will qualify, subject to the guidelines explained below, for limited access and be eligible to receive annual monkfish days-at-sea allocations if the vessel landed more than 7,500 pounds tail-weight (24,900 pounds whole-weight) during the qualification period. Vessels that do not have a multispecies or scallop limited access permit and qualifies according to this criterion will receive a “Category B” monkfish limited access permit (Table 4). Vessels that have a multispecies or scallop limited access permit and qualifies according to this criterion will receive a “Category D” monkfish limited access permit.

**Table 4.** Monkfish permit categories, qualification criteria, days-at-sea allocations, and trip limit for vessels on a monkfish day-at-sea.

Category	Qualification Criteria	Days-At-Sea Allocation <sup>3</sup>	Trip Limit While On A Monkfish Day-At-Sea After May 1, 2000 <sup>4</sup>
A, C	50,000 pounds tail-weight	Annual amount; multispecies and scallop vessels (category C) must also be on a multispecies or scallop day-at-sea	1,500 pounds tail-weight per day-at-sea while using mobile gear; 300 pounds tail-weight per day-at-sea while using fixed gear
B, D	7,500 pounds tail-weight; vessels < 51 GRT or possessing a multispecies day-at-sea permit	Annual amount; multispecies and scallop vessels (category D) must also be on a multispecies or scallop day-at-sea	1,000 pounds tail-weight per day-at-sea while using mobile gear; 300 pounds tail-weight per day-at-sea while using fixed gear

Vessels must also comply with the following guidelines to be eligible for qualification. These conditions were published and distributed in the control date notice.

1. Newly constructed vessels and vessels that rerigged via vessel modification will be eligible to qualify the vessel was under construction during the period February 28, 1991 to February 27, 1995, as evidenced by written construction contracts or other forms of documentation. To qualify for monkfish limited access, a vessel must meet the qualification criteria (specified in Section 4.1.2.1) during the period of February 28, 1991 (the start of the qualification period) and February 27, 1996 (one year after the control date, Section 4.1.1).
2. Change in ownership: Unless the Regional Administrator determines to the contrary, no more than one vessel may qualify, at any one time, for a limited access monkfish permit based on that or another vessel’s fishing and permit history. If more than one vessel owner claims eligibility for a limited access monkfish permit based on one vessel’s fishing and permit history, the Regional Administrator will determine, based on the provisions below, who is entitled to qualify for the permit and the days-at-sea allocation.

If a vessel was replaced, the Regional Administrator should presume that the original vessel’s history applies to the new vessel for a continuous history of fishing during February 28, 1991 to February 27, 1995, unless the original vessel retained historical participation as specified in the following paragraphs. The Regional Administrator may establish this provision for continuous ownership as either a qualification criteria for receiving a permit or as a ground for appeal of eligibility. For example, the history of a vessel that sank or was otherwise destroyed should be applied to the vessel history of a new replacement vessel if the same individual or entity owned both boats. If the original vessel landed 30,000 pounds tail-weight and the second vessel landed 25,000 pounds tail-weight, both during the four-year qualification period, then the vessel would be eligible for a Category A or C permit, because it landed over 50,000 pounds tail-weight through sequential ownership. The same provision would apply to two or more vessels that individually landed less than 7,500 pounds tail-weight during the four-year qualification period, allowing a vessel to qualify for a Category B or D permit based on the sequential history of two or more replacement vessels. This provision should allow for no more than one vessel to be eligible for monkfish limited access.

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<sup>3</sup>Section 4.3.1

<sup>4</sup>Section 4.6.1

If a new owner was in the process of buying a vessel during the control date (Section 4.1.1), the change of ownership will be considered “in-process” and it will qualify under the exception for a newly constructed vessel as described above. That is, a vessel whose sale was “in-process” will have until February 27, 1996 to meet the qualification criteria. An example of an “in-process” sale is one where a bill of sale was signed prior to the control date, but sale did not take place until after the control date. The monkfish landing history of both the new and old owner may be combined for qualification of the vessel under the new ownership.

Historical participation will be presumed to transfer with a vessel, for transfers made after February 27, 1995, unless such transfers were accompanied by a written document indicating the agreement of both buyer and seller that any future fishing rights applicable to that vessel were not transferred via sale, lease, or any other means of conveyance. Any such transfers or explicit retention of fishing rights and permits will be presumed to transfer or be retained in their entirety, unless written documentation clearly states otherwise.

3. **Vessel loss or upgrades:** If fishing rights are explicitly retained by a previous owner as described above, or a qualifying vessel is lost or destroyed, the owner of said vessel or its rights will qualify for a limited access permit for monkfish without having title to a replacement vessel.
4. **Vessel history:** A vessel's history may be applied such that no more than one vessel may rely on that history to qualify for the limited access fishery.

**Rationale:** The landings requirements during the qualification period were chosen so that active vessels in the monkfish fishery would be likely to qualify to receive monkfish days-at-sea allocations. Although there is considerable overlap between vessels having greater landings of monkfish as bycatch and vessels landing lesser amounts from targeting monkfish, these landings criteria would allow vessels that had substantial economic dependence on monkfish prior to the control date to qualify. Because the volume of landings can be a function of vessel size, a more liberal criterion was established for vessels less than 51 GRT, considered to be a small vessel less than 40 to 60 feet in length. Other vessels with substantial economic dependence on monkfish either entered the fishery after the control date or would be able to continue targeting monkfish under the bycatch trip limits.

The qualification criteria for a vessel holding a multispecies permit is more liberal than for other vessels, because many vessels have an unavoidable catch of monkfish when they are fishing for large-mesh groundfish. Often monkfish are a component of their targeted catch, comprising 25 to 40 percent of the catch in the Northern Fishery Management Area. Since these catches could not be accommodated by a bycatch allowance and they would not be enough to meet the 50,000 pounds tail-weight criterion, vessels that are less than 51 GRT will be allowed to qualify for monkfish limited access by showing 7,500 pounds tail-weight of monkfish landings during the four-year qualification period.

The guidelines resolve uncertainties about how to handle qualification of vessels that replaced another qualifying vessel or vessels that have been upgraded. The guidelines presume that the history and permits also transfer with the sale of a vessel, unless there is written documentation to specify otherwise. The guidelines also prohibit permit splitting through vessel sale to prevent speculative increases in fishing effort by transferring the monkfish history with the vessel, while transferring other permits (e.g. multispecies or scallop) to another vessel.

#### 4.1.2.2 Vessel upgrades between February 27, 1995 and May 1, 1999

Vessels that upgraded since February 27, 1995 and exceed the 51 GRT limited access qualification threshold may qualify according to the criteria for vessels less than 51 GRT, if the vessel or the vessel it replaced was less than 51 GRT between February 28, 1991 and February 27, 1995, inclusive. If the vessel history is consistent with the above criteria, it will receive a Category B or D permit and must fish according to the rules that apply to vessels having a Category B or D permit, respectively. Other types of vessel upgrades (Section 4.2.1.2) prior to plan implementation will not make a vessel ineligible for a limited access monkfish permit.

**Rationale:** Although the above guidelines for upgrading, permit transfers, etc. were included in the control date publication and notification to permit holders, the Councils believe that it would be unfair to make a vessel ineligible for limited access because it exceeded some, as yet undefined, upgrading provisions. The control date notice stated that, “Upgrades or replacements of vessels after February 27, Monkfish FMP

1995 that are inconsistent with the Multispecies Fishery Management Plan will disqualify the vessel from the limited access monkfish fishery." This provision to allow a vessel to qualify for a permit category having greater restrictions (lower trip limits would apply as of May 1, 2000) is consistent with the vessel history during the four-year qualification period.

#### 4.1.2.3 Verification process

Vessels will automatically qualify based on official weighout or dealer records (NMFS or state reports showing the landings for that vessel). The owners of pre-qualified vessels will be notified of the vessel's status prior to implementation on May 1, 1999 of the limited access regulations. Vessels with insufficient landings in the official weighout/dealer database will be allowed to certify other sources of supporting evidence during a verification period. The verification period is not to exceed one year unless deemed necessary by the Regional Administrator.

Once a vessel has appealed its eligibility for monkfish limited access, the vessel may request an annual allocation of monkfish day-at-sea. The vessel must participate in the call-in system or report time-at-sea via a VMS while fishing for monkfish on trips that are expected to exceed the monkfish bycatch allowances (Sections 0.4.5.3, 4.6.2, or 4.6.3). Total fishing effort on trips exceeding the bycatch allowances and days reported as a monkfish day-at-sea must not exceed the annual allocation of days before the verification process is concluded.

**Rationale:** This provision provides a method to qualify vessels whose monkfish landings were not individually recorded in NMFS or state landings programs. Reporting by dealers or vessels of monkfish landings were not required prior to implementation of the Monkfish FMP. It would be patently unfair, therefore, to require official landings records as the sole condition for qualification.

## 4.2 Permits

### 4.2.1 Limited Access Vessel Permits

Vessels that qualify for monkfish-only limited access will be required to submit an application and obtain a monkfish permit. To renew or apply for a limited access monkfish permit, the Regional Administrator must receive a completed application by the last day of the fishing year for which the permit is required. Failure to renew a limited access monkfish permit in any year bars the renewal of the permit in subsequent years. Changes in information supplied for the permit must be reported to the Regional Administrator within 15 calendar days of the change.

Vessels may be able to target or retain monkfish as a bycatch while they are fishing under multispecies or scallop days-at-sea, or another federal permit, provided that they do not exceed the trip limits in Section 4.6.2 or 4.6.3. No additional permits or stamps (permit riders) will be required for these limited access vessels.

Permit holders would be required to carry their permit aboard the fishing vessel during fishing and off-loading operations. It must also be available for inspection upon request by an authorized officer. The Regional Administrator may, after publication in the Federal Register, charge a permit fee for administration.

**Rationale:** Vessel permits are necessary to effectively administer and enforce the days-at-sea restrictions and trip limits. Only vessels that comply with the limits on upgrading, refitting, or replacement (Section 4.2.1.2) and that have a monkfish limited access permit will receive annual allocations of monkfish days-at-sea. Vessels that do not have a monkfish limited access permit and any vessel that does not report the monkfish days for a trip cannot exceed the bycatch allowances (Section 0.4.5.3, 4.6.2, or 4.6.3).

#### 4.2.1.1 Transfers, vessel sales, and vessel replacement after May 1, 1999.

The fishing and permit history of a vessel is presumed to transfer with the vessel whenever it is bought, sold, or otherwise transferred, unless there is a written agreement, signed by the transferor/seller and transferee/buyer, or other credible written evidence, verifying that the transferor/seller is retaining the vessel's fishing and permit history for purposes of replacing the vessel. A monkfish limited access permit cannot be transferred to another vessel unless any and all permits associated with that vessel are transferred to the new vessel. Monkfish limited access permits may not be transferred onto another vessel that already has a monkfish limited access permit (i.e. "stacked") unless the original permit is retired (by remitting the permit to the Regional Administrator) or revoked for failure to renew the permit.

**Rationale:** The prohibition on permit 'stacking' prevents a qualifying vessel from using more than one allocation of monkfish days-at-sea, thereby receiving an excessive share of rights to fish. It also prevents fishermen from splitting permits to increase targeting of various species in different fisheries. The prohibition on permit 'splitting' reduces capital stuffing and fishing mortality that would be caused by applying single permits to individual fisheries. It also maintains flexibility for fishing vessels to participate in a mixed-species fishery, consistent with current practices.

#### 4.2.1.2 Limits on upgrading, refitting, or replacement

Any upgrade, refit, or vessel replacement must comply with the specifications in the Code of Federal Regulations, 50 CFR, §648.4. Any monkfish limited access vessel that no longer complies with the upgrade, refit, and replacement limits will be issued a confirmation of permit "history" (Section 4.2.3) and the vessel will be allocated no monkfish days-at-sea. A vessel may be upgraded, whether through refitting or replacement, and still be eligible for or be eligible to retain or renew a monkfish limited access permit, only if the upgrade complies with the following:

- a) The vessel's horsepower may be increased, whether through refitting or replacement, only once. Such an increase may not exceed 20 percent of the horsepower of the vessel initially issued a limited access permit as of the date the initial vessel applied for such permit.
- b) The vessel's length, gross registered tonnage (GRT), and net tonnage (NT) may be increased, whether through refitting or replacement, only once. Any increase in any of these three specifications of vessel size may not exceed 10 percent of the respective specification of the vessel initially issued a limited access permit as of the date the initial vessel applied for such permit. If any of these three specifications is increased, any increase in the other two must be performed at the same time. This type of upgrade may be done separately from an engine horsepower upgrade. If a vessel with a Category B or D permit is upgraded beyond 51 GRT and the increase in GRT does not exceed 10 percent, the vessel will retain and fish under the originally issued Category B or D permit that was issued during plan implementation.

**Rationale:** These limits control the fishing power of vessels that target monkfish during a monkfish day-at-sea. Without these limits, fishing mortality could increase although the day-at-sea allocations remain constant. In response, the Councils would have to lower the annual monkfish days-at-sea allocations, possibly to levels that become uneconomic to individual vessels.

#### 4.2.1.3 Reporting requirements

There are four types of reports that will be required of vessels with active (NMFS allocates monkfish days-at-sea) limited access vessels:

- a) Information requested on a permit application
- b) Information required when calling in and out of the days-at-sea program
- c) Declaration of fishing areas
- d) Vessel trip reports (VTR)

Vessel owners or operators will be required to report information on the annual limited access permit application (50 CFR, §648.4). Vessel owners or operators will be required to follow the regulations (50 CFR, 648.10) to participate in the days-at-sea program and make fishing log report (VTR) [50 CFR, 648.7(b)] for each trip taken by the vessel.

**Area declaration:** An area declaration will be necessary in year 2 and subsequent years if minimum size limits and trip limits differ among the Northern and Southern Fishery Management Areas. Prior to making a trip, vessels with multispecies, scallops, and monkfish days-at-sea permits will be required to declare, for up to 30 days or longer period of time, into the Northern Fishery Management Area to fish under the less restrictive size limit (11-inches tail-length) and trip limits. This declaration will require that the vessel fish only in the Northern Fishery Management Area during the 30-day period beginning with the date of declaration. If the vessel has not made a Northern Fishery Management Area declaration, it will be presumed that the vessel fished in the Southern Fishery Management Area during the trip and the more conservative restrictions will apply to the entire trip. A vessel that has declared its intent to fish only in the Northern Fishery Management Area may transit the Southern Fishery Management Area provided that it complies with the transiting provisions described in Section 4.4.

**Rationale:** Vessel trip reports are needed to monitor fishing effort and discards. These data are crucial to assessing the future status of monkfish and monitoring the effectiveness of management to reduce fishing mortality while keeping discards to a minimum. The area declaration is needed to ensure that vessels do not fish in the Southern Fishery Management Area and transit the Northern Fishery Management Area to land monkfish under the less restrictive measures that apply in the northern area. The 30-day declaration period is necessary to improve enforceability. Otherwise, vessels could rapidly switch fishing areas leading to confusion and poor compliance with the more restrictive Southern Fishery Management Area restrictions.

## 4.2.2 General Category (bycatch) Permits for Monkfish

Any vessel that retains monkfish for commercial sale must obtain a general category permit. This permit will enable a vessel to retain monkfish in amounts less than the bycatch allowances that are appropriate for the gear and the permit that is held by the vessel. These bycatch trip limits are described in Sections 0 and 4.5.3. Vessels with limited access monkfish permits do not need this permit to operate in another fishery that has a monkfish bycatch allowance. Permits are transferrable to replacement vessels and there are no upgrading restrictions, other than the restrictions place on the vessel by other permits.

### 4.2.2.1 Reporting requirements

Vessels with a general category monkfish permit must submit a vessel trip report showing the monkfish catch, fishing effort on the trip, and any other information required on a trip report.

## 4.2.3 Confirmation of Permit “History”

Owners of a vessel that qualified for a limited access monkfish permit (Section 4.2.1), and no longer own the vessel, it sank or was otherwise destroyed may apply for a Confirmation of Permit History, provided that the vessel permit was legally retained by the applicant (Section 4.2.1.1). This person or entity will receive no monkfish days-at-sea allocations until the permit is transferred to another vessel that complies with the upgrading requirements (Section 4.2.1.2). All other provisions of 50 CFR §648.4(a)(1)(i)(J) will apply.

**Rationale:** An owner must hold title to a vessel granted a limited access permit and therefore cannot renew one for a vessel that sank or was otherwise destroyed. This Confirmation of Permit History enables a fisherman that had a limited access monkfish permit on a vessel to maintain the permit without assigning it to a non-existent vessel.

#### **4.2.3.1 Reporting requirements**

Other than providing any required or optional information on the confirmation of permit history application, there will be no reporting requirements associated with this permit status.

#### **4.2.4 Operator Permits**

An operator of a vessel with a monkfish permit must have an "Operator's Permit" issued by NMFS. Any vessel fishing commercially for monkfish must have on board at least one operator who holds a permit, issued under the Code of Federal Regulations, CFR 50, part 648.5. That operator may be held accountable for violations of the fishing regulations and may be subject to a permit sanction. During the permit sanction period, the individual operator may not work in any capacity aboard a federally permitted fishing vessel.

The permit program has the following requirements:

- a) Any operator of a vessel fishing for monkfish must have an operator's permit issued by the NMFS Regional Administrator.
- b) An operator is defined as the master or other individual on board a vessel who is in charge of that vessel. (Note: a general definition of an operator is specified in the Code of Federal Regulations, CFR 50 part 285.2.)
- c) The operator will be required to submit an application, supplied by the Regional Administrator, for an Operator's Permit. No experience or income requirements would need to be met. Any applicant may receive a permit providing they do not have sanctions placed against another fisheries permit issued to them.
- d) The permit is not transferable.
- e) Permit holders would be required to carry their permit aboard the fishing vessel during fishing and off-loading operations and must have it available for inspection upon request by an authorized officer.
- f) The Regional Administrator may, after publication in the *Federal Register*, charge a permit fee.

**Rationale:** An operators permit is necessary to identify the responsible person(s) for a fishery violation. The permit reduces enforcement costs and increases compliance because an operator's permit can be sanctioned for egregious or repeated violations.

#### **4.2.4.1 Reporting requirements**

Other than providing any required or optional information on the operator permit application, there are no reporting requirements associated with the permit.

#### **4.2.5 Dealer Permits**

Any dealer of monkfish must have a permit issued by the Regional Administrator. A dealer is be defined as the person who first receives fish by way of purchase, barter, or trade. (Note: a general definition of a dealer is specified in 50 CFR §648.2.) The dealer would be required to submit an application, supplied by the Regional

Administrator, for a Processor/Dealer Permit, which would be issued for a 12-month period. Applications must contain at least the following information, and any other information required by the Regional Administrator: Company name, place(s) of business, mailing address(es) and telephone number(s), owner's name, dealer permit number (if a renewal), name and signature of the person responsible for the truth and accuracy of the application, a copy of the certificate of incorporation if the business is a corporation, and a copy of the Partnership Agreement and the names and addresses of all partners if the business is a partnership.

The permit would not be transferable and would expire upon change in ownership of the business. The permit must be maintained at the place of business and be available for inspection upon request by an authorized officer. The Regional Administrator may, after publication in the *Federal Register*, charge a permit fee. The Regional Administrator may require that all permitted dealers, including restaurants buying directly from boats, comply with any data reporting requirements as a provision of dealer permitting.

**Rationale:** Dealer permits are necessary to effectively administer the mandatory reporting requirements. Without dealer permits, enforcement and monitoring costs would be substantially higher to ensure that every dealer that processes monkfish would report every landing of monkfish.

#### 4.2.5.1 Reporting requirements

In addition to required or optional information supplied on a dealer applications, dealers must make weekly reports of all fish landed and received on reports supplied by and sent to the Regional Administrator according to 50 CFR, §648.7.

**Rationale:** Dealer reports are necessary to accurately monitor monkfish landings. Other methods of reporting landings are either inaccurate or ineffective.

### 4.3 Effort Management – Annual Day-At-Sea Allocations

Limiting the amount of time that qualifying vessels may target monkfish will control fishing effort, and therefore fishing mortality. Monkfish days-at-sea will be allocated to vessels that qualify for monkfish limited access at the beginning of the fishing year, May 1. Days-at-sea will be counted using procedures specified in the Code of Federal Regulations, CFR 50 part 648.84 and reported via a call-in or vessel monitoring system (VMS). In the event that the fishing year or the method of counting days-at-sea for day-boat gillnet vessels or for vessels using any other gear is changed in the Multispecies FMP, that new method would automatically apply to vessels fishing under a monkfish day-at-sea.

Monkfish limited access vessels will receive an annual allocation of monkfish days-at-sea that may be used to target monkfish or exceed the bycatch allowances (Sections 0, 4.5.3, 4.6.2, or 4.6.3). Following the same procedures in the Code of Federal Regulations, CFR 50 part 648.84, up to 10 unused days-at-sea from the prior year may be carried forward, provided that the vessel participated in the call-in program during the prior year. Days that are under sanction because of a violation may not be carried forward into the next fishing year.

To meet the mortality objectives of the plan in year 4, no directed days-at-sea will be allowed for multispecies vessels (category C and D), scallop vessels (category C and D), or monkfish-only vessels (category A and B). This measure will take effect unless the Councils, via future framework adjustments, replace it with alternative measures having the same conservation value, or the year 2 management measures are sufficient to reduce mortality below the FMP's rebuilding mortality targets (Table 6).

## **Procedure upon implementation**

If prior to May 1, 1999, NMFS has satisfactorily completed the automatic qualification process and vessels have had a satisfactory period to apply for a monkfish limited access permit (either through automatic qualification or appeal), a partial-year allocation of days-at-sea may be allocated. Monkfish days would be prorated, on a calendar basis, upon plan implementation. If plan implementation begins on March 1 and the annual fleet allocation is 40 days, for example, then limited access vessels would receive 7 days to target monkfish between March 1 and April 30. Future days-at-sea allocations would be granted at the start of the fishing year, May 1. If the implementation of the monkfish days-at-sea program coincides with May 1, pro-ration will be unnecessary.

**Rationale:** It is desirable to initiate the days-at-sea program as soon as practicable, but the Councils recognize the time it will take to qualify vessels for monkfish limited access. If it is possible to implement the monkfish days-at-sea program before May 1, 1999, this section describes how many days-at-sea should be allocated in the current fishing year.

### **4.3.1 Annual monkfish day-at-sea allocations**

Forty (40) days-at-sea will be allocated to vessels with a category A, B, C, and D permit (Table 4) on May 1, 1999 (the beginning of year 1). Forty (40) days-at-sea will also be allocated to monkfish limited access permit holders (categories A-D) at the beginning of years 2 and 3. Unless these allocations of days-at-sea and other restrictions on size limits and bycatch stop overfishing and achieve the annual rebuilding mortality targets, no (0) days-at-sea will be allocated in year 4 and subsequent years of the FMP. The Councils may adjust other measures in the FMP to achieve equivalent fishing mortality reductions and adjust the days-at-sea allocations via the framework process. The anticipated days-at-sea allocations are shown in Table 5.

**Table 5.** Monkfish limited access days-at-sea allocations

Fishing year	Annual days-at-sea allocation:
May 1, 1999 to April 30, 2000	40
May 1, 2000 to April 30, 2001	40
May 1, 2001 to April 30, 2002	40
May 1, 2002 to April 30, 2003 and subsequent fishing years	0

Any vessel may carryover a maximum of 10 unused monkfish days-at-sea to the following fishing year's allocation (including beyond May 1, 2002). NMFS will automatically credit each vessel with the amount of days-at-sea remaining in the prior year's account up to a maximum of 10 days-at-sea. Monkfish days-at-sea may not be carried over beyond the year following the one in which they were unused. A vessel owner will not have to apply to have the days-at-sea carried forward.

**Rationale:** Days-at-sea is one of the primary mechanisms for controlling and reducing fishing mortality. The Councils chose 40 days-at-sea because it is believed that fewer days would not provide enough fishing time for even an economically viable seasonal fishery. Few qualifying vessels appear to fish more than 40 days absent, according to the NMFS weightout data, but the Council believes that vessels without multispecies and scallop permits underreported the landings of monkfish. Additional mortality reduction is also expected by limiting multispecies and scallop vessels to using no more than 40 multispecies or scallop days to target monkfish, provided that the vessel qualifies for monkfish limited access.

The 10-day carryover is needed to provide more flexibility to vessels on trips near the end of the fishing year. Near the end of a fishing year, a vessel with unused days-at-sea might be tempted to extend the trip to avoid

loosing allocated fishing time. This practice could lead to unsafe operating conditions, e.g. overloading the hold capacity, fatigue, or remaining at sea during extremely bad weather. Since a slight delay of a portion of the vessel's fishing activity would not jeopardize the mortality objectives, the benefits of increased safety and better operating conditions is worth the small administrative cost.

### **4.3.2 Multispecies and scallop vessels**

Multispecies and scallop vessels that qualify for monkfish limited access (Categories C and D) will receive the same number monkfish day-at-sea as allocated to other permit categories. When the vessel targets monkfish and reports a trip under the monkfish day-at-sea program, the trip will also count against a multispecies or scallop day-at-sea, whichever is applicable. A combination vessel that holds both types of permits may target monkfish during either a multispecies or scallop day-at-sea, provided that unused days are available. The combination vessel must fish according to the rules that would apply to a vessel on either a multispecies or scallop day-at-sea.

**Rationale:** Multispecies and scallop vessels will often qualify for monkfish limited access based on the vessel's monkfish landings while targeting a mix of multispecies/monkfish or scallops/monkfish. In keeping with the mixed catch nature of these two fisheries and the type of fishing effort that qualifies the vessel, trips that exceed the monkfish bycatch allowances must also count against the multispecies or scallop days-at-sea. If multispecies and scallop vessels were able to take their monkfish days apart from (and in addition to) multispecies or scallop days-at-sea, fishing mortality could not be controlled at threshold or target levels. In response, the Councils would have to reduce monkfish days-at-sea allocations to uneconomic levels, possibly to levels that are less than one trip length in duration.

### **4.3.3 Days-at-sea monitoring and reporting requirements**

Days-at-sea, collected and monitored by a certified VMS or call-in program, will be deducted from each vessel's annual allotment. Any vessel that intends to take a trip to target monkfish or exceed the bycatch allowances must declare a monkfish trip prior to leaving port. If the vessel declares its intention to use monkfish days, it will be required to have only legal gear aboard for targeting monkfish (Section 4.7). In other words, limited access vessels will not be able to switch between days-at-sea regulated fisheries in the middle of a trip. On the other hand, if the vessel intends on operating in a fishery with an allowable bycatch of monkfish (Sections 0, 4.5.3, 4.6.2, or 4.6.3), it will not be necessary to call-in monkfish day-at-sea to land monkfish in amounts less than or equal to the bycatch allowance.

The annual allocation of monkfish days will coincide with the multispecies fishing year, currently May 1 to April 30. Future allocations or adjustments may occur at other times than the start of the fishing year, but the intention of the scientific monitoring process (Section 4.11.2.1) is to adjust day-at-sea, if necessary, at the start of the fishing year.

**Rationale:** The procedure described above uses existing systems and mechanisms for monitoring days-at-sea in the multispecies and scallop fisheries. If it is possible to use the VMS equipment to report both multispecies and monkfish or scallop and monkfish days, then vessels with VMS equipment can utilize existing equipment to reduce costs and reporting burdens.

#### **4.3.3.1 Vessels using gillnets during a monkfish day-at-sea**

Vessels that will fish with gillnets during a monkfish day-at-sea must declare into one of two permit categories, prior to the beginning of the fishing year. Days-at-sea for vessels using gillnets will be monitored with the same procedures used to count multispecies days. The present multispecies monitoring system counts hours away from port. If the Council changes the method of accounting for multispecies, the accounting of monkfish days-at-sea will also change via automatic action.

**Day gillnet category:** If the vessel declares into a day gillnet category, each trip under a monkfish day-at-sea lasting between 3 and 15 hours will be counted as a minimum of 15 hours against the annual monkfish day-at-sea allocation. Trips lasting more than 15 hours will be counted in hours from the time the vessel called into a day-at-sea until it has returned to port and called out of a day-at-sea. Fishing gear may remain unintended at sea between trips.

**Trip gillnet category:** If the vessel declares into a trip gillnet category, each trip under a monkfish day-at-sea will be counted in hours from the time the vessel called into a day-at-sea until it has returned to port and called out of a day-at-sea. When fishing under a monkfish day-at-sea, a trip gillnet vessel is required to remove all gillnet gear from the water before calling-out of a monkfish day-at-sea under 50 CFR §648.10(c)(3). When not fishing under a monkfish day-at-sea trip gillnet vessels may fish in an exempted fishery with gillnet gear. Vessels electing to fish under the trip gillnet designation must have on board written confirmation issued by the Regional Administrator, that the vessel is a trip gillnet vessel.

**Rationale:** The two methods of accounting for day-at-sea accommodate different fishing strategies, without unfairly penalizing some fishermen. Vessels that usually make short day-trips to tend gear may do so, but trips that are greater than 3 hours and less than 15 hours will be counted as if the vessel remained at sea for the entire day. This procedure prevents vessels from gaining an unfair advantage by fishing 4 to 8 hours per trip and allowing the net to fish for double or triple the time that other vessels can fish. Vessels fishing under the trip gillnet category will not be penalized for making short trips (by deducting a minimum of hours from the annual day-at-sea allocation), but must not leave the gear unintended at sea between trips. This strategy and the method for accounting monkfish day-at-sea is the same as the procedure for vessels using trawls.

#### 4.3.3.2 Running clock procedure

Vessels that fish during a monkfish day-at-sea may land more than the directed fishery trip limits specified in Section 4.6.1, provided that the days-at-sea continue to count against the monkfish day-at-sea allocation until the ‘trip’ is long enough so that the landings do not exceed the daily trip limits had the trip ended at a later time. The same procedures in 50 CFR §648.86 for administering the trip limit for cod under the Multispecies FMP will apply to the landings of monkfish during a monkfish day-at-sea. A vessel that exceeds the directed fishery trip limits must have sufficient monkfish days-at-sea remaining to accommodate the excess catch. Once the vessel has returned to port, it cannot sail to target other species until the vessel has called out of a monkfish day-at-sea. If the vessel was also operating under a multispecies or scallop day-at-sea (Section 4.3.2), the vessel may call out of those days when the vessel returns to port, without calling out of a monkfish day-at-sea.

If the monkfish landings exceed the applicable directed fishery trip limit, the vessel operator would not call-out of the monkfish day-at-sea program until sufficient time has elapsed to account for and justify the amount of monkfish harvested at the time of offloading regardless of whether all of the monkfish on board is offloaded. For example, a vessel that has called-in to the monkfish day-at-sea program at 3 p.m. on Monday may fish and come back into port at 4 p.m. on Wednesday of that same week with 4,000 lb (1,814.4 kg) of monkfish, and offload some or all of its catch, but cannot call out of the monkfish day-at-sea program until 3:01 p.m. the next day, Thursday (i.e., 3 days plus one minute).

Upon entering port, and before offloading, the vessel operator must notify the Regional Administrator and provide the following information: Vessel name and permit number, owner and caller name, phone number, and the haul weight of monkfish on board and the amount of monkfish to be offloaded, if any. A vessel that has not exceeded the landing limit and is offloading and ending its trip by calling out of the monkfish day-at-sea program does not have to report the landings of monkfish via this call-in system. A vessel that has not exceeded the monkfish landing limits described in Section 4.6.1 and that is offloading some or all of its catch is subject to the call-in requirement described in Section 4.3.3.

**Rationale:** This procedure is necessary to account for the vagaries of fishing and avoiding situations when vessels must discard catch to return to port or sit in the ocean during bad weather to avoid discarding fish. Even though the vessels would probably be targeting monkfish while on a monkfish day-at-sea, catches are unpredictable. A vessel that has a few good hauls early in the trip or an unexpected good haul late in the trip can return to port early due to bad weather or equipment problems without violating the directed fishery trip limits or discarding valuable monkfish.

## 4.4 Management areas

Federal management will apply throughout the range of the species. Two management areas for monkfish will be established (Figure ), a northern fishery management area (NFMA) and a southern fishery management area (SFMA). The Northern Fishery Management Area is defined by a line starting at the intersection of 70

~~Twelve miles offshore of Cape Cod, MA (point A), then~~

southward along 70

~~Twenty-four miles offshore, 41° N latitude, then eastw~~

a northerly direction along the U.S. - Canada boundary until it intersects the Maine shoreline, and then following the coastline in a southerly direction until it intersects with point A. The SFMA would be defined by a line starting at point A, then in a southerly direction to 33°50' N latitude (the NC-SC border), then due east to the 200 mile limit, then in a northerly direction along the 200 mile limit to the U.S. - Canada boundary, then in a northwesterly direction along the U.S. - Canada boundary to 41

N latitude,

then westward to 70

W longitude,

between these two management areas is shown in Figure . Different management measures will apply to vessels fishing in different management areas or sub-areas.

**Transiting provisions:** Vessels may transit from one area to another for the purposes of fishing for monkfish, provided that fishing gear is properly stowed and not available for immediate use (50 CFR, §648.23(b)).

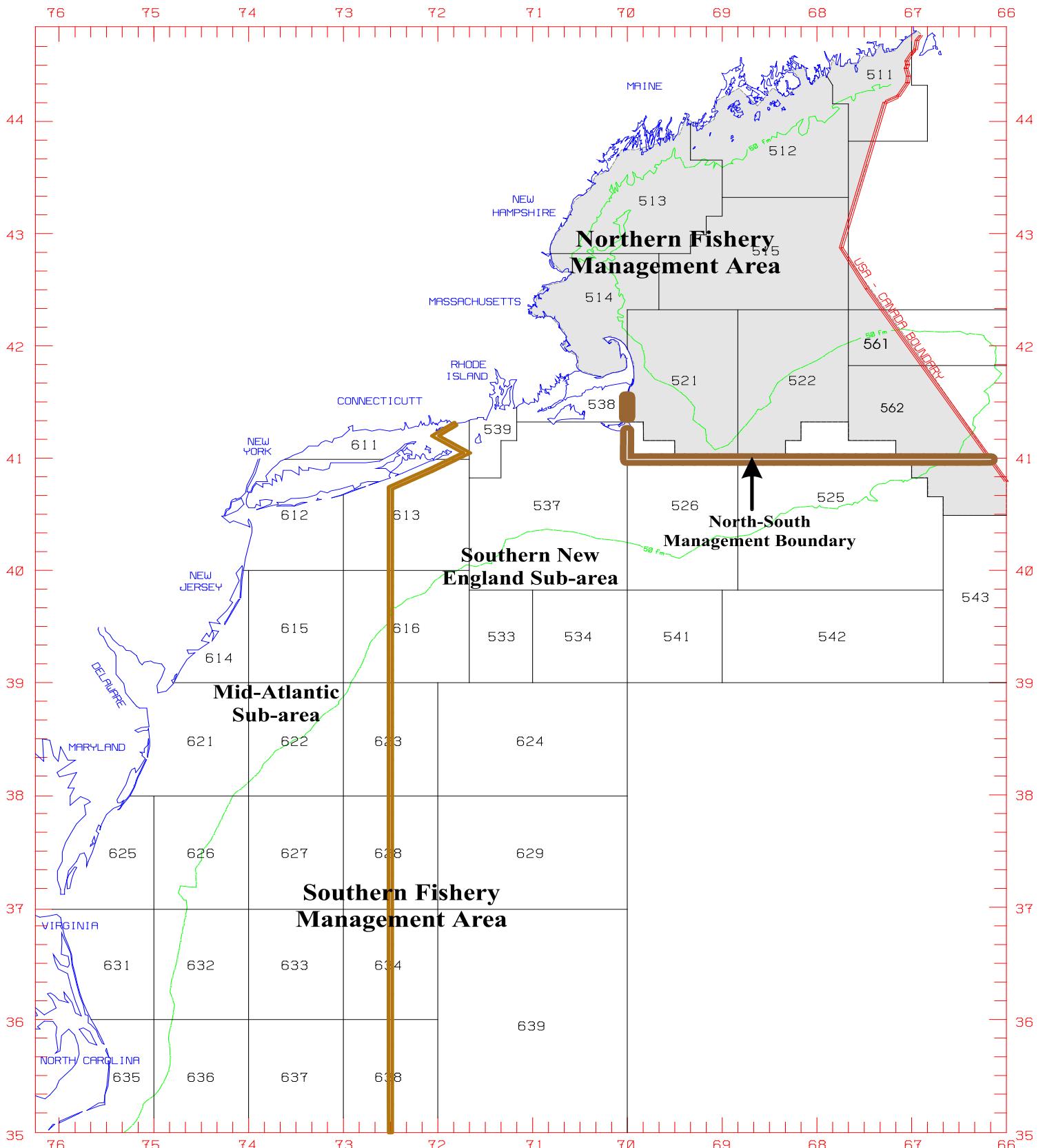
These two areas will also be used to monitor the status of the monkfish resource. Different trip limits and size limits may apply to vessels fishing in each area, depending on what fishery the vessel is participating in. For example, monkfish trip limits while on a multispecies day-at-sea will differ among the two areas, because of the frequency of catching monkfish as unavoidable bycatch when fishing for groundfish. For the same reason, the size limits will also differ among the two areas due to the amount of monkfish caught along with groundfish vs. the amount of monkfish caught in a directed fishery for monkfish.

Target Total Allowable Catches (TACs) have been estimated for the two principal management areas and are consistent with the overfishing definition and the rebuilding strategy adopted by the Councils. The target TACs will be reviewed annually (Section 4.11.2) and adjusted through the framework adjustment procedure (Section 4.11.4.1). The table below shows the planned reductions in the TACs, beginning from a 1995-1996 baseline to the fourth year by which fishing is reduced to the overfishing threshold. During years 5 to 10 (2002 through 2007) a lower, target fishing rate must be achieved to allow rebuilding of the stocks. A third management area would also be considered to differentiate the predominant Mid-Atlantic gillnet fishery (west of 72°30' W longitude) from the mixed-species Southern New England/Georges Bank fisheries.

**Table 6.** TACs corresponding to the fishing mortality objectives for The Northern and Southern Fishery Management Areas.

Fishing year	Objective	NFMA TAC (mt)	SFMA TAC (mt)
1995 - 1996	Baseline	12,739	14,667
May 1, 1998 to April 30, 1999	Partial implementation	Undefined	Undefined
May 1, 1999 to April 30, 2000	Mortality reduction	5,673	6,024
May 1, 2000 to April 30, 2001	Mortality reduction	5,673	6,024
May 1, 2001 to April 30, 2002	Mortality reduction	5,673	6,024
May 1, 2002 to April 30, 2003	Stop overfishing	4,047	3,252
May 1, 2003 to April 30, 2004 and subsequent fishing years	Rebuilding	4,047	2,224

**Rationale:** The reason for the segregation is partly based on the biological characteristics of the resource and partly based on the differences in fisheries in the Gulf of Maine versus areas to the south. Although growth rates are similar for monkfish in both areas, monkfish demonstrate different patterns in recruitment and stock biomass over the survey time series. There appears to be little adult migration between the two areas and egg masses from spawning in the Gulf of Maine probably stay within the Gulf of Maine and northern Georges Bank. Catches from each area will be monitored to evaluate the effectiveness of management measures to meet the individual mortality objectives.



**Figure 5.** Proposed northern and southern management areas for monkfish and three-digit statistical reporting areas. The shaded area represents the statistical areas that will be used to monitor the TACs for the northern monkfish stock. The TAC for the Southern Fishery Management Area will be split into two components for monitoring purposes. For monitoring the effectiveness of management measures in the respective sum-areas, the Multispecies Monitoring Committee will compare the catches from the Southern New England and Mid-Atlantic sub-areas to the catches during 1994-1997

## **4.5 Possession Limits**

### **4.5.1 Minimum size**

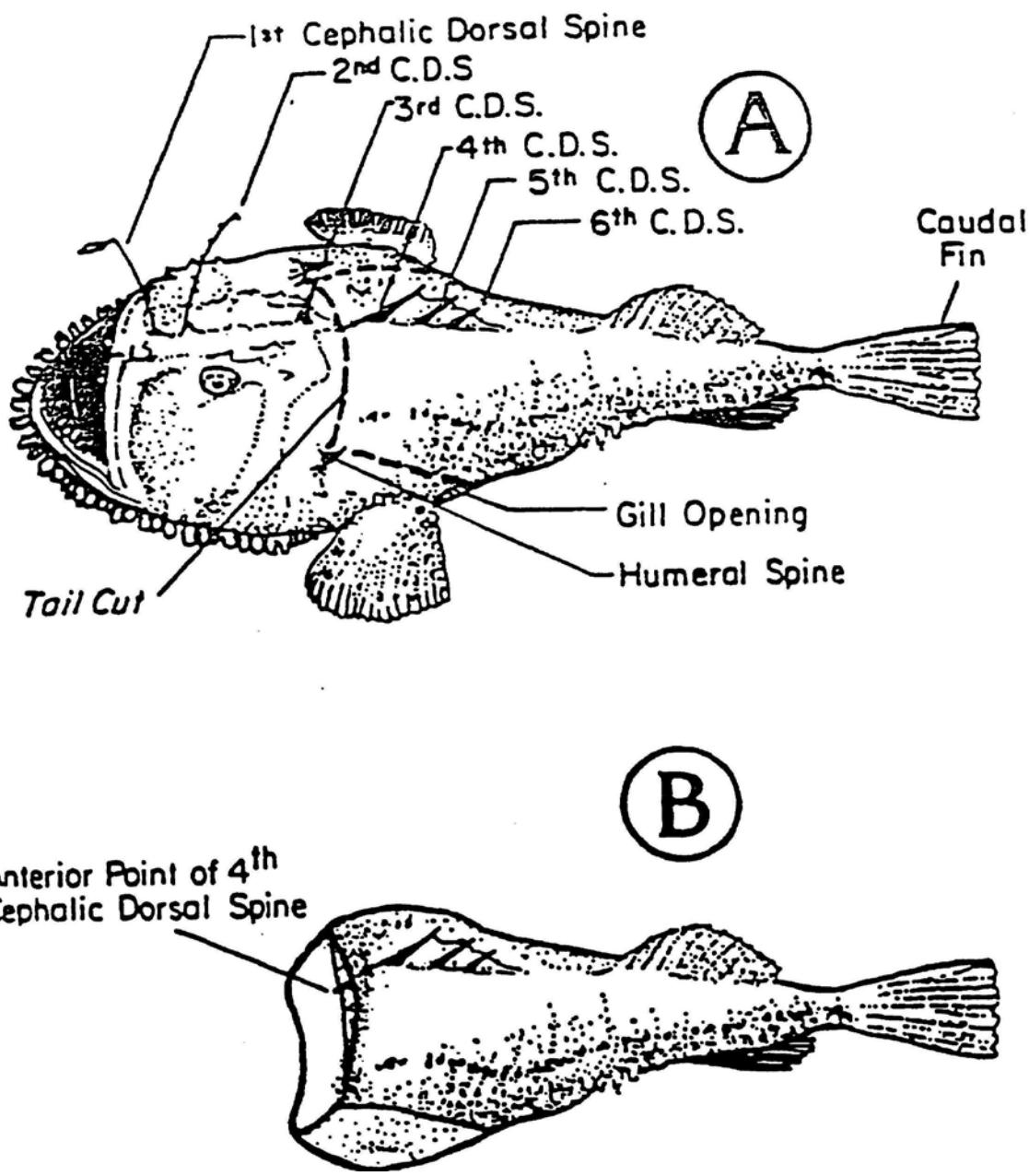
**When final rules implementing the Monkfish FMP are published:** Possession or landing of monkfish tails measuring less than 11 inches in length or whole monkfish less than 17 inches total length by any vessel with a federal fisheries permit or any vessel fishing in the EEZ would be prohibited. Fishermen that process monkfish at sea should use 17 inches total length as a guideline before processing. In nearly all cases, monkfish that are over 17 inches total length will have an 11-inch tail after being cut according to standard practices. Since the minimum size limit applies to all vessels, it is unnecessary to delay implementation of this measure until May 1, 1999 when the first fishing year begins or when monkfish days-at-sea are allocated.

**May 1, 2000:** If the year 1 management measures allow catches to exceed the Southern Fishery Management Area TAC or the Councils fail to take other action to meet the mortality objectives via framework action, a higher size limit will be implemented via a “Notice Action” for vessels fishing in the Southern Fishery Management Area (Figure ). For all vessels fishing in the Northern Fishery Management Area, the minimum size possession limits will remain as described in the above paragraph. For all vessels fishing in the Southern Fishery Management Area, possession or landing of monkfish tails measuring less than 14 inches in length or whole monkfish less than 21 inches total length would be prohibited. Fishermen that process monkfish at sea should use 21 inches total length as a guideline before processing. In nearly all cases, monkfish that are over 21 inches total length will have a 14-inch tail after being cut according to standard practices.

Enforcement of a minimum size is often more convenient at the point of landing, or at the location of the first transaction, usually a shore-side dealer. As a possession limit, however, the proposed measure can be enforced at any point and impedes efforts to avoid the regulation through illegal landings or at-sea transfers. Monkfish tails would be measured from the anterior portion of the forth cephalic dorsal spine to the end of the caudal fin (Figure ). Any tissue anterior to the 4th dorsal spine would be ignored. If the 4th dorsal spine or the tail are not intact, the minimum size would be measured between the most anterior vertebra and the most posterior portion of the tail.

**Rationale:** The minimum size limit is intended to minimize mortality on juvenile monkfish in two ways. Where monkfish is caught predominately as a bycatch, the minimum size limit is intended to prevent increased fishing effort on small fish to compensate for the new restrictions that limit landings and fishing effort. The 11-inch minimum size appears to reflect current catch and discard practices due to market conditions and state regulations. In areas where monkfish are caught more frequently in a directed fishery, fishermen have attested that small monkfish can be avoided. The size limit is also intended to discourage fishing on small, immature fish and cause changes in fishing behavior to selectively target large fish.

Trawl and dredge vessels will be forced to discard a high proportion of formerly landed monkfish under the proposed 14-inch minimum size. A significant fraction of monkfish caught by trawls in the southern area are targeted, so the vessels may be able to avoid catching small monkfish or it might be uneconomic to target monkfish until they re-recruit to the new minimum size. It will take only 13 months for a monkfish that yield an 11-inch tail to grow to a size that will yield a 14-inch tail



**Figure 6.** Monkfish morphology and tail-section: a) labeled figure (dashed line denotes area of tail cur) and b) tail-section as unloaded from commercial fishing boats (from Lyons and Creaser 1986).

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#### **4.5.2 Trip limits for vessels using large mesh while not on a day-at-sea**

Vessels using large mesh (5½ -inch (14.0-cm) diamond or 6-inch square mesh throughout the body, extension, and codend) while not on a monkfish, multispecies, or scallop day-at-sea may retain and land monkfish (whole or tails) up to 5 percent of the total weight of fish onboard.

**Rationale:** This trip limit approximates the customary monkfish bycatch by vessels in other large mesh fisheries. Generally these fisheries operate in areas where monkfish are less abundant or the vessels have no markets to accept monkfish.

#### **4.5.3 Trip limits for vessels using small mesh, rod and reel, or handlines and multispecies vessels less than 20 feet electing not to fish under day-at-sea**

Vessels that are not on a day-at-sea and fishing with small mesh, rod and reel, or handlines may land up to 50 pounds tail-weight (166 pounds whole-weight) per trip. Small mesh is considered to be any mesh is smaller than the large mesh provisions described in Section 0.

Multispecies vessels that are less than 20 feet and elect not to fish under the multispecies days-at-sea program may also land up to 50 pounds tail-weight (166 pounds whole-weight) of monkfish per trip.

**Rationale:** These trip limits approximate the customary monkfish bycatch in small mesh and hook fisheries. The Councils want to discourage any targeting of immature monkfish and minimize discarding of monkfish by vessels using small mesh.

#### **4.5.4 Trip limits for liver landings**

Possession or landing of livers whose aggregate weight totals more than 25% of the total weight of monkfish tails, or 10% of the total weight of round monkfish on any trip or calendar day, whichever is greater will be prohibited. If a vessel lands both monkfish tails and round monkfish, the following weight ratio could not exceed 10%:

$$\text{Aggregate weight of livers} / (\text{Aggregate weight of tails} \times 3.32 + \text{Aggregate weight of round fish})$$

Enforcement of a possession limit at sea will be very difficult, but a possession limit will act as a deterrent to illegal landing of excess livers or at-sea transfers. If a portion of the catch is landed separately (at a different dock, for example), the vessel operator will be required to have a signed receipt from all dealers receiving the trip's monkfish which shows the amount of tails and/or livers landed.

**Rationale:** A liver limit is necessary to prevent vessels from landing the most valuable part of the monkfish and avoiding the size and trip limits by discarding the monkfish carcasses. Without the liver limit, fishing mortality could increase if vessels circumvented the size and trip limits by highgrading and landing only livers. It is impossible to count livers once they have been packaged aboard the vessel, so a weight ratio is necessary to prevent highgrading. The limit (25 percent of the weight of tails) is intentionally set above the mean weight ratio (17 to 18 percent) to allow for seasonal variability and not force vessels to retain tails or whole fish while discarding valuable livers.

## **4.6 Landings limits**

Management measures in this section are impossible to enforce at sea, because compliance with a daily trip limit during a trip is impossible and checking livers at sea is impractical. It is therefore necessary to enforce these measures at the point of landing.

### **4.6.1 Trip limits during a monkfish day-at-sea**

**Prior to May 1, 2000:** No trip limits will apply to vessels fishing during a monkfish day-at-sea prior to and during year 1 of the FMP.

**After April 30, 2000:** If the year 1 management measures allow catches to exceed the Southern Fishery Management Area TAC or the Councils fail to take other action to meet the mortality objectives via framework action, trip limits will be implemented via a “Notice Action” for vessels fishing during a monkfish day-at-sea in the Southern Fishery Management Area (Figure ):

- Category A and C vessels using mobile gear during a monkfish day-at-sea will have a 1,500 pounds tail-weight (4,980 pounds whole-weight) per day-at-sea landing limit
- Category B and D vessels using mobile gear during a monkfish day-at-sea will have a 1,000 pounds tail-weight (3,320 pounds whole-weight) per day-at-sea landing limit
- Any vessel using fixed gear during a monkfish day-at-sea will have a 300 pounds tail-weight (996 pounds whole-weight) per day-at-sea landing limit.

Landings that exceed the applicable trip limits will be allowed, provided that the vessel operator does not call out of the monkfish day-at-sea program until sufficient time has elapsed. The vessel must have sufficient days-at-sea remaining to account for the landings overage and the operator should not call out until the trip's monkfish days-at-sea have accumulated enough to account for the excess landings. If the vessel with a monkfish limited access permit is not called into the monkfish day-at-sea program or has no unused days remaining, the bycatch allowances (Sections 0, 4.5.3, 4.6.2, or 4.6.3) will apply, depending on what other fishery the vessel is participating in.

**Rationale:** The trip limits are expected to contribute to mortality reduction and achieve the biological objectives in year 2.

### **4.6.2 Trip limits during a multispecies day-at-sea**

The trip limits given below apply when a vessel with a monkfish and a multispecies limited access permit is fishing for regulated groundfish during a multispecies day-at-sea only. Vessels that call into the monkfish day-at-sea program will instead have trip limits given in Section 4.6.1.

**Rationale:** The trip limits approximate bycatch amount for multispecies vessels that target groundfish. Since the multispecies vessels that qualify for monkfish limited access also have a history of catching monkfish as a component of the customary groundfish catch, higher trip limits are provided during their multispecies day-at-sea.

#### **4.6.2.1 Vessels with category C or D monkfish limited access permits**

**Beginning May 1, 1999 or the date of implementation of the monkfish day-at-sea program, whichever comes first:** A Multispecies vessel that fishes only in the Northern Fishery Management Area will have no trip limit when it is on a multispecies day-at-sea. If the vessel fishes for any portion of the trip during a multispecies day-at-sea (but not during a monkfish day-at-sea) in the Southern Fishery Management Area, the vessel will be able to land up to

300 pounds tail-weight (996 pounds whole-weight) of monkfish per day-at-sea while using mobile gear or 50 pounds tail-weight (166 pounds whole-weight) of monkfish per day-at-sea while using fixed gear.

**Beginning May 1, 2002:** Vessels that are on a multispecies, but not a monkfish day-at-sea while fishing in any area will be able to land up to 300 pounds tail-weight (996 pounds whole-weight) of monkfish per day-at-sea, or 25 percent of total weight of fish onboard, whichever is less. Trip limits for vessels using fixed gear in the Southern Fishery Management Area will remain at 50 pounds tail-weight (166 pounds whole-weight) of monkfish per day-at-sea.

#### 4.6.2.2 Vessels without monkfish limited access permits

**Beginning May 1, 1999 or the date of implementation of the monkfish day-at-sea program, whichever comes first:** Vessels that are on a multispecies day-at-sea while fishing in the Northern Fishery Management Area will be able to land up to 300 pounds tail-weight (996 pounds whole-weight) of monkfish per day-at-sea, or 25 percent of total weight of fish onboard, whichever is less. If the vessel fishes for any portion of the trip during a multispecies day-at-sea in the Southern Fishery Management Area, the vessel will be able to land up to 50 pounds tail-weight (166 pounds whole-weight) of monkfish per day-at-sea.

### 4.6.3 Trip limits during a scallop day-at-sea

The trip limits given below apply when a vessel with a monkfish and a scallop limited access permit is fishing during a scallop day-at-sea or when a vessel has a sea scallop dredge (with rings) aboard. Vessels that call into the monkfish day-at-sea program and do not have a dredge aboard will have monkfish trip limits given in Section 4.6.1.

**Rationale:** The trip limits provide a liberal bycatch allowance for scallop vessels while targeting scallops. Other than the monkfish day-at-sea provisions for scallop vessels that qualify for monkfish limited access, there are no provisions for landing monkfish as a component catch during a scallop day-at-sea, because the Councils want to discourage targeting monkfish with a standard scallop dredge. If a scallop vessel has a dredge aboard and has called into the sea scallop day-at-sea program, this management measure presumes that the vessel is fishing for scallops, not monkfish. Monkfish caught with dredges are primarily small, immature fish.

#### 4.6.3.1 Vessels with category C or D monkfish limited access permits

**Beginning May 1, 1999 or the date of implementation of the monkfish day-at-sea program, whichever comes first:** Vessels that have a scallop dredge aboard or are on a scallop, but not a monkfish day-at-sea will be able to land up to 300 pounds tail-weight (996 pounds whole-weight) of monkfish per day-at-sea.

**Beginning May 1, 2002:** Vessels that have a scallop dredge aboard or are on a scallop, but not a monkfish day-at-sea will be able to land up to 200 pounds tail-weight (664 pounds whole-weight) of monkfish per day-at-sea.

#### 4.6.3.2 Vessels without monkfish limited access permits

**Beginning May 1, 1999 or the date of implementation of the monkfish day-at-sea program, whichever comes first:** Vessels that are on a scallop day-at-sea will be able to land up to 300 pounds tail-weight (996 pounds whole-weight) of monkfish per day-at-sea.

**Beginning May 1, 2002:** Vessels that are on a scallop day-at-sea will be able to land up to 200 pounds tail-weight (664 pounds whole-weight) of monkfish per day-at-sea.

## **4.7 Gear Restrictions**

The following restrictions establish the type of fishing gear that may be used while the vessel is called into a monkfish day-at-sea. Non-conforming gear must be properly stowed to prevent its use during the monkfish trip. Dredges must not be onboard the vessel when it is fishing during a monkfish day-at-sea. Nothing in this section is meant to supersede more restrictive regulations (existing or future) that are intended to protect harbor porpoise or other marine mammals and endangered species.

### **4.7.1 Authorized gear while on a monkfish day-at-sea**

Vessels called into the monkfish day-at-sea program may use large mesh trawls, large mesh beam trawls, large mesh gillnets, or any hook gear. Large mesh for vessels using nets during a monkfish day-at-sea means the minimum mesh defined in Section 4.7.2. Dredges may not be used to harvest monkfish while on a monkfish day-at-sea. These gears are defined under the regulations governing the Fisheries of the Northeastern United States at 50 CFR, §648.2.

Vessels with a hook-only limited access multispecies permit that also qualify for monkfish limited access will be allowed to use hook, trawl, or gillnet fishing gear while on a monkfish day-at-sea, provided that the trawl and gillnet gear comply with Sections 4.7.2 and 4.7.3, the vessel operates in a monkfish fishery that is exempt from the multispecies day-at-sea regulations (50 CFR, §648.80), and the vessel possesses no large-mesh multispecies.

**Rationale:** It is necessary to restrict the directed monkfish fishery to gears that have better size selectivity to achieve objective 3. Dredges have poorer size selection than do other gears and therefore are prohibited from use during a monkfish day-at-sea.

The hook-only provision is necessary to allow certain multispecies vessels to target monkfish during a monkfish day-at-sea. The multispecies regulations prohibit hook-only vessels from using trawls or gillnets while on a multispecies day-at-sea [50 CFR, §648.82(b)(4(i)(A)]. Since a multispecies vessel on a monkfish day-at-sea must also call into a multispecies day-at-sea (Section 4.3.2), it would be impossible for a hook-only multispecies permit-holder that also qualifies for monkfish limited access to target monkfish with trawls or gillnets. The vessels in this category chose to target multispecies with hook gear, but they qualified for monkfish limited access by catching monkfish with nets during February 28, 1991 through February 27, 1995 (the monkfish qualification period). Monkfish are only infrequently captured by hook gear, making it a poor choice for targeting monkfish. This policy of allowing a multispecies vessel to target monkfish on a multispecies day-at-sea with different gear is analogous to the policy for scallop dredges in Section 4.3.2.

### **4.7.2 Minimum mesh**

Vessels fishing under monkfish days-at-sea must fish with trawls having mesh no smaller than 10-inches square or 12-inches diamond in the codend, unless the vessel has a Category C or D permit and is also fishing under a multispecies day-at-sea. If a vessel is fishing during a multispecies and monkfish day-at-sea, a trawl must have mesh that conforms with the regulations for the Multispecies FMP, currently 6-inch square or diamond throughout the entire net. If using a gillnet during a monkfish day-at-sea, the gillnet must have mesh no smaller than 10-inches diamond. Vessels may have smaller mesh on board if it is stowed so that it is not available for immediate use.

To accommodate situations when a vessel hauls up mesh smaller than the minimum legal size (for example, a lost or discarded small mesh net), the minimum mesh on board regulation will apply to pieces of mesh larger than three feet square. Vessel captains should take necessary steps to render the mesh unusable (e.g. cutting up large pieces into pieces smaller than three feet square, and otherwise destroying the mesh).

**Rationale:** The primary purpose of requiring large mesh is to reduce bycatch of other marine species while retaining the larger monkfish. This management measure could improve the possibility that more exempted areas would be open for targeting monkfish, if the bycatch of other species was below the legal thresholds. Monkfish size

selectivity by these large mesh nets is unknown, but they could have a beneficial effect on size selection. The body shape of monkfish, however, prevents even large changes in minimum mesh size from substantially improving monkfish selectivity. The FMP, therefore, relies more on day-at-sea allocations, trip limits, and size limits to reduce fishing mortality.

### **4.7.3 Gillnet limits and net tags**

A vessel that qualifies for monkfish limited access may place no more than 160 net tags on any combination of monkfish and groundfish gillnets. Vessels without multispecies permits will of course be prohibited from using monkfish net tags on groundfish nets.

**Number and size of nets:** Vessels may not fish with, haul, possess, or deploy more than 160 monkfish gillnets. Multispecies vessels may fish any combination of monkfish, roundfish, and flatfish gillnets, up to 160 nets, provided that the number of monkfish, roundfish, and flatfish gillnets does not exceed the limitations and the nets are tagged in accordance with the regulations in 50 CFR, §648.82. Nets may not be longer than 300-ft (91.44 m), or 50-fathoms, in length.

**Tagging requirements:** Beginning May 1, 1999 or the date of implementation of the monkfish days-at-sea program, whichever comes first, all monkfish gillnets fished, hauled, possessed, or deployed must have one tag per net, with one tag secured to every other bridle of every net within a string of nets. Tags must be obtained as described in 50 CFR, §648.4. The vessel operator must produce all net tags upon request by an authorized officer.

Vessel owners or operators seeking replacement of lost, destroyed, or missing tags must request replacement of tags by letter or fax to the Regional Administrator. A check for the cost of the replacement tags must be received before tags will be re-issued.

**Rationale:** Restrictions on the number of nets is necessary to ensure that vessels using gillnets do not increase the amount of gear fished to compensate for the restrictions on fishing effort and landings. If the number of nets increases, the Councils would have to prohibit leaving nets unintended at sea between trips or reducing the number of day-at-sea or trip limits to contain total fishing effort. Some vessels will need to reduce the number of monkfish gillnets they deploy, if they currently fish more than 160 nets. The proposed net limit, however, will accommodate many fishermen in New England that tend to fish more nets and nearly all fishermen in the Mid-Atlantic that tend to fish fewer nets.

## **4.8 Closed Areas**

The Councils do not currently propose any closed areas to preserve monkfish, although future closed areas may be implemented via a framework action to protect spawning aggregations. Some areas may be closed to the monkfish limited access fishery, however, because of unacceptably high bycatch of other species.

### **4.8.1 Exempted fisheries**

The Multispecies FMP regulations at 50 CFR, §648.80 specifies the type of gear that may be used within the Gulf of Maine/Georges Bank regulated mesh area and the Southern New England regulated mesh area. Vessels that are not called into the multispecies day-at-sea program cannot fish in these areas unless they operate in an exempted fishery.

Three exempted fisheries for monkfish are defined in the multispecies regulations:

- Gulf of Maine/Georges Bank Monkfish Gillnet Exempted Area – July 1 to September 14
- Southern New England Monkfish and Skate Gillnet Exempted Area – Year around

- Southern New England Monkfish and Skate Trawl Exempted Area – Year around

Thus, vessels that qualify for monkfish limited access, but do not have a multispecies limited access permit can only fish for monkfish in these three exempted areas and the entire Mid-Atlantic regulated mesh area. Future changes to the exempted areas may apply to monkfish without amending or adjusting this FMP.

**Rationale:** The multispecies restrictions on gear and fishing activity were intended to limit groundfish bycatch below acceptable levels. The exempted fishery program for multispecies will therefore apply to vessels fishing under only monkfish day-at-sea, unless there are other areas that would become exempted under the Multispecies FMP.

## **4.9 Closed Seasons**

### **4.9.1.1 Blocks of time out of the fishery – Vessels with monkfish-only days-at-sea**

Vessels with a Category A or B permits (i.e. “monkfish-only”) will be required to declare out of the monkfish fishery and cannot use a monkfish day-at-sea for a continuous 20-day block during the months of April, May, and June. The vessels may engage in other fisheries that they can legally participate in, but they may possess no monkfish during this 20-day block.

**Rationale:** The 20-day block out of the fishery is necessary to limit fishing mortality during known spawning periods. Monkfish become more vulnerable to fishing, especially to monkfish gillnets, when they migrate and aggregate to spawn. Reasons for this action would be to protect spawning, to avoid catching immature monkfish, and to enhance economic value. Blocks of time out of the fishery may also be required to avoid captures of marine mammals and endangered species.

### **4.9.1.2 Blocks of time out of the fishery – Vessels with multispecies days-at-sea**

Specified periods to protect groundfish spawning when multispecies vessels are required to declare out of the fishery would also apply to multispecies days-at-sea used to target monkfish. Multispecies days-at-sea vessels that have declared out of the multispecies fishery, for any reason including the fulfillment of its 20 day out periods, will be prohibited from possessing monkfish. Vessels that target species other than groundfish and monkfish will, however, be able to participate in exempted fisheries during the mandatory groundfish tie-up periods. Multispecies vessels with a category C or D would not be required to comply with the provisions in Section 4.9.1.1.

**Rationale:** Since vessels with multispecies day-at-sea permits must use a multispecies day-at-sea to target monkfish, either as the sole target species or as a component of a mixed groundfish catch, the vessel cannot fish for monkfish independently when the vessel is declared out of the multispecies fishery.

## **4.10 Recreational Fishery Management**

Fishing mortality from recreational catches is a negligible fraction of the total. The Councils therefore propose no regulations for recreational fishing at this time.

## **4.11 Framework Adjustment Process and Monitoring**

Many management measures in the Monkfish FMP can be adjusted via framework action. The effectiveness of the management program depends on uncertain factors that may change over time. Achieving the FMP's mortality objectives will require at least annual adjustments to the management measures. It is therefore necessary to have an administrative mechanism in place that fulfills the Councils' public input and notification requirements while maximizing flexibility and responsiveness.

The framework adjustment process allows changes to be made in regulations in a timely manner without going through the plan amendment process. The purpose is to provide a formal opportunity for public comment that substitutes for the customary public comment period provided when publishing a proposed rule. If changes to the management measures were contemplated in the FMP, there was sufficient opportunity for public comment on the framework action, and the changes are not highly controversial, the Secretary of Commerce may waive the need for additional public comment through publication of a proposed rule in the Federal Register.

### **4.11.1 Framework Adjustment Process**

The Councils will develop and analyze the proposed actions over the span of at least two Council meetings, and provide advanced public notice of the availability of both the proposals and the analyses. Opportunity to provide written and oral comments will be provided throughout the process before submitting the recommendations to the Regional Administrator. The Councils may convene and consider the advice of scientists on the Monkfish Monitoring Committee and the Industry Advisory Committee during this process.

In response to the annual review by the Monkfish Monitoring Committee or at any other time, either Council may recommend adjustments to any of the measures proposed by this FMP. These include but are not limited to the measures described in Section 4.11.4. The joint Monkfish Oversight Committee (subject to approval of the Council chairmen) or either Council may initiate a framework adjustment. Framework adjustments will require one initial meeting (the agenda must include notification of the framework adjustment proposal) and two final Council meetings, one at each Council.

After a management action has been initiated, the Councils will develop and analyze appropriate management actions over the span of at least two Council meetings. The Councils will provide the public with advance notice of the availability of both the proposals and the analysis and opportunity to comment on them prior to and at the two final Council meetings. Documentation and analyses for the framework adjustment will be available at least two weeks before the first of the final two meetings. The Councils' recommendation for adjustments or additions to management measures must come from one or more of the categories listed in Section 4.11.4.

The Councils may refer the proposed adjustments to the joint oversight committee for further deliberation and review. Upon receiving the recommendations of the oversight committee, the Councils will publish notice of its intent to take action and provide the public with any relevant analyses and opportunity to comment on any possible actions. After receiving public comment, the Councils must take action (to approve, modify, disapprove, or table) on the recommendation at the second Council meeting following the meeting at which it received the recommendations.

Management adjustments or amendments for monkfish will require majority approval of each Council for submission to the Secretary. The Councils may recommend through the framework adjustment process

implementation of stock-specific, gear-specific, or regional adjustments provided that there is adequate opportunity for public comment, and all other regulatory requirements are observed.

After developing management actions and receiving public testimony, the Councils may make a recommendation to the Regional Administrator. The Councils' recommendation will include supporting rationale and, if management measures are recommended, an analysis of impacts and a recommendation to the Regional Administrator on whether to issue the management measures as a final rule. If the Councils recommend that the management measures should be issued as a final rule, the Councils will consider at least the following four factors and provide support and analysis for each factor considered:

- a) Whether the availability of data on which the recommended management measures are based allows for adequate time to publish a proposed rule, and whether regulations have to be in place for an entire harvest/fishing season;
- b) Whether there has been adequate notice and opportunity for participation by the public and members of the affected industry in the development of the Councils' recommended management measures;
- c) Whether there is an immediate need to protect the resource or to impose management measures to resolve gear conflicts; and
- d) Whether there will be a continuing evaluation of management measures adopted following their implementation as a final rule.

If the Regional Administrator concurs with the Councils' recommended management measures they will be published as either a final rule based on the factors specified above or as a proposed rule in the *Federal Register*. If the Councils' recommendation is published as a proposed rule and the Regional Administrator concurs with the Councils' recommendation after additional public comment, the measures will be published as a final rule in the *Federal Register*.

If the Regional Administrator approves the Councils' recommendations, the Secretary is expected to waive for good cause the requirement for a proposed rule and opportunity for public comment in the *Federal Register*. The Secretary, in so doing, will publish a "final rule" to remain in effect until amended. Submission of recommendations does not preclude the Secretary from deciding to provide additional opportunity for prior notice and comment in the *Federal Register*, but it contemplates that the Council process will adequately satisfy that requirement.

The Regional Administrator may approve, disapprove, or partially disapprove the Councils' recommendation. If the Regional Administrator does not approve the Councils' specific recommendation, he must notify the Council in writing the reasons for his action prior to the first Council meeting following publication of his decision. Nothing in this proposal prevents the Secretary of Commerce from soliciting additional comment, but it is contemplated that the Councils' process will adequately satisfy that requirement.

#### **4.11.2 Annual review and adjustments**

##### **4.11.2.1 Monkfish Monitoring Committee**

The Councils will establish a Monkfish Monitoring Committee consisting of technical staff from the New England and Mid-Atlantic Fishery Management Councils, the NMFS Northeast Regional Office, the Northeast Fisheries Science Center, the U.S. Coast Guard, two representatives of the fishing industry selected by the Council chairmen, and representatives from affected coastal states appointed by the Atlantic States Marine Fisheries Commission. One fisherman should be appointed from each management area with one of the two fishermen from the multispecies or scallop fisheries. Affected coastal states include Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. The Monkfish Monitoring Committee will elect a chairman from within its ranks, subject to approval by both Council chairmen.

The Monkfish Monitoring Committee will meet at least annually, but may meet more frequently or as needed. The term of reference for the Monitoring Committee will be to monitor the effectiveness of the management plan and to develop options for framework adjustments such that the plan continues to meet the objectives. This role is separate from the PDT, whose purpose is to provide technical support to the Monkfish Oversight Committee in the development of amendments and management measures.

### **Development of target TACs and adjustment options**

The Monkfish Monitoring Committee (MMC) will hold its final meeting at least 6 months prior to the beginning of the next fishing year. The MMC may hold earlier meetings to accomplish the work by the deadline. The fishing year for monkfish will coincide with the multispecies fishing year (Section 4.3), presently running from May 1 to April 30. With this fishing year schedule, the MMC must therefore complete its work by November 15 for the Councils to receive the findings of the MMC and initiate a framework action. The MMC will review available data pertaining to: discards and landings; days-at-sea and other measures of fishing effort; stock status and fishing mortality rates; enforcement of and compliance with management measures; and any other relevant information. Data will be provided primarily by NMFS, but the MMC may also consider data provided by the states, ASMFC, the U.S. Coast Guard and other sources.

The MMC will review the data to develop target TAC recommendations and management options necessary to achieve the FMP goals and objectives. The management options may include a preferred option to achieve the plan objectives. The MMC will demonstrate through analysis and documentation that the options it develops are expected to meet the Monkfish FMP goals and objectives. The MMC may review the performance of different user groups or fleet sectors in developing options. The range of options may include any of the management measures in the plan including, but not limited to those listed in Section 4.11.4.

#### **4.11.2.2 Annual framework adjustment**

Following the procedures described in Section 4.11.1, the Councils will initiate a framework adjustment in response to the MMC report and recommendations. The Councils will meet as soon as practicable to review the recommended target TACs and all of the options developed by the MMC and other relevant information, consider public comment, and develop a recommendation to meet the Monkfish FMP objectives, consistent with the other applicable law. The Councils may delegate the Joint Monkfish Oversight committee to conduct an initial review of the options developed by the MMC. The oversight committee will review all of the options developed by the MMC and any other relevant information, consider public comment and make a recommendation to the Councils.

#### **Submission of the recommendation**

Based on this review, the New England and Mid-Atlantic Fishery Management Councils shall submit a recommendation to the Regional Administrator of any changes, adjustments or additions to days-at-sea allocations, closed areas or other measures necessary to achieve the Monkfish FMP's goals and objectives. Included in the Councils' recommendation will be supporting documents, as appropriate, concerning the environmental and economic impacts of the proposed action and the other options considered by the Councils.

If the New England and Mid-Atlantic Fishery Management Councils submit, on or before January 7, a recommendation to the Regional Administrator after one framework meeting, and the Regional Administrator concurs with the recommendation, the Regional Administrator will publish the Councils' recommendation in the Federal Register as a proposed rule. The Federal Register notification of the proposed action will provide a 30-day public comment period.

The New England and Mid-Atlantic Councils may instead submit their recommendation on or before February 1, if they choose to follow the framework process outlined in Section 4.11.3 and request that the Regional Administrator publish the recommendation as a final rule. If the Regional Administrator concurs that the Councils'

recommendation meets the Monkfish FMP objectives and is consistent with other applicable law, and determines that the recommended management measures should be published as a final rule, the action will be published as a final rule in the Federal Register. If the Regional Administrator concurs that the recommendation meets the FMP objectives and is consistent with other applicable law and determines that a proposed rule is warranted, and, as a result, the effective date of a final rule falls after the start of the fishing year, fishing may continue. However, days-at-sea used by a vessel on or after the start of a fishing year will be counted against any days-at-sea allocation the vessel ultimately receives for that year.

If the Councils fail to submit a recommendation that meets the Monkfish FMP objectives and is consistent with other applicable law, the Regional Administrator may adopt any option developed by the MMC, unless it was rejected by either the New England or Mid-Atlantic Council; provided the option meets the Monkfish FMP objective and is consistent with other applicable law. If either the New England or Mid-Atlantic Fishery Management Council has rejected all options, then the Regional Administrator may select any measure that has not been rejected by both Councils.

Table 7 gives a hypothetical example where the Councils have jointly rejected all options. Table 8 gives another hypothetical example where the Councils have rejected only some options (i.e. they have not jointly rejected all options).

**Table 7.** Hypothetical example where the two Councils have jointly rejected all options.

Management option recommended by the MMC	Options rejected by the New England Council	Options rejected by the Mid-Atlantic Council	Options that may be chosen by the Regional Administrator
1	X		X
2	X	X	
3		X	X
4	X		X

**Table 8.** Hypothetical example where one or more options have not been rejected by either Council.

Management option recommended by the MMC	Options rejected by the New England Council	Options rejected by the Mid-Atlantic Council	Options that may be chosen by the Regional Administrator
1	X		
2	X	X	
3		X	
4	X		
5			X

#### 4.11.2.3 Triennial review of biological objectives and reference points

A triennial review will be conducted, beginning in year 3 (2001), to evaluate threshold and target biological reference points. This review will trigger a framework action in January 2002 to replace the existing (“default”) measures that would take effect on May 1, 2002 (year 4). The framework process would include a comprehensive evaluation, conducted by the Monkfish Monitoring Committee during 2001, of the effectiveness of the management measures to reduce mortality below the overfishing threshold and allow rebuilding within (at that time) six years. The framework process will follow the procedure described in Section 4.11.2, but may have different timing to accommodate the availability of year two data and allow for time necessary to conduct a more comprehensive review than would happen in other years.

### **4.11.3 Within season management action**

Either Council or the joint monkfish oversight committee (subject to approval of the Council chairmen) may, at any time, initiate a framework adjustment to add or adjust management measures. The Councils may add or adjust management measures if they find that action is necessary to meet or be consistent with the goals and objectives of the Monkfish FMP. Framework adjustments will require one initial oversight committee meeting (the agenda must include notification of the framework adjustment proposal) and two final Council meetings, one at each Council. Documentation and analyses for the framework adjustment will be available at least two weeks before the first of the final two meetings. Management adjustments or amendments for monkfish will require majority approval of each Council for submission to the Secretary.

### **4.11.4 Management Measures That Can Be Adjusted Via Framework**

The management measures described below are contemplated for future framework adjustment. The impacts of changes in these measures have not been fully analyzed but fall within the scope of possible management restrictions contemplated by this FMP.

#### **4.11.4.1 Target TACs**

Adjustments to the target TACs will be necessary to reflect future stock conditions so that the TACs are consistent with the mortality objectives. If abundance increases through good recruitment or biomass increases through rebuilding, the TACs that correspond with the mortality objectives would increase. Conversely, stock declines through continued overfishing or poor recruitment could require lower TACs.

**Rationale:** This adjustment is necessary so that the Councils are sure that the mortality objectives are being met if the catches do not exceed the target TACs and that optimum yield is being achieved.

#### **4.11.4.2 Overfishing definition reference points**

Improved data collection and a better understanding of the monkfish population dynamics may change the perception whether the fishing mortality rate during 1970 to 1979, or any other period, allowed the stock(s) to on average reproduce itself and remain at a stable level of biomass. In addition, new biological evidence may indicate that other biological reference points are more appropriate for management targets.

In the northern fishery management area, for example, there is currently no mortality rate target established by the overfishing definition. As an initial management target, the Council adopted  $F_{0.1}$  as an appropriate level of fishing that would promote conservation, while enhancing yield and maintaining a healthy age-structure. More detailed scientific investigation (Appendix I) revealed that the replacement fishing mortality rate for the northern management area appears to be less than  $F_{0.1}$ . A target mortality rate, in this case  $F_{0.1}$ , which is higher than the threshold rate,  $F_{1970-1978}$  does not make sense. It is possible, however, for the replacement fishing mortality rate to be less than  $F_{0.1}$ . This outcome can be expected where survival of sub-legal fish is very low (further explanation is given in the FEIS).

At the triennial review or if new biological information becomes available, the Council may adjust the overfishing definition or by amending the Monkfish FMP. If the Council chooses to make technical adjustments to the overfishing definition, it will consider the technical merits and potential impacts by convening the Monkfish Monitoring Committee to evaluate these factors arising from assessment advice or other scientific literature. The potential impacts will be estimated and included in at least an Environmental Assessment prepared for the

framework action public documents. Public comment will be taken on the proposed overfishing definition adjustments and their potential impact according to the framework adjustment process described above.

#### 4.11.4.3 Closed seasons or closed areas

As soon as information is available to identify suitable areas, it is the Councils' intention to initiate a framework action to protect monkfish spawning areas via closure or another suitable management measure. Adjustments to these closed seasons and areas may be necessary to compensate for changing fishing practices, migratory patterns, or market conditions.

**Rationale:** Closed seasons or areas could be effective for protecting spawning activity, reducing mortality and selectivity on immature fish to improve yield-per-recruit, and improving economic yield. The framework adjustment process would allow the Councils flexibility in responding to changing conditions. Closed seasons or closed areas may also be required to avoid captures of marine mammals and endangered species.

#### 4.11.4.4 Minimum size limits

The status of the resource will be reviewed annually to determine if the resource is overfished or if gains in yield per recruit can be achieved through increases in the minimum size at the current fishing mortality rates. If the stock is overfished, or if the current yield per recruit is 10% below its maximum at the current fishing mortality rate and yield, and as a result of the increased size limit yield would recover to current levels within two years, then the Council may increase the minimum tail size by one or more inches. The minimum size for whole fish will also increase to the corresponding total length converted from the minimum tail length using the scientifically accepted conversion. The minimum size for whole fish will be rounded up to the nearest one-half inch.

**Rationale:** Considerable gains in yield-per-recruit and in protection of immature fish could be realized through improve size selection by the fishery. The size limits were initially set at levels that reflect current discard and marketing practices, thereby preventing the fishery from prosecuting small fish to compensate for the implementation of restrictions on fishing effort and trip limits. It is uncertain how much discards would be created at the proposed or at higher size limits, because it depends on changes of fishing behavior rather than mesh selection. If fishermen that target monkfish are able to avoid concentrations of small monkfish, then minimum size limits above current levels could be effective at reducing mortality on small fish and improving yield-per-recruit.

#### 4.11.4.5 Liver to monkfish landings ratios

If the liver to tail landings ratio is inappropriate, the proposed measure might allow some fishermen to disregard the FMP's intentions and discard small monkfish while retaining their livers. If the landings limit for livers is too high, fishermen can circumvent the minimum size limit by cutting livers from undersized fish. On the other hand, a ratio that is too restrictive would force fishermen to discard valuable livers in order to retain legal sized monkfish. The Councils' intent is to avoid both situations and fine-tuning adjustments may be necessary after FMP implementation. This adjustment may include a liver to tail ratio that varies by area or by season. The effectiveness of this measure will be reviewed as needed and the Council may initiate the process for making adjustments at any time.

**Rationale:** Adjustments to this management measure may be necessary to minimize discarding of fish or valuable livers.

#### 4.11.4.6 Annual monkfish days-at-sea allocations and monitoring

Annual adjustments to the monkfish day-at-sea allocations could be needed to reduce mortality below target levels or to optimize yield if the fishery is underharvesting the resource. Limits on days-at-sea are one of the primary management measures affecting mortality. Catch per day-at-sea is expected to change linearly with stock abundance if a day-at-sea is closely linked with a unit of fishing effort. Other than for inaccuracies in the original FMP assessment or due to changes in fishing power, the annual days-at-sea allocations should not change due to fluctuations in abundance and biomass. If catch per day-at-sea increases due to technological improvements, however, then absent any other management adjustments the days-at-sea allocations would have to decline to compensate for the increased fishing power. Both increases and decreases in annual days-at-sea allocations are possible.

Days-at-sea adjustments, if necessary, would be adjusted at the start of the fishing year, so problems with prorating unused effort can be avoided. Mid-year adjustments are not anticipated.

**Rationale:** Days-at-sea adjustments may be needed to respond to changing resource and fishery conditions or to correct for inaccuracies in the original FMP assessment.

#### 4.11.4.7 Trip or possession limits, possibly expressed as a daily limit and possibly administered via a running clock.

This framework adjustment applies to the directed fishery trip limit (Section 4.6.1) as well as limits on landings of bycatch (Sections 0, 4.5.3, 4.6.2, 4.6.3). The former management measure is to control mortality while allocating an amount of days that represents at least a seasonal fishery for qualifying vessels. The effectiveness of the directed fishery trip limits depends on exploitable stock biomass. If exploitation remains above the overfishing definition thresholds, stock biomass is expected to continue declining and reduced trip limits would be necessary to maintain their intended effect. On the other hand when stock rebuilding occurs or after good recruitment, stock biomass and catch per effort will increase making the trip limits a greater factor (compared to days-at-sea limits) in controlling mortality. In the long run, the directed fishery trip limits could cause excessive discarding and would not be needed for controlling mortality if total effort is restricted.

The effectiveness of bycatch limits will also depend on exploitable stock biomass levels. At high stock biomass, the current bycatch limits (based on 1994 and 1995 landings) could be insufficient to allow many vessels targeting other species to land their unavoidable, monkfish bycatch. At low stock biomass, the bycatch limits could be insufficient to have the desired effect (discouraging non-limited access vessels from targeting monkfish). Some fine-tuning of the bycatch limits is probably likely to correct for potential inaccuracies in the initial bycatch limits and to respond to changing fishing patterns.

Administering the daily trip limits could also require adjustments as the daily trip limit monitoring system matures. The “running clock” system (Section 4.6.1) is relatively new and not all the bugs in the system have been worked-out yet. Since the proposed system for monkfish will have the same features as the one for Gulf of Maine cod, any changes to the administration of the cod trip limit will also precipitate changes to the one for monkfish. There could, however, be valid reasons for treating differently the landings for each species, if the fishery and markets for cod and monkfish are dissimilar.

**Rationale:** Directed fishery trip limits could require adjustments to control fishing mortality from limited access monkfish vessels on a day-at-sea. This management measure is one of the three primary ones (days-at-sea allocations, trip limits, size limits) controlling exploitation by vessels that qualify for monkfish limited access. Adjustments to the bycatch allowances could be needed to respond to changes in exploitable stock biomass.

#### 4.11.4.8 Gear restrictions

Adjustments to these management measures may include but not be limited to changes in minimum mesh size and configuration, the number of nets a vessel could use, and twine size or gauge.

The status of the resource will be reviewed annually to determine if the resource is overfished or if gains in yield per recruit can be achieved through improvements in selectivity. The Monkfish Monitoring Committee may consider and recommend changes in gear regulations, if it is calculated that improvements in yield per recruit can be achieved by new or existing technology.

**Rationale:** A framework procedure to adjust gear restrictions is needed to respond to development of new gear technology, such as gear that would reduce unwanted bycatch of small fish and other species. Changes in gear restrictions may also be necessary to reduce encounters with marine mammals and endangered species.

#### 4.11.4.9 Transferability of permits and permit rights (framework adjustment would require full public hearings) or administration of vessel upgrades, vessel replacement, or permit assignment.

The Councils may need to make future technical adjustments to the measures that govern how permits are issued and what rights are assigned to them. Adjustments that decrease the number of qualifying vessels or make the upgrade restrictions retroactive will not be considered as a frameworkable management change. Only adjustments that correct for inequities or alleviate administrative problems would be considered under this framework process. If a very low number of vessels qualified for “history” permits, for example, a framework adjustment to activate those permits (i.e. allocate days-at-sea) could be considered if it did not have a measurable effect on fishing mortality.

**Rationale:** Certain adjustments to the permits or the permitting procedure may be necessary to collect better data, to improve efficiency and reduce costs, and to improve law enforcement. It is likely that recommendations for adjustments to this measure will be made so that they are implemented at the beginning of a permitting cycle.

#### 4.11.4.10 Other frameworkable measures presently included in the Northeast Multispecies Fishery Management Plan (50 CFR Part 648.90) and the Atlantic Sea Scallop Fishery Management Plan (50 CFR Part 648.55).

Other than the measures specifically listed above, the Multispecies and Atlantic Sea Scallop FMPs include adjustments to the following management measures: scallop shell height limits, offloading windows, crew limits, onboard observers, measures to resolve gear conflict, and any other management measure currently included in the FMPs. Offloading windows, crew limits, onboard observers, measures to resolve gear conflict could apply to monkfish limited access vessels to ease enforcement burden, improve compliance, or resolve gear conflict. Changes to crew size on scallop vessels, for example, will be possible even though the crew size limit is currently seven for scallop vessels using a scallop day-at-sea. Atlantic Sea Scallop FMP limits on crew size were intended to restrict harvesting capacity and therefore fishing mortality. On the other hand, the Councils may later decide to waive the crew size limits when the vessel is on a monkfish day-at-sea and it has no dredges aboard.

**Rationale:** Since multispecies and scallop vessels must take the monkfish days-at-sea concurrently with the multispecies or scallop days, concurrent adjustments may be necessary to change management measures in the Multispecies and Monkfish FMPs or the Sea Scallop and Monkfish FMPs. This cross-reference is necessary to ensure that a framework adjustment in one plan is not blocked because it was not included in the other.

## 5.0 COMPLIANCE WITH NATIONAL STANDARDS

### 5.1 National Standard 1 – Optimum Yield

*“Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the U.S. fishing industry.”*

This FMP includes all elements of optimum yield as defined by the Sustainable Fisheries Act and the final guidelines, published on May 1, 1998. Optimum yield, a definition of overfishing, and a rebuilding schedule are described in Sections 3.4.2, 3.4.1.1, and 3.4.1.2, respectively.

Optimum yield (Section 3.4.2) is defined as the yield produced by the target fishing mortality rate when the stock is at a target biomass level. The target fishing mortality rate is  $F_{0.1}$  in the Southern Fishery Management Area and at an undefined level below  $F_{\text{threshold}}$  in the Northern Fishery Management Area. The target biomass level is a proxy value for MSY conditions (Overfishing Definition Review Panel 1998). Optimum yield is therefore measurable, if some basic assumptions about the relationship between survey biomass measurements, fishing mortality, and commercial catch is made. The long-term yield, associated with optimum yield is estimated in Section 8.1.5.2.5.1.

The overfishing definition (Section 3.4.1.1) includes the four types of reference points that are recommended by the National Standard 1 guidelines (50 CFR, §600.310). These reference points are a maximum fishing mortality threshold consistent with  $F_{\text{MSY}}$ , a minimum biomass threshold, a biomass target consistent with  $B_{\text{MSY}}$ , and a fishing mortality target that is risk averse.

The overfishing definition includes a proxy value for a threshold fishing mortality rate, consistent with  $F_{\text{MSY}}$  (Overfishing Definition Review Panel 1998). The target fishing mortality rates have been chosen to be risk averse, but there has been no formal assessment of risk because there is too little information about monkfish stock dynamics. Fishing mortality has been estimated by the SAW 23 (NEFSC 1997) and the fishing mortality reference points can be directly compared to these mortality estimates. The fishing mortality reference points were estimated using the Beverton and Holt (1956) method that the SAW 23 used to estimate current fishing mortality.

Stock biomass thresholds have been chosen to determine when the monkfish resource is in an overfished condition, i.e. depleted. The biomass reference point for each stock is defined from the most recent period of time when the monkfish resource was in a healthy condition, i.e. there was a high proportion of mature fish in the population and the population trend was stable. Thus the biomass during 1970-1979 serves as an acceptable proxy for a minimum biomass threshold that is risk averse. Similarly, the Council chose a higher biomass target that is an acceptable proxy for  $B_{\text{MSY}}$ . It is unclear how this minimum biomass threshold is related to a rebuilding threshold, because the Council was unable to model monkfish stock dynamics and predict rebuilding potential. The biomass target is  $\frac{1}{2}$  of the maximum (three-year average) level observed since 1963 in the autumn research survey.

The rebuilding schedule (Section 3.4.1.2) for monkfish is 10 years, the maximum allowed under the Sustainable Fisheries Act. Due to the inability to model monkfish stock dynamics and estimate rebuilding potential, the fishing mortality rate that will meet the rebuilding goal is uncertain. The Council has however established a comprehensive monitoring (Section 4.11.2.3) and framework adjustment process (Section 4.11.1) to ensure the rebuilding goal is achievable.

## **5.2 National Standard 2 – Scientific Information**

*“Conservation and management measures shall be based upon the best scientific information available.”*

Section 3.6 of this document describes the data the Councils used to evaluate impacts and describe fisheries. Much of the data had been updated since the preparation of the Draft FMP (formerly Draft Amendment 9 to the Multispecies FMP) and these new data had been incorporated into the revised analyses. The Councils know of no new or additional data that would meaningfully alter the results or conclusions reached within this FMP. Section 4.2 describes the new data collection requirements, primarily applying to vessels that qualify for monkfish limited access but do not have a multispecies or scallop days-at-sea permit. The Council estimated the costs of the new reporting requirements are analyzed and discussed in Section **Error! Reference source not found.** (PRA).

## **5.3 National Standard 3 – Management Units**

*“To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.”*

The FMP proposes to manage monkfish throughout the range of the species, in accordance with U.S. law. Bigelow and Shroeder (1953) report that the historic range of monkfish, *Lophius americanus*, extends from the Newfoundland Banks and the Gulf of St. Lawrence in Canada to Cape Lookout, NC. This range is consistent with more recent information, although sporadic catches have been observed further south in the waters off the Southeastern U.S. It is unclear if the monkfish resource in the Northwest Atlantic is composed of one, two, or several stocks. There appears to be some distinction between spawning, maturation, and distribution between monkfish found in the Gulf of Maine and those found in the Mid-Atlantic Bight. It is unknown whether the monkfish on the Scotian Shelf in Canada are interrelated with those in the Gulf of Maine or in Southern New England. Likewise, it is unknown whether the monkfish south of Cape Lookout, NC are interrelated with those in the Mid-Atlantic. Monkfish that occur north of Cape Hatteras, NC appear to be contiguous with and interrelated with monkfish observed off the Delmarva and the Mid-Atlantic. Other species of anglerfish in the North Atlantic include *L. piscatorius*, commonly found in Europe, and *L. budegassa*, commonly found in the Mediterranean.

Monkfish landings occur within the U.S. from Maine to North Carolina (Table 9). All reported U.S. landings occur in states that are contiguous with the proposed northern and southern fishery management areas (Figure ). Some landings of monkfish occur in Canada from incidental catch in the groundfish and scallop fisheries, and there has been a recently developing directed fishery.

**Table 9.** Average annual landings of monkfish, 1992-1996. Source: NMFS (<http://remora.ssp.nmfs.gov/commercial/landings/index.html>).

State	Pounds, thousands	Revenue (\$1,000)
Connecticut	1,083	501
Delaware	24	11
Maine	4,018	2,179
Maryland	64	56
Massachusetts	12,358	6,832
New Hampshire	295	224
New Jersey	1,798	1,038
New York	603	299
North Carolina	152	114
Rhode Island	3,571	2,114
Virginia	979	383
Grand Total	24,946	13,752

The FMP proposes two management areas for monkfish, although management extends throughout the range of monkfish in U.S. waters. All federally-permitted vessel and all vessel fishing in the Exclusive Economic Zone will be subject to this management plan. The Councils presently propose no management rules for the EEZ south of the NC/SC border, however.

## 5.4 National Standard 4 – Allocations

*“Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be:*

- 1) *Fair and equitable to all such fishermen*
- 2) *Reasonably calculated to promote conservation.*
- 3) *Carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.”*

The proposed management measures for monkfish defines a subset of fishing vessels that have demonstrated a history in the fishery and have a high dependence on targeting monkfish. The limited access criteria are therefore intended to be fair and equitable by qualifying vessels that had a legitimate interest in the directed fishery that developed in the early 1990s, prior to the control date. The control date is intended to limit speculative entry into the directed monkfish fishery that occurred in 1995 and 1996 when monkfish liver prices reached new highs. Without limited access, the FMP could not achieve its objectives without significantly adding more restrictions that would negatively impact the industry. As a result, the benefits expected from the proposed management measures would decline due to higher inputs of capital and labor in the fishery. A reduction in net benefits would reduce OY in terms of economic and social value. The social and economic consequences of establishing a limited access program for the monkfish fishery are addressed in Sections 8.1.6 and 8.1.7.

Any U.S. resident is eligible for qualification, regardless of state of residence. Fishermen may use state and federal records to document their monkfish landings and demonstrate their participation in the directed fishery. Vessels that qualify for monkfish limited access also may possess monkfish anywhere in state or federal waters, provided that the possession complies with the requirements in Section 4.0. They are not prevented, for example, from fishing in one of the two management areas provided that they abide by the regulations for that area. Some vessels that began targeting monkfish after the control date may not qualify for limited access, but they are treated

no differently than vessels in another region. Vessels that targeted monkfish since 1995 in NJ and fail to qualify, for example, are no different than a vessel that fails to qualify in Virginia, since monkfish there are considered part of the same stock and are similarly overfished and in need of management.

The FMP allocates temporary fishing privileges as defined by a day-at-sea given to certain vessels. Permits are transferable during a vessel sale or when an owner transfers a permit from one vessel to another that he owns<sup>5</sup>. More than one limited access monkfish permit cannot be added (i.e. stacked) on a single vessel. Although there are no limits on a maximum number of permits an owner or corporation may hold, it is highly unlikely that businesses will acquire excessive numbers of limited access monkfish permits. To do so, would require an individual or business to acquire and operate a fishing vessel for each limited access permit. Beside the cost of purchasing and operating individual vessels for each permit, this outcome is unlikely since nobody has acquired a large number of vessels with monkfish history under the current conditions.

#### **5.4.1 Days-at-sea allocations for multispecies and scallop vessels**

One of the more contentious issues identified at the second round of public hearings in February 1998 was the perceived inequity between the allocation of monkfish days to vessels with multispecies or scallop permits. Under the preferred alternative, vessels with a multispecies or scallop limited access permit may use up to 40 multispecies or scallop day-at-sea during a fishing year to target monkfish, provided that the vessel qualifies for monkfish limited access. Vessels that qualify for monkfish limited access and have no multispecies or scallop permits also would receive 40 days to target monkfish, but the days would not be counted against another fishery program. On the surface, this allocation of days and the way they may be used appears to be inequitable because multispecies and scallop vessels would be required to use an existing day-at-sea if the vessel only targets monkfish. Other vessels with no multispecies or scallop days-at-sea only would not loose opportunities to fish for other species and would receive separate monkfish-only days.

The preferred alternative qualification criteria and day-at-sea allocations fairly allow vessels to qualify for monkfish limited access and allocate day-at-sea in a manner that accommodates the customary way that the industry operated and caught monkfish. Compared with other alternatives that would meet the monkfish mortality objectives, the preferred alternative also greatly reduces regulatory discards (Sections 8.1.5.1.1.5 and 8.1.5.1.1.6).

The Councils chose the preferred alternative primarily because many (535) multispecies and scallop vessels would qualify for monkfish limited access. For the non-preferred alternatives, significantly fewer (390-458) of these vessels would qualify. The Councils preferred that vessels which target monkfish as a component of a mixed catch including groundfish and scallops should qualify for monkfish limited access. Even though more scallop vessels would qualify with the preferred alternative, the Councils also believe that few of these vessels will use scallop days to target only monkfish with 10-inch or larger mesh fishing gear. Also, a management program that requires multispecies and scallop vessels to use a multispecies or scallop day-at-sea when targeting monkfish would be consistent with past practices. Many vessels use mobile gear to target both groundfish and monkfish or scallops and monkfish on a single trip. Thus the 40 day-at-sea restriction for multispecies and scallop vessels will limit the amount of fishing effort that could be used to target monkfish, while also accommodating the way that multispecies and scallop vessels historically fished.

This equity issue did not, in fact, arise until the last round of public hearings in February 1998, when the Councils proposed to reduce the amount of multispecies and scallop days-at-sea that could be used to target monkfish. Initially, the Councils' preferred alternative would have allowed multispecies vessels up to 88 annual days-at-sea to target monkfish. Similarly, scallop vessels could use up to 120 annual scallop days to target monkfish. Also in this earlier proposal, all limited access multispecies vessels would automatically qualify for monkfish limited access. On one hand, the multispecies and scallop fishermen saw the original, more liberal approach as fair. The earlier proposal would have allowed them to target monkfish at any time within their days-at-

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<sup>5</sup> The second replacement vessel must not exceed the upgrade limitations contained in this FMP to be able to transfer to take place.

sea allocation. Others pointed out that the earlier proposal would, however, have allowed vessels to target monkfish during tens of thousands of unused multispecies and scallop days.

When the Councils made the qualification criteria for multispecies vessels more restrictive (by raising the qualification criteria from zero pounds to 7,500 pounds for the four years preceding the control date) and reduced the number of monkfish days to 40, fishermen thought the preferred alternative was inequitable. Multispecies fishermen believed that they should be able to target monkfish outside the multispecies days-at-sea program, even though the preferred alternative qualification criteria<sup>6</sup> would be more liberal than the qualification criteria for other vessels. Similarly, scallopers who qualify for monkfish limited access thought that the cost of converting their vessel and losing valuable scallop days-at-sea would exclude them from the monkfish fishery.

There are five reasons why the Councils chose the preferred alternative over other options that would allocate monkfish-only days to multispecies and scallop vessels that qualify for monkfish limited access:

The monkfish qualification criteria would be more liberal for multispecies vessels than the qualification criteria for other vessels. Multispecies vessels, therefore, should not be entitled to additional day-at-sea to target monkfish.

The monkfish bycatch limits for vessels on a scallop day-at-sea would be considerably more liberal than recommended by the PDT (Appendix I). Scallop vessels, whether or not they qualified for monkfish limited access, will still be able to land monkfish as a component catch and therefore additional days to target exclusively monkfish are unnecessary for the preferred alternative.

The monkfish qualification criteria and the days-at-sea allocations for multispecies and scallop vessels accommodate the current fishery that targets a mixed catch including monkfish. Many of the multispecies and scallop vessels qualify for monkfish limited access due to monkfish that they landed as a component catch.

Other alternatives would increase regulatory discards to unacceptable levels because the other alternatives proposed lower bycatch limits on a multispecies or scallop day-at-sea to allow for more monkfish-only days.

Other alternatives would allow for too few monkfish-only days for the large number of multispecies and scallop vessels. Previous analyses indicated that only 12 days per year could be allocated in year 1 and 3 days per year in year 4, while meeting the mortality objectives. For many vessels, this allocation of monkfish days was much less than would allow a profitable season and in some cases would be shorter than a single trip. Some fishermen stated that it would be too costly to convert their vessel to fish seasonally for monkfish for such a small allocation of days.

It is nonetheless informative to analyze and examine another alternative that would allow some monkfish-only days to be allocated to any vessel that qualifies for monkfish limited access. The following analysis is similar to non-preferred alternative 4, except that it estimates the implications of using alternative 3b qualification criteria, a 200 pound per day-at-sea bycatch monkfish trip limit for vessels on a multispecies or scallop day-at-sea, and meets the same year 2 mortality reductions as estimated that the preferred alternative would achieve. Under the qualification criteria for non-preferred alternative 3b, 455 vessels would qualify for monkfish limited access, compared to 600 vessels under the preferred alternative. Of the 455 vessels that would qualify under non-preferred alternative 3b, 390 had multispecies, scallop, or combination permits for 1998 and are allocated days-at-sea. All other management measures (allocation of days to vessels that qualify, bycatch limits for vessels that are not on a multispecies or scallop day-at-sea, and directed fishery monkfish trip limits) are exactly the same as the preferred alternative. For comparison, multispecies and scallop vessels could use only 40 multispecies or scallop days to target monkfish.

<sup>6</sup> A multispecies vessel will qualify by having 7,500 pounds tail-weight of monkfish landings during the four-year qualification period, while other vessels larger than 51 GRT would need at least 50,000 pounds tail-weight of monkfish landings to qualify for limited access.

Compared to the preferred alternative, the more conservative qualification criteria from non-preferred alternative 3b and the reduced bycatch limits would be more conservative. In the Northern Fishery Management Area (Table 10), the expected monkfish mortality reduction would be 50 percent in year 2, versus the 33 percent reduction expected under the preferred alternative. This alternative management scenario would only affect the days-at-sea categories, since vessels without multispecies and scallop permits would be unaffected. Landings by vessels that do not qualify for monkfish limited access would increase by 40 percent (980 mt vs. 697 mt), because there would be more vessels that do not qualify for monkfish limited access. Conversely, landings by multispecies and scallop vessels that qualify for limited access would be 3,849 mt rather than 5,781 mt. Discards, on the other hand, would increase nearly 10-fold to 20 percent of landings, rather than only two percent of landings.

**Table 10.** Northern Fishery Management Area: Summary of estimated landings and discards after applying the proposed qualification criteria day-at-sea limits and trip limits. These results are compared to the total 1995-1996 landings for vessels in each category to estimate the anticipated monkfish mortality reduction. The qualification criteria for the non-preferred alternative 4b are the same as those for non-preferred alternative 3b.

	Vessel classification	<b>Mortality reduction objective</b>	<b>Preferred alternative</b>			<b>Non-preferred alternative 4b</b>		
			Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)
Year 2	DAS Qualifiers		5,781	49	7,991	3,849	422	6,578
	DAS Non-qualifiers		697	49	1,599	980	490	4,742
	Monkfish-only		309	115	708	284	115	708
	Bycatch fisheries		104	33	389	49	18	389
	Total		6,891	246	10,687	5,162	1,045	12,417
	Percent reduction	55%	33%			50%		

Similar results are predicted for the Southern Fishery Management Area (Table 11). As a result of decreased landings, the mortality reduction expected under this approach would be 61 percent, compared to 49 percent for the preferred alternative. Unlike the northern area, however, landings by non-qualifiers actually would decline to 684 mt compared to 1,046 mt for the preferred alternative, even though more vessels fall into the “DAS Non-qualifiers” category. Regulatory discards would increase nearly four-fold to about 25 percent of landings.

**Table 11.** Southern Fishery Management Area: Summary of estimated landings and discards after applying the proposed qualification criteria day-at-sea limits and trip limits. These results are compared to the total 1995-1996 landings for vessels in each category to estimate the anticipated monkfish mortality reduction. The qualification criteria for the non-preferred alternative 4b are the same as those for non-preferred alternative 3b.

	Vessel classification	<b>Mortality reduction objective</b>	<b>Preferred alternative</b>			<b>Non-preferred alternative 4b</b>		
			Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)
Year 2	DAS Qualifiers		4,903	44	7,853	3,472	213	6,595
	DAS Non-qualifiers		1,046	210	3,200	684	745	5,505
	Monkfish-only		409	105	1,426	404	105	1,426
	Bycatch fisheries		86	60	935	24	63	935
	Total		6,444	419	13,414	4,584	1,126	14,461
	Percent reduction	59%	49%			61%		

The difference in total catch between the preferred alternative and this alternative scenario could allow management to allocate monkfish-only days-at-sea to multispecies and scallop vessels that qualify for monkfish limited access. In the northern area (Table 10), the non-preferred alternative 4b would have catches that are 930 mt less than the preferred alternative. In the southern area (Table 11) the difference is 1,153 mt. Any management option that accounts for these catches would have equivalent monkfish mortality implications. If monkfish-only

days-at-sea were allocated to all 455 vessels that would qualify for monkfish limited access using the non-preferred alternative 3b criteria (Section 8.1.4.2.2) and multispecies and scallop vessels could not target monkfish during a day-at-sea, the amount of the TAC that could go to a directed fishery would allow 16 days per year for each vessel in year 2. Since the year 2 mortality would be above the overfishing threshold, non-preferred alternative 4b would also allow no or very few days for the limited access monkfish fishery in year 4. With the non-preferred alternative 3b qualification criteria, a 200 pounds tail-weight per day-at-sea trip limit, and an allotment of 16 monkfish-only days, landings in year 2 would total 11,829 mt, or 11 percent less than the preferred alternative. Regulatory discards, on the other hand would be 2,171 mt, or over three times what is anticipated for the preferred alternative. Regulatory discards would be 18 percent of the total landings, versus only five percent for the preferred alternative.

## 5.4.2 Qualification criteria

Another contentious issue that relates to equity is how the proposed qualification criteria affect fishermen of different states or regions. Although it is permissible to have variable impacts on fishermen that reside in different states, it is not legal to unfairly discriminate against them with rules that intentionally exclude their participation in a fishery. NC fishermen identified this issue at the February 1997 and the February 1998 public hearings. They believed that the Monkfish FMP left them out of the management unit and unfairly prevented them from qualifying for monkfish limited access.

The preferred alternative now includes in the management unit monkfish that occur throughout the range, including monkfish off NC. There appears to be no bias in the proposed qualification criteria that excludes NC fishermen from limited access and the vessels that would not qualify appear to be indistinguishable from vessels in other states that also do not qualify.

NC fishermen would be subject to the same qualification criteria that apply to vessels in other states and may use state landings data to document their participation in the monkfish fishery. According to the 1995 and 1996 dealer records, sixteen NC vessels would qualify for monkfish limited access. Seven vessels that targeted monkfish during 1995-1996 would fail to qualify. These seven vessels represent a proportion of the monkfish fishery that is no greater than the fraction that would not qualify in other states. Failure to qualify for monkfish limited access is the result of insufficient monkfish landings during the four-year qualification period because 1) the vessel did not target monkfish or 2) the vessel entered the fishery after the February 27, 1995 control date.

Some vessels that target monkfish in NC entered the directed monkfish fishery after the control date, but appear to be no different than vessels in other states that also began targeting monkfish after the control date. In NC, the monkfish vessels targeted inshore species with gillnets and began targeting monkfish during the spring when monkfish are available. Similarly, fishermen in NJ began targeting monkfish with gillnets after they could not target species like sturgeon. Massachusetts's fishermen began to target monkfish after the control date because the Multispecies regulations reduced the time when they could pursue groundfish. All cases involved shifts in effort as a response to increasing prices and markets for monkfish, more restrictive regulations in other fisheries, and developing fishing technology.

Although the Councils' intention was to manage monkfish throughout the range, the February 1997 public hearing document erroneously described the management unit as extending from the US-Canada boundary to the NC-VA border and from the shoreline to the 200-mile limit. Council staff added this specific description of the management unit during the final editing stages and it overlooked the contiguous resource area south of the NC-VA border, north of Cape Hatteras, NC. The preferred alternative qualification criteria in the February 1997 public hearing document allowed a vessel of any state the opportunity to qualify for monkfish limited access provided that it could show fishing activity of sufficient volume.

During the first public comment period in 1997, the North Carolina Fisheries Association wrote:

*"Some NC commercial fishermen have been inadvertently left out of the proposed monkfish regulations. We respectfully request the NEFMC & MAFMC work with the NCFA to address this legitimate concern.*

*"NC flounder fishermen (trawlers) historically land monkfish along with summer flounder. The State of NC commercial landings database contains accurate, historical monkfish landings data. How will NC vessels with a history of landings monkfish be treated in the proposed amendment? Obviously, it would be inherently unfair not to allow NC trawler fishermen continued access to this resource in the form of a bycatch allowance.*

*"According to the last paragraph on page 3 of the hearing draft, the southern fishery management area (Southern Fishery Management Area) extends as far south as the VA-NC border and stops at statistical area #631. This is not consistent with the range of monkfish as fishermen are catching monkfish 7-30 miles off the NC coast (areas #631 & 635).*

*"The public hearing document (page 4) clearly states "a limited access program for vessels that target and land large volumes of monkfish will be based on historic participation from February 28, 1991 to February 27, 1995 (control date)." Since NC gillnet fishermen do not own multispecies permits, naturally they were never informed that a monkfish control date was either pending or instituted.*

*"NC gillnet fishermen did not start targeting monkfish until March 1995, several of them even later than that. They all have made substantial gear investments to start this fishery and should not be excluded from continuing to participate. In essence, they are being penalized for developing a limited fishery that provides an opportunity to harvest species other than weakfish, bluefish, dogfish, and shad. Considering the current management situation for these other species, the NC monkfish gillnetter should be applauded, not punished.*

*"Furthermore, even if these NC fishermen (approx. 6) did fit in under the control date, they typically do not catch the large amounts of monkfish or fish the large number of trips necessary to qualify for a permit under the "preferred option". However, they cannot operate under extremely low trip limits or measures allowing for monkfish to constitute only 10% of the total catch since these fishermen will target and land exclusively monkfish during January-April.*

*"Finally, these NC fishermen are right now fishing next to vessels from the northern area that will continue to fish off NC and catch monkfish while NC monkfish fishermen will not be able to do the same if the proposal remains unchanged. This is unfair to NC fishermen and directly violates National Standard #4 of the Magnuson-Stevens Act.*

*"Therefore, NCFA strongly urges the NEFMC & MAFMC consider allowances for these gillnet fishermen now actively catching monkfish. This can be accomplished by the following:*

*Extend the Southern Fishery Management Area (and the formal range of monkfish management) to include statistical areas #631 and #635.*

*Gillnet fishermen fishing in Statistical Areas #631 & #635 with at least 1,000 lbs. of whole monkfish landed and recorded on a valid state landing tickets between January 1, 1995-March 14, 1997 should be granted a permit and a number of days-at-sea to target harvest monkfish."*

NMFS published the monkfish control date notice on February 27, 1995 in the Federal Register. This official government publication is distributed nationally and serves as the official form of notification for all Federal regulations. In addition to this official notification, NMFS mailed a notification to all Northeast region permit-holders that announced the establishment of a monkfish control

date. This mailing included holders of summer flounder and sea scallop permits that fish from NC. The control date notice, furthermore, did not specify a management or geographical boundary where the control date would apply. As published, it applied to all US vessels that land monkfish.

The Councils responded to the public hearing comments by reaffirming the original policy that management was to apply throughout the range and that the qualification criteria therefore would apply to any vessel landing monkfish. According to the proposed qualification criteria, either federal or state records could be used to substantiate participation. Responding to comments by day-boat fishermen, the minimum number of trips and landings per trip thresholds were omitted from the final preferred alternative qualification criteria to accommodate vessels that landed small volumes of monkfish over many trips, as is typical in NC.

The Councils discussed, but could not develop qualification criteria that would admit the small number of NC vessels into the monkfish limited access program without opening the floodgates to other vessels that had entered the monkfish fishery since the control date. The industry later indicated that there were 50 to 75 vessels in NJ that had entered the fishery. Since limited access coupled with days-at-sea allocations is a conservation measure for monkfish, the Councils could not liberalize the qualification criteria in the way that NCFA suggested without harming the vessels that legitimately participated in the monkfish fishery before the control date.

The proportion of vessels that would not qualify for monkfish limited access ranges from twelve percent (11 vessels) in RI to 100 percent (1 vessel in DE; Table 12). For all states, there were 333 vessels that had at least one trip targeting monkfish (monkfish revenue was greater than 30 percent of total revenue), 35 percent of all vessels that had trips targeting monkfish. For NC, the fraction of vessels that targeted monkfish during 1995-1996 and would not qualify (according to NMFS records only) would be 30 percent of total monkfish vessels (Table 12). States with the highest proportion of non-qualifying vessels that targeted monkfish during 1995-1996 are PA, MD, and NH. It is possible that monkfish landings in all four states are underreported and a greater fraction will ultimately qualify for monkfish limited access. The greatest number of vessels (146) would fail to qualify in MA.

Vessels that potentially fail to qualify account for only 7 percent of trips and 6 percent of landings for all vessels with directed trips (Table 12). NC vessels that may not qualify account for only one percent of trips and two percent of landings. It is likely that these amounts in NC are underreported through the federal dealer reports and could be significantly higher, however. Even though these trips and landings by non-qualifying vessels may be prohibited by the preferred alternative, not all of the indicated monkfish landings would be prevented. A significant fraction of monkfish landings by the vessels that do not qualify for limited access may still occur under the bycatch trip limits, even though they represent trips where monkfish revenue was greater than 30 percent of total revenue. These potential landings within the bycatch restrictions have been estimated in Section 8.1.5.1.1.5.

When the Councils developed the final management measures and at the February 1998 public hearings, NC fishermen restated their belief that they were not properly notified that the monkfish control date applied to them. Mr. James Fletcher, Director of the United National Fishermen's Association, stated that many NC boats entered the monkfish fishery because the February 1997 public hearing document indicated that their catches would be exempt from management. The NC fishermen maintained that it was unfair that they were not properly notified of the control date and they were misled by the management proposals.

NC data (Patricia Murphy, DEHNR, pers. comm.) for 1994-1997 on the other hand contradicts this information. Gillnet vessels in NC began targeting monkfish during the spring of 1994 (Figure 13), prior to the publication of a monkfish control date. It appears that the number of vessels in the monkfish fishery increased slightly in 1995, but catch per trip increased significantly. The monkfish landings per trip remained high in 1996 and fell slightly in 1997. The number of vessels appeared to remain at 1995 levels during 1996 and 1997. Data for March and April 1997, however, were incomplete and only represent the landings and trips for vessels in Dare County.

For the vessels in the monkfish gillnet fishery during 1994, failure to receive the 1995 control date notification would have had no bearing on their decision on whether to enter the fishery. It is possible that additional vessels entered the fishery in 1997 after the public hearing, but this is not evident in the NC landings data.

**Table 12.** State-by-state comparison between trips targeting monkfish (monkfish revenue greater than 30% of total revenue) during 1995-1996 by vessels that would not qualify for monkfish limited access with 1995-1996 trips by vessels that would qualify for monkfish limited access. The percent of trips and revenue comparisons were adjusted to account for the difference in time between the two periods.

State	Non-qualifying vessels with trips targeting monkfish						Qualifying vessels		
	Vessels	Percent	Trips	Percent	Monkfish Revenue ('000)	Percent	Vessels	Trips	Monkfish Revenue ('000)
ME	27	29%	136	9%	173	11%	65	560	\$1,439
NH	22	69%	425	43%	749	57%	10	324	556
MA	137	37%	1,753	11%	1,648	10%	238	4,005	14,094
RI	20	24%	267	5%	440	7%	65	1,587	5,548
CT	2	50%		6%		2%	2		
NY	26	74%	219	63%	183	59%	9	58	127
NJ	29	53%	344	23%	447	28%	26	443	1,136
PA	0		0		0		1		
DE	0		0		0				
MD	9	90%	134	88%	185	91%	1		
VA	24	67%	39	20%	93	38%	12	75	152
NC	7	64%	10	30%	44	66%	4	8	23
Others/ Unspecified	30	48%	362	12%	690	21%	32	1,045	2,542
Grand Total	333	42%	3,691	13%	4,653	15%	465	8,125	\$25,674

## **5.5 National Standard 5 – Efficiency**

*“Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.”*

The FMP proposes to establish a limited access fishery for monkfish and vessels that qualify to participate would receive an annual days-at-sea allocation. Limited access is necessary to ensure that the proposed management measures meet the FMP goals, reduce fishing mortality, and rebuild stock biomass. It therefore has implications for efficiency in harvesting the resource that would exceed those for other forms of management. These implications and the factors that the Councils should consider when establishing a limited access system are described below. Limited access permits are transferable to other fishermen through vessel sale or other forms of conveyance. The permit could be transferred to another vessel along with all other permits on the original vessel, provided that the new vessel does not exceed certain characteristics thought to control fishing power.

### **5.5.1 Efficiency in the utilization of resources**

At present, there is too much harvesting capacity in the monkfish fishery to reduce fishing mortality and achieve optimum yield, without excess capital and labor in the fishery dissipating the benefits. The proposed qualification criteria will restrict access to the fishery to those vessels that legitimately targeted monkfish or to those that had a high dependence on monkfish as a catch of mixed species prior to the control date. Although the qualification criteria is not the primary management measure intended to reduce fishing mortality, the proposed limited access program reduces excess capital and labor that entered the fishery since the February 27, 1995 control date. These cost savings are estimated in Section 8.1.6 to total \$20 million over 20 years.

Even more important, the FMP proposes to rebuild stock biomass and as a result, catch per unit effort. Once the stock rebuilds, a directed fishery managed by days-at-sea limits will improve the profitability of those days and the fishing industry. As a result on the limit on days, there is little incentive to fish quicker during a fishery season to capture more fish than another vessel. Incentives to increase capital or labor and make the days more productive remain, but the limited access provisions include upgrade limits that restrict a vessel's ability to mitigate the days-at-sea restrictions. Gillnet vessels are furthermore limited in the number of nets they may set at any time. Trawl vessels will be limited in the amount of net they can pull via the proposed horsepower upgrade limit. When rebuilding occurs, the Councils will match the days-at-sea allocations with the harvesting capability and the anticipated yield from the resource. The lower fishing mortality rate will also rebuild age-structure, enhance yield-per-recruit and promote the landings of larger, more valuable monkfish. The proposed size limit, while increasing costs in the short term, is expected to keep vessels from targeting small fish during the valuable days-at-sea. This measure also will increase the size of monkfish that the industry catches.

Compared to other forms of management, the days-at-sea program is very efficient. Days are easily monitored with a vessel tracking or call-in system and management via days-at-sea do not create a race for fish or create incentives to increase capital to the same extent as would management by quota. An optional call-in system is more costly to the government over the long term, but this flexibility is necessary for some vessels where an expensive VTS is too costly. Management via a quota (non-preferred alternative 1) would have caused the fleet to target monkfish early in the season before the quota was taken. Vessels might respond to quota management by increasing their speed and attempting to fish in poorer weather during the open monkfish season. Other forms of management, by themselves, can also decrease efficiency because they reduce catch per unit effort or force fishermen to pay for new technology more so than they would under days-at-sea management. Examples where fishermen would be less efficient are area closures and trip limits, implemented without other complementary measures that would reduce or restrict time at sea for fishing vessels.

## **5.5.2 Limited access**

Limited access is necessary to manage fishing effort and link days-at-sea limits to the expected fishing mortality rates. This linkage will allow adjustment of days-at-sea allocations to rebuild the fishery and achieve optimum yield. Without limited access, there would be no limit on total days fished as new vessels enter the monkfish fishery, in response to reductions in days for vessels presently in the fishery. Since the Councils have chosen effort management as the primary management strategy, it is necessary to control other inputs of effort, capital, and labor to achieve the FMP goals, reduce fishing mortality, and rebuild the resource to conditions that will achieve optimum yield. Without limited access, the Councils would have to respond to the increased fishing pressure by adding or reducing other limits, e.g. number of nets, trip limits, closed areas, etc.

## **5.5.3 Factors considered**

### **5.5.3.1 Present participation in the fishery**

The Council considered the equity and fairness of the proposed limited access qualification criteria on vessels that entered the monkfish fishery after the control date. In nearly all cases, the fishermen refitted the vessels to pursue monkfish at a moderate cost. Modifications were necessary to target monkfish such as reconfiguration of deck equipment, adding winches that hold more cable, or simply purchasing new gear. These vessels chose to target monkfish because of regulations in other fisheries (multispecies, scallop, sturgeon, etc.) or because of reduced abundance of target species (groundfish, bluefish, weakfish, etc.). Some of this recent fishing effort will shift back into the original fisheries and some will seek other species like spiny dogfish, whiting, bluefish, weakfish, or croaker. The characteristics of these vessels are analyzed and discussed in the Fishery Impact Statement (Section 7.0).

### **5.5.3.2 Historical fishing practices, and dependence on the fishery**

Basically, there are three types of participants in the monkfish fishery: vessels that target monkfish alone, vessels that target a mix of species including monkfish, vessels that catch and land monkfish incidentally to other species. In the first case, the qualification criteria are sufficiently low that any vessel that had a good year of fishing (or four mediocre ones) prior to the control date should easily qualify for limited access. These vessels may have to reduce fishing time until the stock rebuilds, but they will be the primary beneficiaries of the expected stock rebuilding. Many vessels that target a mix of species including monkfish will also qualify under the proposed qualification criteria. These vessels often rely on monkfish landings for a significant (20 to 50%) of their fishery revenue. Vessels in the multispecies fishery often fall into this category and the proposed qualification criteria that applies to them is more liberal than for other vessels. The limited access proposal thus recognizes and makes allowance for this partial dependence on monkfish revenue. Most of the vessels that land monkfish as an incidental catch when targeting other species will not qualify for monkfish limited access. This failure to qualify will prevent vessels from increasing effort and targeting monkfish, when they have not previously participated in the directed fishery. Bycatch allowances for vessels that do not qualify have been set at levels that will require vessels to discard monkfish on a very small proportion of trips (Section 8.1.5.1.5.2). It may be attractive to reduce monkfish landings for vessels that have a low reliance on monkfish revenue, but the available management options either increase discards to unacceptable levels or would greatly reduce target catches, both reducing efficiency. The characteristics of these vessels are summarized and described in Section 6.4.

### **5.5.3.3 The economics of the fishery**

The economics of the monkfish fishery is analyzed and described in Section 6.4.5.

The capability for non-qualifying vessels to engage in other fisheries is analyzed and described in the Fishery Impact Statement (Section 7.0). This evaluation is based on the fishing history and permit status of those vessels when they did not target monkfish. Evaluation of the capability of vessels to engage in new fisheries would require an analysis of engineering and stability of each vessel that fails to qualify for monkfish limited access, well beyond the scope of this FMP. The conclusions in the Fishery Impact Statement are therefore based only on past vessel history, their permit status, and the present regulations in alternative fisheries.

#### 5.5.3.4 The cultural and social framework and affected fishing communities

The anticipated impacts on the cultural and social framework are discussed in the Social Impact Analysis, Section 8.1.7. The economic impacts on communities are estimated in Section 8.1.7.3.

#### 5.5.3.5 Other relevant considerations

A new limited access program that overlaps other fishery management programs and jurisdictions raised many issues about equity and fairness. One of the major issues was the effect of a control date on vessels that recently began fishing in a region (NC) within the range of management. The other significant issue was the requirement that multispecies vessels which also qualify for monkfish limited access use a multispecies day-at-sea to target monkfish. The rationale and evaluation of these issues are discussed in Section 5.4.1.

The implementation and annual administrative costs for the limited access program are relatively low, compared with other limited access programs that have been implemented for multispecies (NEFMC 1995) and sea scallops (NEMFC 1993). The estimated costs for the limited access program are low because limited access is piggy-backed onto existing programs. The number of new limited access vessels is only 65 to 130 vessels, while the number of vessels that is expected to qualify is over 600. The Paperwork Reduction Act analysis (Section **Error! Reference source not found.**) estimates the cost of implementation during year one will be \$20,300 to the public and \$100,200 to the government. Continuing costs for permit renewal is estimated to be \$12,400 to the public and \$76,100 to the government.

#### **5.5.4 Analysis**

Most overcapitalization of the fishery has arisen from effort shifts to target monkfish, not because of construction of new or larger, more powerful vessels. While this shift has been positive for other overfished resources, it has increased monkfish fishing effort beyond sustainable levels. The Multispecies and Atlantic Sea Scallop FMPs (Amendment 5 and Amendment 4, respectively) both forecasted this effort shift, but at the time (1992-1993) monkfish was viewed as an alternative fishery that could absorb some fishing effort, as long as targeting of small monkfish could be avoided. Thus the economic inefficiencies caused by too much fishing effort is the result of redeployment of capital and labor within the fisheries of the Northeastern U.S.. Following implementation of the FMP, this excess capital could shift into other fisheries or could be redeployed in other sectors of the economy through gradual vessel attrition. A more thorough evaluation of the economic costs and impacts are described in Sections 8.1.6 and 1.1.

Limited access was chosen by the Councils as an effective way of achieving OY without imposing serious costs inherent in other management systems or creating economic waste by raising discards. Efficient utilization was not the sole criteria for selecting limited access, however. No management measures within the FMP restrict the fishery in ways that prevent industry from using more efficient technology, unless the technology also increases fishing power and threatens the achievement of OY. Restrictions on horsepower, vessel length and size, and on numbers of nets are therefore proposed as conservation measures. These restrictions, however, perpetuate the status quo and do not impose new restrictions that would make the industry less efficient. The FMP proposes no restrictions on the shoreside harvesting or marketing of monkfish. Vessels are however required to land monkfish or monkfish tails to reduce the potential for economic waste caused by fishermen retaining valuable livers and discarding monkfish that are less than the minimum size. Without this liver restriction, the fishery could greatly reduce yield-per-recruit and spawning potential from harvesting monkfish at younger ages and preventing the achievement of OY.

#### **5.5.5 Economic allocation**

No allocation of resources or fishing opportunities is proposed by the FMP on the basis of economic factors.

### **5.6 National Standard 6 – Variations and Contingencies**

*“Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.”*

Considerable uncertainty exists about the biological targets (MSY proxies), the response of the monkfish stocks to lower fishing mortality, optimum yield, and the effectiveness of the proposed measures to achieve the FMP objectives. Recruitment has varied by at least an order of magnitude in the last 30 years. It therefore will have a significant influence on whether the FMP can rebuild the monkfish resource to the biomass target or the maximum mortality rate in years 4 to 6 that will be needed to achieve rebuilding. Equally important is the recovery of other stocks and changes in other fisheries regulations that could influence fishermen’s decisions to target monkfish or other species. These sources of uncertainty and variation are explained or analyzed in the estimation of biological reference points (Section 3.4.1.1), future yield (Section 8.1.5.2.5.1) and economic net benefits (Section 8.1.6).

The Monkfish FMP includes a framework adjustment procedure, described in Section 4.11, that would allow the Council to respond more quickly to changing conditions than would be possible through a plan amendment. The management measures that could be adjusted to respond to changing conditions are described in Section 4.11.4. The Councils also intends to appoint a Monkfish Monitoring Committee (MMC) which would

evaluate the plan's success in reducing mortality and rebuilding stock biomass. The MMC will develop and recommend management adjustments to achieve the plan objectives. During year 3, the MMC will also review the biological reference points, the management targets, and OY. This review will take place after collecting two years of data while the proposed management measures have been in place. This re-evaluation is expected to improve the estimate of the target reference points, OY, and the mortality limits needed to rebuild stock biomass in (at that time) six years.

## **5.7 National Standard 7 – Costs and Benefits**

*“Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.”*

Monkfish is a very important resource in need of management due to overfishing and the requirement to achieve OY. The monkfish fishery has recently ranked as high as third in total landings and value in New England and occasionally has had the highest annual value for any New England groundfish. The increasing importance to New England fisheries has partly been due to the decline in landings of other species and partly due to the increasing price of monkfish livers. Unfortunately, the monkfish resource is significantly overfished and depleted, especially in the southern area. States implemented minimum size and limits for liver landings during 1993, but these regulations have not reduced fishing mortality. Since monkfish occurs primarily in federal waters, state laws cannot effectively manage the resource and prevent overfishing.

After the stock biomass rebuilds, a directed fishery that is very profitable and efficient is anticipated, provided that monkfish bycatch is held in check. Based on the anticipated yield at OY, the net economic benefits compared to the status quo will increase by \$20 million over 20 years. Additional cost reduction is expected from limits on days-at-sea. These gains are estimated and described in Section 8.1.6. Mortality reduction is expected through days-at-sea limits in concert with other management measures, while at the same time maximizing the industry's flexibility to determine the optimal time and location to fish. Administrative, compliance, and enforcement costs are expected to be low (Section **Error! Reference source not found.**) because of the FMP's reliance on existing systems for reporting and monitoring days. Based on these general factors, the Monkfish FMP is therefore needed to improve benefits, reduce costs, and achieve optimum yield for a fishery resource that is predominately found in the EEZ.

## **5.8 National Standard 8 – Communities**

*“Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to:*

- 1) *Provide for the sustained participation of such communities; and*
- 2) *To the extent practicable, minimize adverse economic impacts on such communities.”*

The importance of the monkfish fishery to communities and the expected impacts of the preferred and non-preferred alternatives are described in Section 8.1.7.3. Considerable reductions in catch and mortality are necessary

to stop overfishing and rebuild stock biomass, however, and this requirement imposes significant economic impacts on communities that depend on fishing. Communities that have a greater reliance on the directed monkfish fishery and therefore have a greater fraction of vessels that qualify for limited access tend to have greater impacts. Once stock rebuilding occurs, these same communities are anticipated to benefit from the higher yield when days can be restored to limited access vessels.

The preferred alternative attempts to minimize these impacts by allowing the greatest number of vessels to qualify for monkfish limited access. It also attempts to minimize the impacts on communities that depend on the multispecies and scallop fisheries by integrating the monkfish management into the existing day-at-sea programs in those fisheries. Vessels that do not qualify for monkfish limited access would have lower bycatch trip limits to accommodate extra day-at-sea granted to the multispecies and scallop vessels that qualify for monkfish limited access. In contrast, the preferred alternative allows qualifying vessels to use multispecies or scallop days to target monkfish while allowing a sufficiently high bycatch trip limit that accounts for greater than 95 percent of trips where monkfish is caught as bycatch. The preferred alternative, therefore, minimizes the impact on communities that rely on mixed-species fisheries that are common in New England and the Mid-Atlantic.

## **5.9 National Standard 9 – Bycatch**

*“Conservation and management measures shall, to the extent practicable:*

- 1) Minimize bycatch; and*
- 2) To the extent bycatch cannot be avoided, minimize the mortality of such bycatch.”*

The Monkfish FMP proposes to manage monkfish via regulations on day-at-sea, trip limits, size limits, and qualification for limited access. The day-at-sea program integrates monkfish management into the existing day-at-sea program, where possible, to accommodate the mixed-species nature of the multispecies fishery. The implementation of an effort reduction program via day-at-sea limits, moreover, has a very positive impact on discard mortality (NMFS 1997). Similarly, the limited access measure could also reduce bycatch of other species, depending on how vessels that do not qualify respond to the new regulations. The anticipated responses by vessels that targeted monkfish after the control date are explained in the Fishery Impact Statement (Section 7.0). Trip limits usually are very problematic, because fishermen can be forced to discard species that they cannot avoid while targeting something else. The Councils proposed bycatch limits that accommodate the majority of conditions when monkfish are caught and landed incidentally to other species. Trip limits to control bycatch were set so that only the highest five percent of trips (ranked by monkfish landings) would have to discard monkfish, if they did not change fishing behavior. Some bycatch limits are at even higher levels than this objective goal recommended by the PDT and therefore have an even lower likelihood of increasing bycatch. The implications of various size limits were evaluated by the Councils and are explained below. It appears that the 11-inch minimum size prevents the industry from targeting small, immature monkfish while minimizing the amount of discarding that would be caused by this management measure.

Management measures included in the FMP that minimize bycatch are: integration of monkfish management into existing days-at-sea programs, minimum mesh limits that reduce bycatch of other species while targeting monkfish, bycatch allowances that allow 95 percent or more of trips to land incidental catches of monkfish, and an 11-inch size limit in areas and conditions where catches of immature monkfish are unavoidable.

### **5.9.1 Discard data collection and analysis**

The FMP will require all vessels with limited access monkfish permits to report fishing effort and estimate landings and discards on Vessel Trip Reports (VTR, Section 4.2.1.3). These reports will be used

to document the timing, prevalence, and amount of discarding that occurs in the monkfish fishery. In addition to documenting bycatch of other species and the effects on management/recovery of those stocks, the VTR data will help the Council to identify the amount of regulatory discarding and under what conditions excessive discarding occur. The Councils could use this data to support adjusting the management measures to reduce bycatch of monkfish and other species through the framework process established by this plan.

Although the VTR data will document and allow estimation of discards via a nearly complete census of the directed monkfish fishery, the existing sea sampling program often provides more reliable and detailed catch and effort data. Samples are taken on a tow-by-tow basis and the onboard observers collect more detailed information about the gear and the way that it is fished. This data can be critical to the Councils evaluation of different mesh options, potential gear restrictions, and various time/area/gear closures. Total discard amounts are often estimated by visual examination for each species that the vessel catches, including fish, some shellfish, marine mammals, and birds. The onboard observers also collect length data for landed and discarded finfish species. This information is crucial to estimating total discards by size and including it in the catch-at-age data for assessment of stock abundance and fishing mortality. Size data for landings and discards are also important for estimation of the exploitation pattern and the effect that management has had on it.

Unfortunately, sea sampling data is often woefully inadequate for estimating the size distribution of discards. Sampling frequency is often unbalanced (due to the emphasis on collecting marine mammal data aboard gillnet vessels) and usually leaves large gaps in the data when trying to estimate discarding by season, gear, and/or area. The present sea sampling program intercepts about one percent of total trips in the Northeast Region, while sampling for gillnet vessels approaches 10 percent of total trips. Although the VTR data could assist scientists in estimating and characterizing total discards (provided the data agree with the sea sampling data and are unbiased), sea sampling should be increased by two- to five-fold to adequately estimate discarding for the purposes of stock assessment. In the Councils' opinion, any increase in the frequency of sea samples would improve the information needed to manage monkfish and other species, but a five percent sub-sample of total trips stratified by gear, area, and season would provide a robust estimate of discarding. The Councils recognize the costs associated with deploying onboard observers, but these costs could be justified by the quality of information collected for all species in the commercial catch.

### **5.9.2 Discard implications of the proposed management measures**

Increased discarding is anticipated from implementation of the trip limits and minimum size limits. Day-at-sea limits in the monkfish fishery, the multispecies fishery, and in the scallop fishery will reduce bycatch of monkfish and other species. The proposed limited access program will also reduce monkfish discards and could reduce bycatch of other species, depending on the actual response of vessels that do not qualify for monkfish limited access. The combined effects of the limited access program; day-at-sea reductions for monkfish, multispecies, and scallops; and the proposed directed fishery and bycatch trip limits have been included in the estimate mortality implications for monkfish (8.1.5.1.1.3). Discarding of monkfish for several non-preferred alternatives are also analyzed and considered in this section. The discard implications of the proposed minimum size limit and various alternatives are estimated and considered in Section 8.1.5.1.1.6. The effect of various minimum size limits as a function of the discard mortality rate is shown in Figure 35.

There are some factors that would reduce monkfish discards that could not be analyzed, however. A large fraction of monkfish is presently discarded because of small size or no markets for monkfish caught on long trips. The amount of discards in the present fishery is estimated in Section 8.1.5.1.1.6.6. These discards will decrease by the same fraction as the ratio between future landings plus regulatory discards to current landings. This fractional reduction in discards that presently occur was not included in the evaluation of mortality reduction and could have significant implications for monkfish mortality reduction and stock rebuilding. This source of mortality will need to

be carefully monitored to evaluate the effectiveness of management during the monitoring phase of the plan. Ultimately, the success of the plan will be borne out in reductions in fishing mortality and increases in stock biomass observed through survey data.

A second factor that the Councils could not quantify is the effect that the proposed size limit will have on fishing behavior. It is possible, that fishermen will avoid areas where small monkfish are prevalent and cannot be landed due to the minimum size regulation. While this shift in effort is usually absent in other management systems, the monkfish vessels have a greater cost associated with fishing in areas where small fish occur. Limited access vessels will only have 40 days to fish for monkfish and fishing on small fish not only wastes capital and manpower, it also wastes valuable fishing time. The Councils expect that the effort restrictions will act as a powerful incentive for fishermen to fish when and where monkfish of legal size occur and avoid areas where small fish are abundant. Fishermen have testified throughout the Councils deliberations that there are times and areas where fishermen observe a segregation of large and small fish. These areas, however, cannot be identified by a semi-annual research survey and are unpredictable.

Permits are required of all vessels that land monkfish and must submit a vessel trip report. For most vessels, the reporting burden is small compared with the value of the trip or monkfish landings. Most vessels already have reporting requirements for other species, like groundfish, scallops, and summer flounder. The addition of monkfish adds little, if any, reporting burden. A few vessels, however, may not otherwise be required to make a vessel trip report and would not apply for a general category monkfish permit to avoid reporting. Fishermen on these vessels may be forced to discard their occasional catches of monkfish or to unload them illegally. The former response could increase discard mortality and waste, but the Council expects these amounts to be negligible.

### **5.9.3 Management measures to minimize bycatch and bycatch mortality**

Compared with the alternative, the preferred alternative was chosen to minimize the impacts on fishermen in fisheries where monkfish is an incidental catch and minimize the amount of regulatory discards that would occur. The preferred alternative is expected to increase regulatory discards less than the non-preferred alternatives. Regulatory discards are expected to increase by 675 (4% of estimated catch), 665 (5%), and 3,191 mt (31%) in years 1, 2, and 4, respectively (Table 94 and Table 95). For non-preferred alternatives 3a and 3b, regulatory discards are expected to increase by 914 (5%) to 1,424 (9%), 886 (5%) to 1,443 (9%), and 3,350 (31%) to 2,815 (25%) mt in the same time periods.

Discards in year 4 are probably overestimated for DAS Qualifiers and Monkfish-only categories because the FMP calls for no day-at-sea allocations in year 4 and the amount those vessels caught was counted as discards if the monkfish revenue did not exceed 50 percent of the total for a given trip. The likely outcome, however, is that many of the vessels that qualify for monkfish limited access will turn away from the monkfish fishery if the days allocated are reduced to zero.

Other examined options included rejected alternative 1 (Section 8.1.4.4.1) and rejected alternative 4 (Section 8.1.4.4.3), one that would allocate days to all monkfish qualifiers, regardless of their permit status (Section 5.4.1), and the cumulative impact of the Monkfish FMP preferred alternative and the preferred alternative for Amendment 7 to the Atlantic Sea Scallop FMP (Section 8.1.11.1). The Councils rejected alternative 1 because the bycatch trip limits were too low to provide for a quota allocation for the directed fishery. The proposed trip limits for alternative 1 would not accommodate monkfish landings when they are a component of a mixed catch of targeted species. The estimates of discards for rejected alternative 1 were not as rigorous as those for the preferred alternative, but the initial estimates by the PDT (Appendix I) were unsatisfactory. Likewise, non-preferred alternative 4 proposed trip limits of 200 pounds tail-weight per day-at-sea for all vessels to enable the Councils to allocate an acceptable level of days to the directed fishery. Most comments were against (then) non-preferred alternative 4, because it appeared that it would cause excessive discarding of monkfish by vessels that have incidental catches of monkfish or that target them as a component of a mixed catch. The Councils examined a wide variety of bycatch trip limits and the analyses are provided in Section 8.1.5.1.1.5.3.

An evaluation of another option that would allocate days to all monkfish qualifiers, regardless of their permit status was included in the Final FMP to show the impacts of addressing some equity concerns raised during the February 1998 public hearings. The details of this evaluation are presented in Section 5.4.1. To show the ramifications of a management approach that could allow monkfish-only days for all vessels that qualify for monkfish limited access, more conservative qualification thresholds and bycatch trip limits were considered. For year 2, regulatory discards total 2,171 mt (18% of total catch) vs. 665 mt (5% of total catch for the preferred alternative (Table 10 and Table 11).

The National Environmental Protection Act requires the Councils to examine the cumulative impacts of related laws and regulations or proposals for new laws or recommendations. One of the more significant proposals is Amendment 7 to the Atlantic Sea Scallop FMP, since many scallop vessels catch and land monkfish bycatch while targeting scallops. Under the Monkfish FMP, limited access scallop vessels that qualify for monkfish could also use a portion of their scallop day-at-sea to target monkfish. Amendment 7, therefore, has implications for monkfish bycatch as well as for monkfish as a targeted species. Section 8.1.11.1 describes the impacts in more detail. Regulatory discards would generally be lower than for the monkfish preferred alternative alone, estimated to be 637 (4% of total catch), 634 (5%), and 2,941 mt (35%) for years 1, 2, and 4, respectively.

The implications for discard mortality caused by various size limits is described in Section 8.1.5.1.1.6. During the development of the Monkfish FMP, the Council considered various minimum sizes ranging from 11 to 14-inches tail-length and various implementation options by area and gear. Although it appeared that there could be a benefit of a 14-inch minimum size limit in the Southern Fishery Management Area, the Councils chose to implement an 11-inch minimum size limit throughout both management areas to reduce discards and to lower

enforcement costs associated with different size limits by area. An 11-inch minimum size limit appears to approximate current practices and should cause minimal discarding. In the Southern Fishery Management Area, a greater fraction of the total monkfish catch comes from the directed fishery and the monkfish gillnet fishery. In the former case, the Councils believe that vessels targeting monkfish could avoid concentrations of small monkfish, depending on conditions. The segregation of monkfish between 11 and 14-inches tail length from larger fish might not be as distinct, reducing the fishing industry's ability to avoid illegal fish. The Councils proposed a one-year delay in the higher size limit to allow for more review of this issue and evaluate the need for a higher size limit to meet a potential shortfall in year 2 mortality targets. Gillnet fishermen, on the other hand, rarely catch monkfish less than 14 inches (Figure 38 and Figure 39). Discards at the higher size limit for gillnet vessels would therefore be minimal.

Area closures were not included in the preferred alternative, because not enough is known about monkfish to enable closures that would, among other things, reduce discarding of small monkfish. Area closures are however included within the framework adjustment process, possibly as a measure to reduce discards. Vessel Trip Reports and the Sea Sampling Observer Program data will be instrumental in assessing various area closure options. It might seem attractive to encourage vessels to use gillnets to target monkfish, instead of trawls or dredges. The Councils rejected this approach because it would require vessels to change gear (possibly endangering human life at sea) and gillnets are known to have higher rates of marine mammal encounters than other fishing gears used in the monkfish fishery.

The Councils determined, on the other hand, that it is inappropriate for vessels to use scallop dredges to target monkfish, as had been customary during periods of low scallop abundance. Scallopers using dredges, especially in the Southern Fishery Management Area, tend to catch large amounts of small monkfish (Figure 39). Anecdotal information indicates that their catch of small fish occurs, even when they are fishing next to other gear that is capturing predominately large monkfish. One possible explanation is not that scallop dredges catch more small fish, but that large monkfish are able to escape the oncoming, noisy dredge better than small fish. This effect, if it occurs, would make a dredge unsuitable for targeting mature monkfish without small fish contributing to a large fraction of their catch.

#### **5.9.4 Implementation and monitoring**

The Councils' Monkfish Monitoring Committee will seek and evaluate discarding when it reviews the effectiveness of the FMP and develops management options. The Monitoring Committee review and report is a mandated, integral part of the Councils' framework adjustment process. Among the management measures that could be considered to reduce discarding are area closures, size limits, and gear restrictions. Increases in size limits would be limited to those that would produce a positive benefit within two years, accounting for potential increases in discard mortality. Mesh size is currently thought to have little effect on monkfish selectivity, owing to the unusual morphology of monkfish. Other gear technology, grates for example, could be very effective in avoiding capture of small monkfish and could be implemented by a framework adjustment.

#### **5.9.5 Other considerations**

Bycatch of species governed by other laws (Marine Mammal Protection Act – Section 8.5, Endangered Species Act – Section 1.1, and The Migratory Bird Treaty Act – Section 8.1.9) is discussed in other sections of this document.

## **5.10 National Standard 10 – Safety of Life at Sea**

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

The Monkfish FMP proposes no area closures or closed seasons that might cause fishermen to fish under conditions that they would not otherwise have fished. The management measures within this FMP, moreover, maximize the flexibility of fishermen to choose when or where they can fish, when compared with other management options. Fishing is already a competitive environment that forces fishermen to search for higher concentrations of fish and to employ new, potentially dangerous gear to maximize their catch. To the extent practical, the FMP minimizes the danger to life at sea while meeting the mortality objectives and other requirements of the Magnuson-Stevens Act and related laws.

### **5.10.1 Operating environment**

No area closures, closed seasons, or other management measures that might cause vessels to extend trips, take trips under adverse conditions, or fish further from shore are proposed by the FMP. Compared to the alternatives, the preferred alternative will maximize the ability for fishermen to fish during the most advantageous times. The other form of management that the Councils seriously considered was establishing seasonal quotas (non-preferred alternative 1). Under this system, there is an incentive for fishermen to concentrate fishing effort immediately after the season opens to maximize their share of the quota before it is filled and the season is closed. Under the preferred alternative, each vessel will be allocated days to target monkfish at any time during the fishing year. In addition, the preferred alternative proposes to allow vessels to carry some unused days into the next fishing year to avoid situations where a vessel might be forced to fish at the end of a fishing year to avoid losing days.

### **5.10.2 Gear and vessel loading requirements**

The FMP proposes no new gear requirements, except for scallop vessels that qualify for monkfish limited access. Due to the small size of monkfish captured in the traditional scallop dredge, continued targeting of monkfish by vessels using dredges would not be consistent with the plan goals. Scallopers that qualify for monkfish limited access and are on a monkfish day-at-sea will therefore be required by the FMP to use gear having mesh no less than 10-inches square or 12-inches diamond. Scallopers may be able to modify their scallop dredges so that it meets the requirements by removing the rings from the dredge and replacing it with a mesh bag. Some other gear modifications may be necessary, but the gear in any case is expected to be lighter, and potentially easier to handle than would be a standard scallop dredge. Vessels using gillnets to target monkfish will be required to use net tags to identify their nets. Deployment of net tags is not expected to present any significant, new hazards to safety.

### **5.10.3 Limited seasons or areas**

No season or area closures are proposed by the FMP. The framework adjustment procedure allows the implementation of season or area closures, but the effects on safety will be examined when the duration and boundaries of the proposed closures are specified.

## **5.10.4 Consultation**

The Councils twice convened its Law Enforcement Committee to evaluate and advise the Councils on Law Enforcement aspects of the plan<sup>7</sup>. The US Coast Guard has representation on this committee and also is a voting member of each Council. In addition, the Councils sent a copy of the Draft FMP and public hearing document to the US Coast Guard for comment. No concerns about the safety of life at sea have been raised by the Coast Guard or by the public.

## **5.10.5 Mitigation measures**

Although the FMP requires no mitigation measures (its management measures actually promotes the safety of human life at sea and presents no new dangers or threats), there are management measures that increase flexibility and enable fishermen to choose fishing methods and seasons that are less dangerous. The foundation of day-at-sea management is to allow fishermen the flexibility to choose when they want to fish. If certain seasons or times present adverse weather conditions that would exceed a vessel's designed seaworthiness, then a fisherman could advance or postpone when he used the 40-day allocation. The only aspect of the day-at-sea program that could force a fisherman's decision to fish is at the end of the fishing year when he may have not fished all of his day-at-sea. To mitigate this potential problem, the FMP proposes to allow fishermen to carry forward up to 10 unused days into the next fishing year. As a result, a fisherman would not have the incentive to extend his last trip in the year to use up his days or to make a trip that he would not have otherwise made because the end of the fishing year was near.

Net limits and the day-boat gillnet category are other measures that have potentially mitigative or positive effects on safety. The FMP proposes net limits and limited access that will reduce the amount of gear that fishermen deploy. Thus, it removes the incentive to increase the amount of gear in response to less fishing time. At the same time, the day-at-sea program imposes some problems for leaving gear at sea while it continues to fish. To compensate for a requirement that all vessels bring their gear to port when they leave the fishing grounds, the FMP proposes to allow gillnet fishermen to declare into a trip- or day-boat category. If the vessel declares into a day-boat category, its time at sea is counted differently but it may leave its gear in the water between trips. This measure is intended to accommodate the various ways that fishermen operate and avoid forcing them to a new mode of fishing for which their vessel was not designed.

# **6.0 DESCRIPTION OF THE RESOURCE (AFFECTED ENVIRONMENT)**

## **6.1 *Biological Environment***

### **6.1.1 Distribution**

The goosefish (commonly referred to as monkfish) is a member of the family Lophiidae or anglerfishes. It is a widely distributed benthic fish that occurs in the Northwest Atlantic Ocean from the northern Gulf of St. Lawrence southward to Cape Hatteras, North Carolina. The species is known to inhabit waters from the tide-line to depths as great as 840 m (Markle and Musick 1974). They also tolerate a wide range of temperatures, being taken to the north on the Newfoundland Banks in water as cold as 32° F and in the southern waters exceeding 70° F. Adults inhabit the

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<sup>7</sup> Two Law Enforcement Committee meetings were held to consider the proposed management measures:

July 16, 1996 – Review and discussion of the proposed monkfish management measures.

November 18, 1997 – Develop comments on the proposed monkfish management measures.

sea floor over the entire range of substrate types including hard sand, gravel, broken shell, and soft mud (Bigelow and Schroeder 1953).

Spatial and temporal distributions of goosefish from NEFSC spring and autumn bottom trawl survey data (inshore and offshore) illustrate the ubiquitous nature of the species (SAW 14). During spring and autumn, goosefish exhibit a widespread distribution both north and south of Georges Bank (Figs 3-4). In the northern portion of the survey area, spring and autumn survey catch distribution patterns were similar. South and west of Nantucket Shoals, however, seasonal survey patterns differed suggesting movement between inshore and offshore waters on the shelf. While there were consistent catches during both seasons south of Block Island Sound, goosefish were found primarily in the offshore waters in autumn but were distributed further inshore during spring. South of Chesapeake Bay (about 37°N), goosefish regularly appear in survey catches in the spring, but not in the autumn (SAW 14).

### 6.1.2 Age, growth, and reproduction

Armstrong et al. (1992) studied the age, growth, and reproductive biology of goosefish based on specimens collected from NMFS groundfish surveys and commercial fishing cruises between Georges Bank and Cape Hatteras. Maximum ages observed based on examination of vertebral annuli were 9 and 11 years for males and females, respectively. Males and females exhibited similar growth patterns up to age four, thereafter females were slightly larger than males with the difference becoming more pronounced at the oldest ages observed.

A description of the processing and ageing methods currently under examination by personnel from the NEFSC were presented at SAW 14. In a University of Massachusetts/NEFSC study begun in February 1992, 97 goosefish from the Gulf of Maine and the northern Georges Bank region were aged using a variety of age structures (primarily otoliths and vertebrae). In spite of the small sample size, a significant ( $p < 0.05$ ) fit of the von Bertalanffy growth equation to the data was obtained. Growth parameters were comparable to those of Armstrong et al. 1992.

Armstrong et al. (1992) reported the length at which 50% of the goosefish examined were mature ( $L_{50}$ ) to be 14.5 inches (36.9 cm) for males and 19.2 inches (48.7 cm) for females. They observed spawning to occur in May and June in the area from Cape Hatteras to Southern New England. A peculiar aspect of the reproductive biology of female goosefish is their production of nonadhesive, mucoid egg rafts or veils. The egg veil produced can reach 18-36 ft. in length and 0.5 - 5.0 ft. in width. The large egg mass produced requires a considerable energy investment by the females and at the time of spawning can account for 50% of their body mass. The egg veil functions to improve geographic dispersal of the eggs, provides protection from predators, and may facilitate fertilization (Armstrong et al. 1992).

More recent maturity analyses were derived from data collected during NEFSC and MA Division of Marine Fisheries (DMF) bottom trawl survey cruises (SAW 14). Both sexes began to mature at about 30 cm (12 in) total length, with males generally attaining 100% maturity by about 50 cm (19.5 in) and females by about 60 cm (23.6 in). The distribution of maturity stages for mature fish in the spring suggested that goosefish inhabiting southern waters spawn earlier than their northern counterparts.  $L_{50}$ s were higher for goosefish inhabiting northern waters: 43 and 46 cm for males and females, respectively, compared to 37 cm for males and 42 cm for females in southern waters. It appeared that southern males mature at age 3 and females at ages 3 and 4. Males inhabiting Gulf of Maine - Northern Georges Bank mature at ages 3 and 4 and females at ages 3 to 5. The results of current SAW analyses for male goosefish in the Southern New England and Mid-Atlantic region are comparable to those reported by Armstrong et al. (1992). However,  $L_{50}$  reported for females in the SAW document is about 7 cm lower than that of Armstrong et al. (1992).

### **6.1.3 Stock status**

Few data exist to conduct an age or length based analytical stock assessment for this species. While length-at-age data are available, size frequency data from the commercial landings are lacking. Consequently, direct estimates of annual mortality from fishery dependent data are not possible at this time. However, an initial assessment of the goosefish resource made by examining NEFSC fall and spring groundfish survey data (U.S. Dept. of Commerce 1992, SAW 14) reached the following conclusions:

*"Northern area autumn biomass indices (abundance in weight,) indicate a significant decrease since the late 1970s; biomass apparently decreased to less than one third of the late 1970s level by 1991. Spring indices show a similar pattern. Autumn cruise data show that biomass fell by half from 1984 to 1991.*

*Southern area weight indices indicate a nine fold decrease in biomass from 1966 to 1991; the 1991 autumn index is 11% of the 1966 level. The 1991 summer weight abundance index is about 70% of the 1984 level.*

*Indices in terms of numbers of fish did not exhibit a corresponding downward trend in either area thus indicating a decrease in the average size of individuals occurred. Research cruise length frequency plots show the truncation of the size distribution through time in both areas, but particularly in the northern area. The truncation is reflected to a small degree in average length.*

*These abundance trends give reason to suspect that resource biomass is decreasing. The ongoing decrease concomitant with the landings described earlier (that were driven by large increases in ex-vessel price) provides substantial evidence that the resource is at least heavily exploited and that the possibility of over-exploitation should not be ruled out."*

A preliminary yield per recruit analysis for goosefish for the northern area suggests that  $F_{max}$  is 0.2 (Figure 6 in the SAW 14 report). These results also indicate that substantial yield gains could result from fishing practices that release young fish (up to age 4) alive.

The assessment identified the following sources of uncertainty in the current analysis:

*"The yield per recruit model is based, to a large degree, on a growth model generated from interpretations of the age of fish from visual inspections of their bony parts. Annular marks on goosefish tend to be unclear and difficult to decipher. Validation of age interpretations over the full range of sizes is lacking.*

*The extent of the resource beyond the shelf break is unknown, thus, substantial biomass might or might not exist beyond the fishery and research cruise coverage."*

The Stock Assessment Review Committee Chairman pointed out that abundance and stock production estimates do not exist so: (1) whether or not current removals are in excess of stock production is uncertain; (2) appropriate removal levels cannot be projected.

He also noted that an estimate of the reproductive (adult) stock size is absent, hence the probability of continued reproductive success and consequent existence of the stock under current conditions (escalating removals and declining biomass) cannot be assessed."

The assessment included the following recommendations:

*"1. Size frequency samples must be collected from the landings if the resource is to be assessed adequately.*

2. Age interpretations need to be validated over the entire size range if they are to be the basis of accurate growth modeling.
3. An effort should be made to determine the seaward extent of the resource beyond the shelf break.
4. Accurate abundance estimates (both juveniles and adults) and stock production estimates are acutely needed."

In spite of the uncertainty noted, the assessment concluded that, "*Decreasing biomass indices concomitant with landings of small fish suggest that the resource is at least fully-exploited and might be over-exploited. The increased targeting of goosefish and displacement of fishing effort from other fisheries into the unregulated goosefish fishery is problematic. Preliminary yield per recruit analysis indicates that substantial gains can be realized by increasing the current size of recruitment to age four (30.5 cm/12 in tail length).*"

During plan development, the status of the stock was re-assessed by the 23<sup>rd</sup> Stock Assessment Workshop (U.S. Dept. of Commerce, 1997). This assessment updated SAW14 results and the methods used by the Technical Working Group for monkfish to estimate historic fishing mortality rates. This updated assessment estimated fishing mortality rates through 1995, recomputed the historic biological reference points, and gave advice relative to the biological reference points in the proposed overfishing definition.

SAW 23 concluded that, "The stock is at low levels of biomass and is over-exploited." The report highlighted the continuing trend of fewer large fish that had been observed in the survey and in the commercial catch. It also highlighted the decline in calculated egg production associated with having fewer large fish in the population.

Compared to the fishing mortality rates and biological reference points estimated by the TWG, fishing mortality in the northern area remained high for the 1991-1995 period, about three times the maximum fishing mortality threshold of 0.05. Also the mean weight per tow (1.24 kg) in the northern area was 85 percent of the minimum biomass threshold selected by the Council to define when the stock was in an overfished condition.

In the southern area, fishing mortality between the 1989-1994 to the 1991-1995 periods increased from 0.45 to 0.51 (37% exploitation). The mortality rate was over three times the maximum fishing mortality threshold, 0.14 (12% exploitation). Stock biomass, measured by the survey, was only 57 percent (0.43 kg/tow) of the minimum biomass threshold defined by the Council to determine when the stock is in an overfished condition. The low biomass condition has persisted in the southern area since 1987.

Since the assessment indicated that monkfish mortality was too high and biomass was too low, the SAW 23 report (U.S. Dept. of Commerce 1997) gave the following management advice:

*"Fishing mortality has exceeded all reference points for more than a decade in the northern area and since the early 1980s in the southern area. Fishing mortality should be decreased significantly and any redirection of displaced effort from other fisheries should be avoided to enhance prospects of stock rebuilding."*

## 6.2 Ecological relationships

Goosefish were identified in only twenty-two stomachs from 1973-1990 NMFS research surveys (R. Rountree, pers. comm.). Prey sizes ranged from 30-175 mm fork-length. Most samples were collected during spring surveys.

Species of predator	Frequency	Total stomachs sampled	Percent frequency
Sandbar shark	1	66	1.52
Dusky shark	1	74	1.35
Thorny skate	2	1,294	0.15
Goosefish	2	2,135	0.09
Smooth dogfish	2	2,396	0.08
Spiny dogfish	12	24,876	0.05
Atlantic cod	2	9,398	0.02

### 6.3 Essential Fish Habitat

The Council updated the description of essential fish habitat for monkfish to develop an amendment for essential fish habitat. This description (Appendix IV) provides more detailed information than presented below and describes the distribution of monkfish eggs, larvae, and adult fish. The Council plans to bring its plans into compliance with the essential fish habitat requirements of the Sustainable Fisheries Act via a separate amendment to this plan. Although the Council has not yet approved a designation of essential fish habitat for monkfish, the draft description of monkfish habitat is provided in the FMP to augment the descriptive information given below.

No unique or special habitat is identified for the conservation of monkfish, due to their general life history and the wide distribution of adults and juveniles. Monkfish are widely distributed from the shoreline to the continental slope (to depths greater than 800 m, Markle and Musick 1974) and range from the Grand Banks and Gulf of St. Lawrence to Cape Hatteras, North Carolina. They tend to inhabit a wide variety of substrates where prey items are plentiful, including hard sand, sand/mud, gravel, and shell-littered areas (Bigelow and Schroeder 1953). Monkfish are less abundant in the shallow portions of Georges Bank (Almeida et al. 1995), presumably due to fast current, few prey items, or a combination of both. Their distribution is similar to, although broader than, the distribution of demersal groundfish in the Northwest Atlantic. A more detailed description of the physical environment for groundfish is given in NEFMC (1996).

Although less abundant in brackish waters, monkfish seem to tolerate a wide range of temperature and salinity. They have been observed in water temperatures ranging from 0 to 24 °C, but their preferred temperature range appears to vary with latitude. They are most abundant in temperatures of about 9°C in the Mid-Atlantic Bight (Edwards 1965), in 3 to 9 °C in Canadian waters (Jean 1965), and in 7 to 11 °C on the continental slope off of Virginia (Wenner 1978).

Monkfish are opportunistic piscivores as adults, consuming whatever species are available. They are also cannibalistic, monkfish being the largest (14%) part of their diet. Armstrong (1987) reports that the other major prey items include long-finned squid (*Loligo pealeii*), Atlantic cod (*Gadus morhua*), little skate (*Raja erinacea*), red hake (*Urophycis chuss*), silver hake (*Merluccius bilinearis*), sand lance (*Ammodytes* sp., butterfish (*Peprilus triacanthus*), and ocean pout (*Macrozoarces americanus*). The dominance of these species in the diet probably somewhat reflects the availability of prey, but food preference studies are unavailable. Immature monkfish have a greater portion of invertebrates in the diet, particularly red shrimp (*Dichelopandalus leptocerus*) in the specimens collected by Armstrong (1987). Thus, monkfish are not constrained by the availability of certain prey items.

Spawning appears to occur over most of the depths inhabited by monkfish, unlike other species of the same genus in the eastern Atlantic Ocean which migrate to deep water to spawn (Bowman 1919). Less developed egg veils have been collected in inshore waters as well areas along the continental shelf in 2,000 m (Bigelow and Schroeder 1953). Spawning occurs mainly during May and June (Armstrong et al. 1992) and gillnet fishermen report catching ripe females near banks and ledges during these months. Spawning may occur earlier or later in the Gulf of Maine or along the continental slope than these observations show.

Monkfish release large pelagic egg veils that can contain more than 1 million eggs. These egg veils float freely in the surface water and are directed by prevailing currents and wind-forced advection. The duration of development before hatching is unknown, but larvae 6-8 cm long have been reported in October (Connolly 1922). Little is known about areas where monkfish first become benthic.

Smaller monkfish appear to be a primary prey item of larger monkfish, but it is unknown whether certain substrates offer small monkfish better protection from predation than others, especially when one considers the way monkfish seek prey. Other benthic species that inhabit the Gulf of Maine and Georges Bank rely on gravel and cobble substrates to avoid predation, to spawn, and to feed (Wahle and Steneck 1991, Gotceitas and Brown 1993, Stevenson and Knowles 1988, Schneider et al. 1987). Adult monkfish have a wide distribution over many types of habitat as long as prey are abundant, perhaps owing to their feeding strategy (acting like a rock on open bottom may be more productive than acting like a rock on rocky bottom).

Young, benthic monkfish are vulnerable to predation, but it is not known whether gravel or cobble substrates offer any protection. Some have suggested that small monkfish are more abundant in very deep water. If small monkfish are more abundant on the continental slope, the area may serve as a refuge from predation by coastal species like cod and whiting. The abundance of small monkfish in this area is unknown, however, because most research surveys are conducted at shallower depths.

Areas of critical spawning and nursery habitat cannot, therefore, be identified because of the wide distribution of spawning, the pelagic existence of egg veils, the uncertain duration of development during the pelagic phase, and unknown characteristics of critical habitat when monkfish are most vulnerable to predation.

## **6.4 DESCRIPTION OF THE FISHERY (HUMAN ENVIRONMENT)**

Most monkfish are landed as a bycatch from groundfish and scallop fishing. This bycatch accounted for over 80% of the catch of monkfish. Most recently increases in directed effort helped reduce that bycatch proportion to 70%. The remaining 30% was the result of directed effort by fishermen using trawls, scallop dredges, and gillnets. The geographical range of directed effort by fishermen using these gear types varies, but generally occurs in deeper waters for trawls than scallop dredges or gillnets. Directed fishing activity continued during the 1991-92 fishing season, abated during 1992 when prices fell, but has since renewed as price increases resumed.

Landings with all gear types have risen to record high levels (Figure 1). These high levels occurred because of increasing directed fishing effort and increasing fishing effort for groundfish and scallops throughout the mid- to late-1980's. The low landings observed from 1964 through the mid-1970's are somewhat misleading because they include only domestic landings. Foreign landings of goosefish during this period are largely unknown, but are thought to be significant.

Until recently, goosefish had a limited market in the U.S. and were taken largely as bycatch in the groundfish and scallop dredge fisheries. Goosefish have traditionally been landed with the head removed and the tails only were landed and marketed as "monkfish". However, the market for goosefish tails and other body parts has improved steadily over the past decade. Goosefish livers have recently found a growing and lucrative export market (primarily in Japan). The result has been a rapid increase in the reported landings. Less than 5 million pounds of monkfish (whole fish weight) were landed in 1981. By 1991, landings increased to 26.5 million pounds with an ex-vessel value of 19.2 million dollars. This exceeded the ex-vessel value of yellowtail flounder, pollock and haddock.

Goosefish are taken over a wide geographical area. The bulk of the landings during the late 1970's were taken from the Gulf of Maine, Georges Bank, and southern New England. However, the landings originating from Mid-Atlantic waters increased steadily during the late 1980's to about 32% of the total in 1991. During 1991, otter trawl landings increased from area 537 three-fold, while landings from area 616 increased six-fold.

### **6.4.1 Trends in monkfish landings**

Prior to 1975, otter trawls accounted for almost all of the nominal landings of goosefish. By the late 1970's scallop dredges began to account for about half of the reported landings. These data should be treated with caution, however, since almost all the monkfish landed during this period were taken as bycatch. It was customary for bycatch to be sold separately, therefore a large portion of the landings of goosefish in the earlier years may have been missed by the reporting system. In the most recent years, scallop dredges and otter trawls still accounted for about 95% of the landings although sink gillnet catches appear to be increasing in the most recent year (U.S. Dept. of Commerce 1992).

Since that assessment through 1992 was made, the fisheries that target monkfish have changed markedly. Total landings have increased in response to developing foreign markets for tails, livers, and whole fish (eviscerated, but the liver is not removed). When scallop abundance was low or when scallopers had no days-at-sea allocations, they turned to monkfish as a lucrative alternative. Monkfish landings by scallop vessels increased as more vessels began targeting monkfish, especially in the southern area. From 1991 to 1993, the scallopers accounted for 59 percent of the total monkfish landings in the southern area.

More trawl vessels have also started to target monkfish, in response to increasing demand, decreasing groundfish abundance, and stricter regulations for multispecies and summer flounder. This change in fishing

patterns occurred more in the southern area than in the northern area. Most of the directed monkfish trawl activity in the southern area is centered in the deep water of Southern New England and the southeastern part of Georges Bank. Trawlers generally fish along narrow bands of depth on the slope area and in the canyons that cut into the continental shelf. Most trawlers that target monkfish here use 10 or 12 inch square mesh in the codend and catch small amounts of other species, owing to the large mesh and the location where they are fishing. Other trawlers fishing in this area use smaller mesh to target monkfish and lobsters. Monkfish landings via trawls accounted for about 10 percent of the total landings during 1991-1993 (Figure 5). More recent landings appear to have increased because of the intensified fishing activity by trawlers when they no longer have multispecies days-at-sea to target groundfish.

In the northern area, trawlers target monkfish and flatfish in the Gulf of Maine. Because they are targeting regulated groundfish, they generally use 6-inch mesh in the trawls and fish under the multispecies days-at-sea program to catch the smaller plaice and winter flounder. Monkfish landings via trawls accounted for about 80 percent of total landings during 1991-1993 (Figure 5), primarily as a mixed catch with regulated groundfish. Recent landings have probably declined, as a proportion of the total annual landings, due to the restrictions on multispecies days-at-sea and the prohibitions for vessels targeting monkfish where groundfish bycatch is unacceptable.

The most profound change has been in the gillnet fisheries. In the northern area, gillnet fishermen that used to target mainly groundfish have begun targeting monkfish. Up to now, the multispecies regulations did not effectively limit the time gillnet fishermen could target groundfish, so these regulations did not force gillnet fishermen to target other species. The gillnet fishermen mainly began targeting monkfish in the northern area in response to the demand for livers and tails. The multispecies FMP, however, limited access to the groundfish gillnet fishery and the monkfish fishermen may include new fishery entrants that target exclusively monkfish. Monkfish landings via gillnets accounted for about nine percent of total landings in the northern area during 1991-1993 (Figure 5). More recent landings have probably increased as a proportion of the total because fewer days-at-sea are available to groundfish trawlers and monkfish fishing by gillnets has increased.

New entrants in the gillnet fishery in the southern area also contributed to the expansion of the monkfish fishery there. Many gillnet fishermen, mainly in New Jersey and Maryland, did not qualify for multispecies permits or relinquished them because they catch few groundfish. Besides the new entrants to the fishery, the early gillnet fishermen previously target sturgeon. Due to stricter regulations for the sturgeon fishery, many of these gillnet fishermen began targeting monkfish as an alternative. Monkfish landings via gillnets accounted for about seven percent of total landings during 1991-1993 (Figure 6). More recent landings suggest that this proportion is higher because of the more fishermen using gillnets and fewer days-at-sea in the scallop fishery.

**Table 13.** Monkfish landings by vessels using otter trawl gear, 1991 – 1996. Source: NMFS (<http://remora.ssp.nmfs.gov/commercial/landings/index.html>).

State	Landings (mt)					
	1991	1992	1993	1994	1995	1996
<b>Maine</b>	1,353	2,093	3,009	4,152	4,226	4,101
<b>New Hampshire</b>	50	57	69	70	46	26
<b>Massachusetts</b>	1,853	2,125	2,265	5,424	7,963	6,545
<b>Rhode Island</b>	2,683	2,850	1,696	2,192	1,607	2,962
<b>Connecticut</b>	380	381	1,592	462	500	898
<b>New York</b>	199	289	239	480	359	667
<b>New Jersey</b>	222	519	337	193	161	145
<b>Delaware</b>						
<b>Maryland</b>	12	6	7	6	14	
<b>Virginia</b>	178	92	65	112	492	155
<b>North Carolina</b>	50	12	31	101	185	58

**Table 14.** Monkfish landings by vessels using scallop dredge gear, 1991 – 1996. Source: NMFS (<http://remora.ssp.nmfs.gov/commercial/landings/index.html>).

<b>State</b>	<b>Landings (mt)</b>					
	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>
<b>Maine</b>	31	47	78	20	48	9
<b>New Hampshire</b>						
<b>Massachusetts</b>	3,374	4,827	6,433	4,806	4,322	3,759
<b>Rhode Island</b>	266	255	216	7	42	36
<b>Connecticut</b>			626			195
<b>New York</b>			3			
<b>New Jersey</b>	554	797	827	440	425	582
<b>Delaware</b>						
<b>Maryland</b>	1	7				
<b>Virginia</b>	486	862	679	384	461	669
<b>North Carolina</b>	8	4				6

**Table 15.** Monkfish landings by vessels using gillnet gear, 1991 – 1996. Source: NMFS (<http://remora.ssp.nmfs.gov/commercial/landings/index.html>).

State	Landings (mt)					
	1991	1992	1993	1994	1995	1996
Maine	71	75	51	58	67	116
New Hampshire	36	37	45	182	379	426
Massachusetts	310	485	835	2,016	2,012	1,966
Rhode Island	62	406	725	999	1374	766
Connecticut						162
New York	3	2	141	127	101	323
New Jersey	74	47	191	429	993	430
Delaware			1	67	153	
Maryland						
Virginia						31
North Carolina			5	37	54	175

## 6.4.2 Monkfish as a by-catch

### 6.4.2.1 Trawls

Monkfish caught in trawls along with groundfish species account for 83 percent of total landings in the northern fishery management area (Figure 5). The majority of these trips target other species, like cod and haddock, and monkfish make up a small proportion of the value of their landings. On other trips, however, monkfish are one of a few targeted species that include groundfish, like American plaice and winter flounder.

In the southern fishery management area, on the other hand, monkfish are caught less frequently by vessels targeting groundfish or summer flounder and make up less than ten percent of total landings (Figure 6). There is a directed monkfish trawl fishery that contributes about ten percent of total landings in this area. These trips catch few other species and monkfish account for the majority of the trip's value.

#### Description of fisheries

Vessels that catch monkfish and use trawls to target other species usually make trips that are several days long. These vessels mainly target regulated groundfish, summer flounder, squid, and whiting. The first two fisheries have minimum mesh regulations, six and five and a half inches, respectively. The vessels use large otter trawls and make tows lasting as long as eight hours. More detailed information about these fisheries is contained in the Environmental Impact Statements for the Multispecies FMP (NEFMC 1995) and the Summer Flounder FMP (MAFMC 1987).

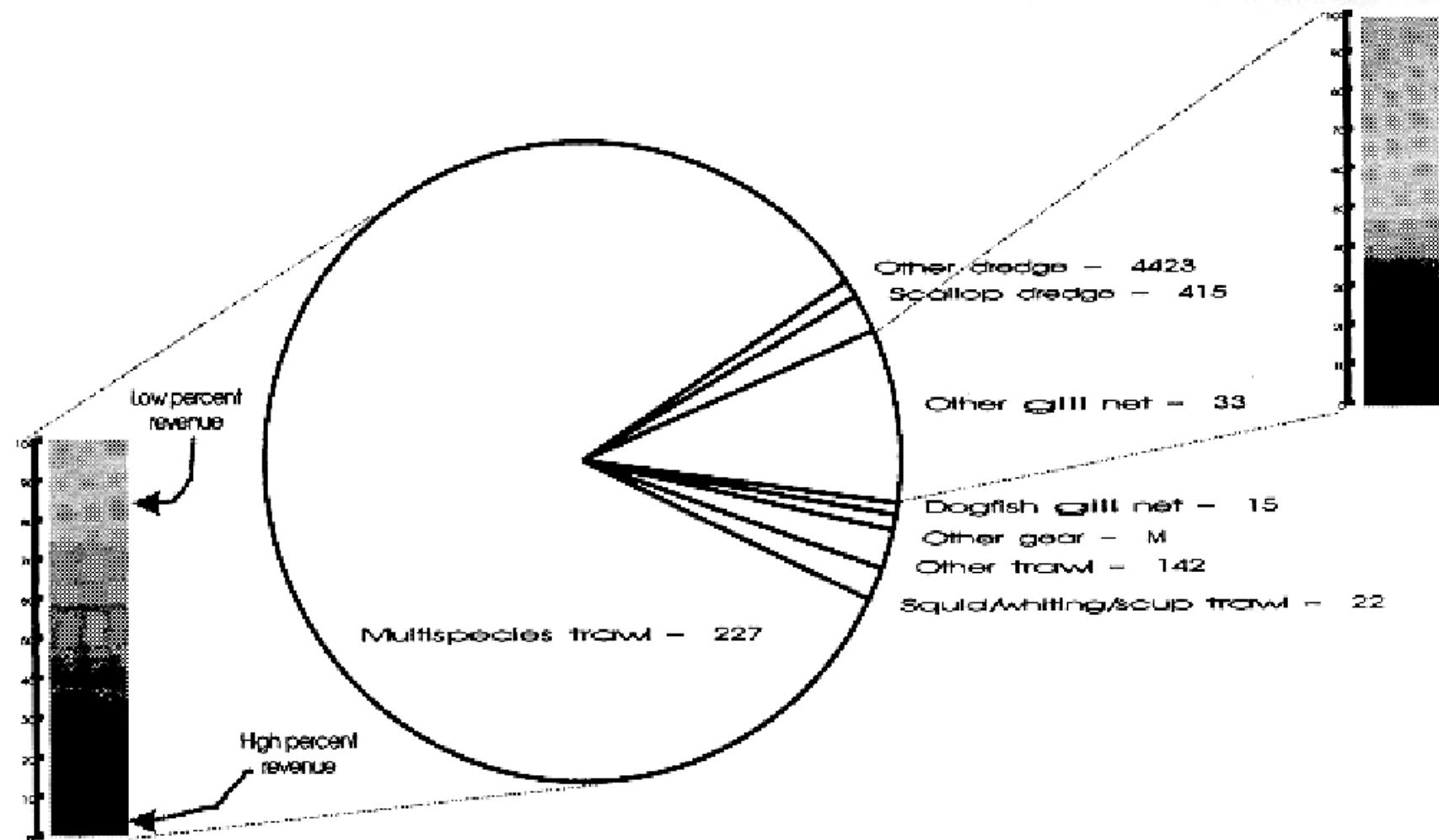
The gear configuration varies throughout the region in response to bottom conditions. Vessels that fish in areas with hard, rocky bottom often use heavier gear with large rollers and disks on the footrope. This bottom condition is commonly found in New England waters, including Georges Bank. Sandier bottom is often found in the Mid-Atlantic, south of Hudson Canyon. Vessels can fish lighter, less rugged gear and reduce drag.

### **Distribution of effort, seasonality, and landings trends**

Most of the monkfish caught as a bycatch by trawl vessels are landed in Maine, Massachusetts, and Rhode Island (Figure 7). Monkfish bycatch has increased from 1991 to 1994, possibly due to developing markets for monkfish that have encouraged fishermen to land their monkfish bycatch, rather than discard the formerly unmarketable catch. Trawl-caught monkfish landings in Maine and Massachusetts appear to fluctuate seasonally, peaking in the summer and early fall and bottoming in January through March. This seasonal pattern appears to be related to the amount of fishing effort directed on species of groundfish. Patterns of groundfish effort could change due to the increasingly restrictive regulations on the time that a vessel may fish for multispecies.

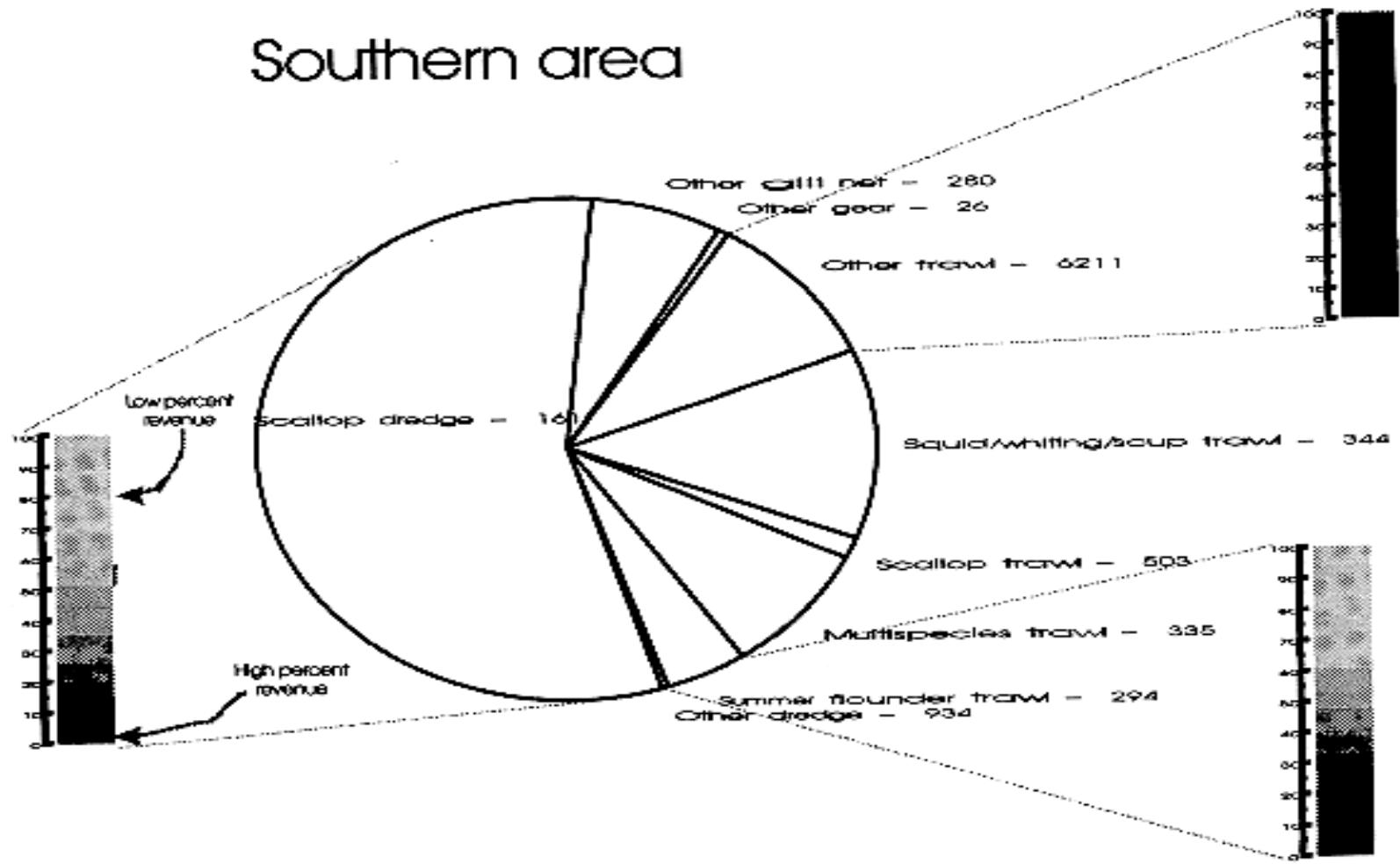
There appears to be no seasonal trend in Rhode Island, New York, and New Jersey (Figure 7). Monkfish bycatch noticeably increased in Rhode Island and New York during March and April 1994. Landings of monkfish bycatch in Virginia appears to peak in the spring, perhaps associated with the spring, offshore summer flounder fishery.

## Northern area

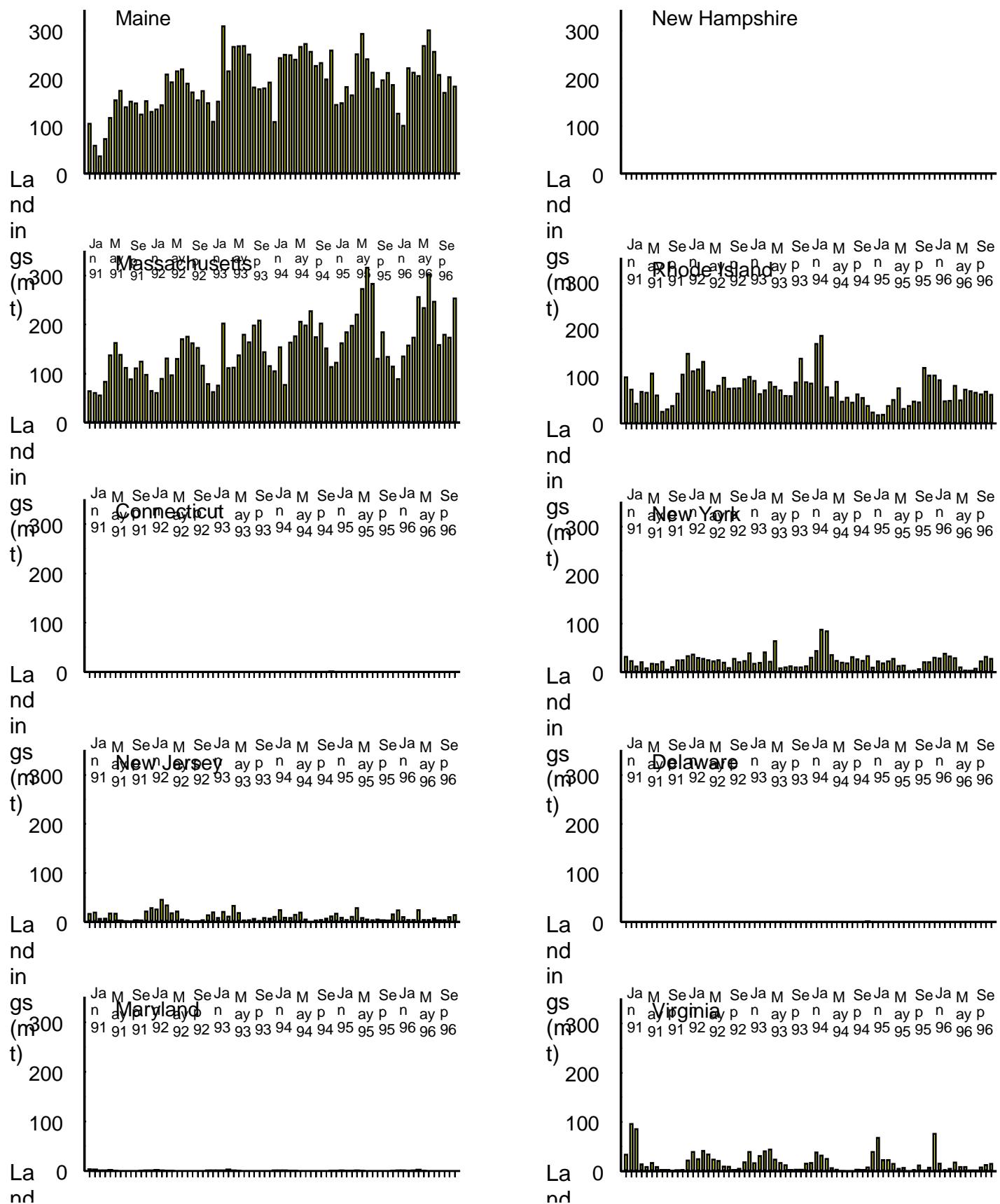


**Figure 5.** Percent of monkfish landings by gear and associated landed species in the northern area, 1991-1993. Numbers following the labels are the average landings per trip (pounds tail-weight). Proportion of trips in certain monkfish revenue groups (directivity) are plotted for multispecies trawls and mixed species ('other') gillnets.

## Southern area



**Figure 6.** Percent of monkfish landings by gear and associated landed species in the southern area, 1991-1993. Numbers following the labels are the average landings per trip (pounds tail-weight). Proportion of trips in certain monkfish revenue groups (directivity) are plotted for multispecies trawls and mixed species ('other') gillnets.



**Figure 7.** Monthly landings of monkfish bycatch by vessels using trawls, 1991 – 1996.

#### **6.4.2.2 Scallop dredge**

Scallop dredges only landed less than five percent of total monkfish landings from the northern area (Figure 5). Most of the scallop effort in the northern area is confined to the northern edge of Georges Bank. There is some scalloping along the coast of Maine and Massachusetts, mainly with a single 10-foot dredge. Some scalloping also occurs on Pippines Ledge, in the central Gulf of Maine. Monkfish landings from scallop dredges that fish in these areas has been low, partly due to reduced scallop abundance and size. The closed areas to protect groundfish also limit monkfish landings from scallop dredges in the northern area.

In the southern area, on the other hand, scallop dredges land 56 percent of total monkfish landings by all gears (Figure 6). Eighty-five percent of trips by vessels using dredges to target scallops derive less than 25 percent of their revenue from monkfish. The average monkfish landing per trip is slightly more than 1600 pounds tail-weight, but often vessels land significantly higher amounts of monkfish as a true incidental catch.

#### **Description of fisheries**

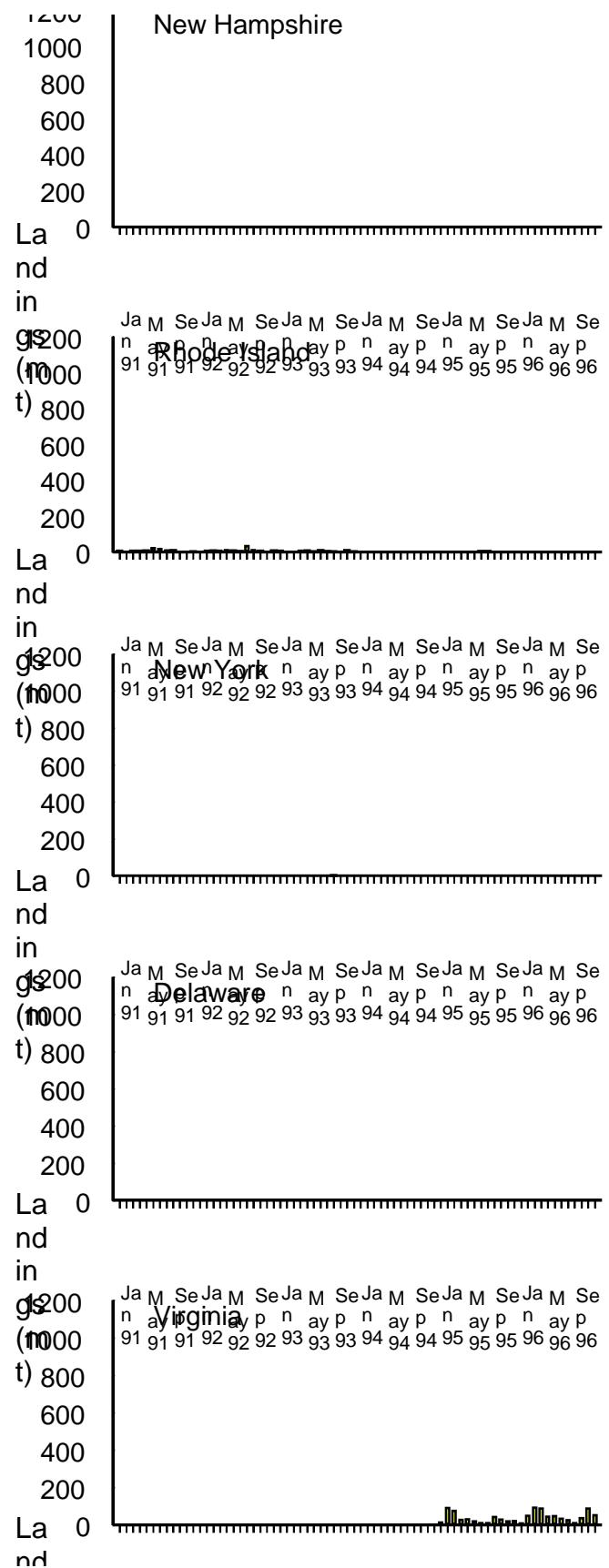
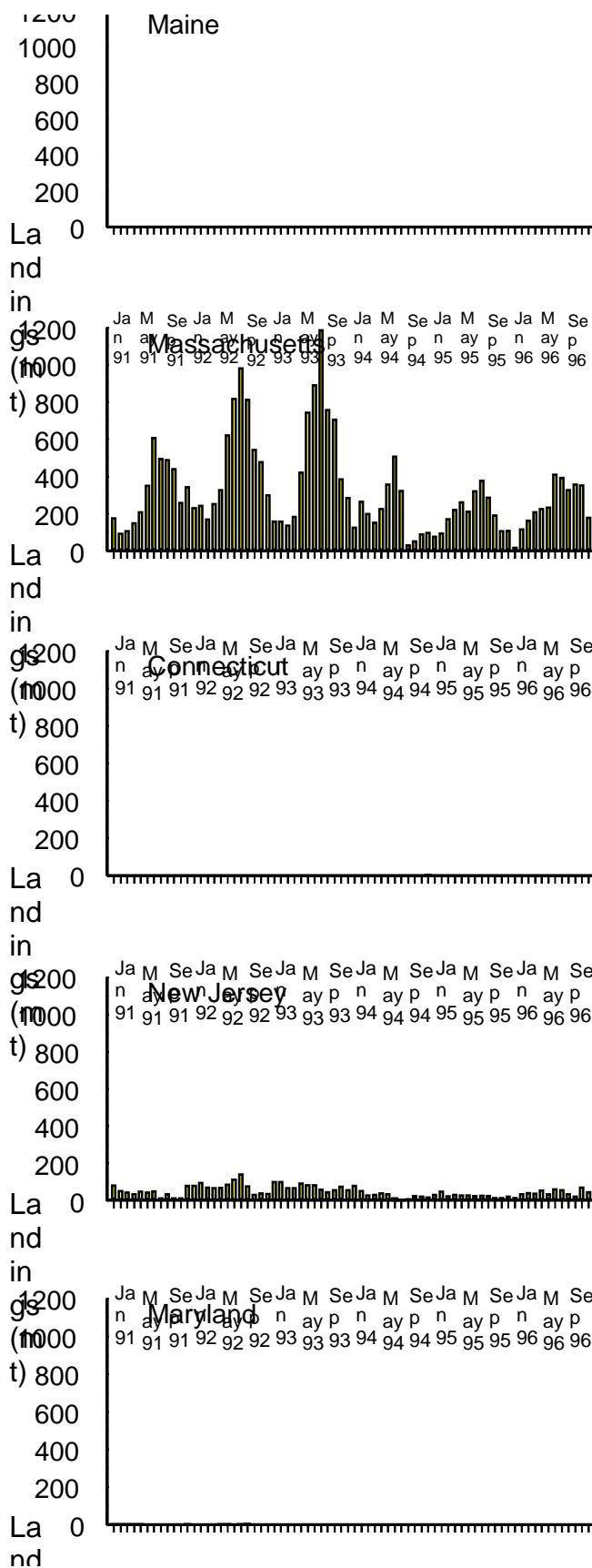
Scallop vessels generally take long trips, from 12 to 20 days. Most vessels use two dredges, totaling no more than 30'6" wide. Each dredge consists of a metal frame and a bag made of 3½-inch rings connected by links. The dredges also have a twine-top of mesh inserted in the top of the bag to reduce the weight of the dredge and enhance escapement of small fish and scallops. More details about this fishery are given in the Environmental Impact Statement for the Atlantic Sea Scallop FMP (NEFMC 1994).

#### **Distribution of effort, seasonality, and landings trends**

The primary ports for scallop vessels are located in Massachusetts, New Jersey, and Virginia. About 80 percent of monkfish bycatch is landed in Massachusetts and there is a distinct seasonal pattern. Landings of monkfish bycatch by scallop vessels occur all year, but peak during mid-summer.

These peak landings increased each year through 1993, then notably declined in 1994. Declining scallop abundance and increasing monkfish prices were main factors for the increased landings through 1993. During 1994, however, new limits on days-at-sea and maximum crew size coupled with high abundance of small scallops in the DelMarVa region caused monkfish bycatch to decline. Apparently, scallopers reduced the amount of crew-time used to process monkfish that was needed to process the smaller scallops with less crew onboard.

The only other state with appreciable monkfish landings as a scallop bycatch is New Jersey. Unlike Massachusetts, the monkfish landings by scallopers show no seasonal trend. The other state with a large number of scallop vessels is Virginia. Although monkfish exist in the southern end of the scallop range, few monkfish are landed as a bycatch. The distribution of monkfish from research survey data suggests that monkfish occur in slightly deeper waters near Maryland and Virginia. This change in distribution may contribute to low monkfish bycatch due to greater segregation of monkfish and scallops.



**Figure 8.** Monthly landings of monkfish bycatch by vessels using scallop dredges, 1991-1996.

### **6.4.2.3 Gillnet**

Most of the gillnet effort, when monkfish is a bycatch to other species, occurs in New England. Monkfish landings from gillnets account for about nine percent of total monkfish landings from the northern area (Figure 5). Eighty percent of the gillnet trips derive less than 25 percent of the total revenue from the landings of monkfish. Most of the gillnet trips in the northern area target regulated groundfish, primarily pollock, cod, white hake, and flounders.

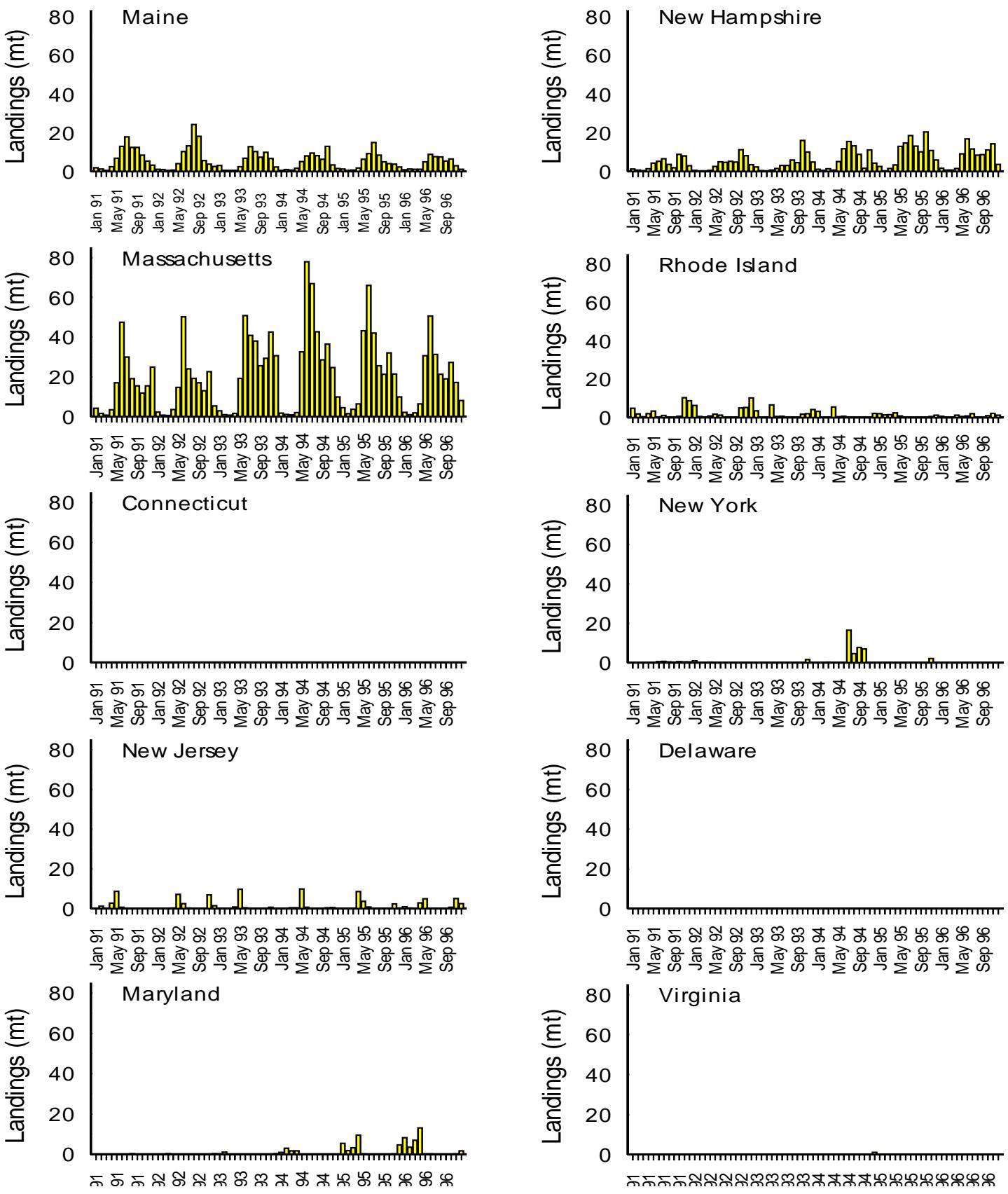
In the southern area, monkfish from gillnets contribute to seven percent of total landings, but most of the monkfish landings occur because of directed fishing effort (Figure 6). Only eight percent of gillnet trips derive more than 50 percent of the total revenue from species other than monkfish.

#### **Description of fishery**

Fishermen use gillnets with 6-inch mesh to target regulated groundfish, mostly on and flanking ledges and banks where groundfish are abundant. There are actually two fisheries, one targeting roundfish (pollock, cod, and white hake) and the other targeting flatfish (American plaice and winter flounder). Gillnets that target roundfish are high profile, stand-up nets. Those targeting flatfish are tied down and have a lower profile. A more detailed description of these fisheries, including the number of nets and the frequency of net hauling, is contained in the Environmental Impact Statement for the Multispecies FMP (NEFMC 1995).

#### **Distribution of effort, seasonality, and landings trends**

Monkfish landings from gillnet bycatch is mainly landed in New England states. Compared to other sources of bycatch, monkfish from gillnets is a small fraction of the total landings (Figure 5). Most of the gillnet bycatch of monkfish is landed in Maine, New Hampshire, and Massachusetts (Figure 9). Landings have a distinct seasonal pattern that corresponds to the amount of fishing effort for groundfish. Monkfish bycatch peaks in May to November and is at very low levels during January to April. Landings from gillnet bycatch appear to be increasing, especially in Massachusetts. The reason for this increase is mainly due to increasing liver prices and a developing market for whole, high quality monkfish.



**Figure 9.** Monthly landings of monkfish bycatch by vessels using gillnets, 1991-1996.

#### **6.4.2.4 Other gears**

Vessels using longlines, hooks, and traps catch few monkfish. Monkfish landings by all other gears account for about two percent of total landings in the northern area (Figure 5) and one percent in the southern area (Figure 6). Landings as a proportion of the total weight fish on-board is rarely above one or two percent. Too little data are available to estimate the size distribution of monkfish caught by these gears. Monkfish in traps are probably small and would be discarded alive. Monkfish on hook gear are probably larger fish that happen to swallow prey that have been caught by the hook gear. The monkfish are probably caught alive, and their morphology makes them easy to handle without appreciable damage.

#### **6.4.3 Directed effort and its by-catch**

Few trips target monkfish, but directed trips occur and appear to be increasing (U.S. Dept. of Commerce 1992). The recent increases in the reported landings are probably in response to increasing prices (Figure 19). Ex-vessel prices rose steadily from less than 10 cents per pound in 1970 to about 50 cents per pound in 1980. Since then, the average ex-vessel price received for monkfish tails has increased to nearly two dollars per pound. The increasing demand for parts other than tails is a potential contributing factor. The reported landings of livers have risen steadily while the landing of cheeks and belly flaps has also been recently reported (U.S. Dept. of Commerce 1992).

##### **6.4.3.1 Trawling**

Monkfish landings from directed trips in the northern area account for three to five percent of total landings (Figure 5). This activity may have increased in recent years because of reductions in days-at-sea for multispecies vessels. When they run out of days-at-sea allotments, some may be fishing exclusively for monkfish within the Gulf of Maine as an alternative to fishing for regulated multispecies. Recent changes to the multispecies FMP, however, prevent this fishing activity because the bycatch of groundfish is higher than the five-percent threshold for a fishery exemption.

The directed trawl fishery is much more important in the southern area and accounts for about 10 percent of total monkfish landings (Figure 6). Even more than the fishery in the northern area, the directed monkfish fishery by trawl vessels has increased considerably in response to the limits on days-at-sea for multispecies vessels. Unlike the northern area, however, this increased targeting of monkfish would continue (without this amendment) because the lower bycatch of groundfish, especially with very large mesh, is below the five percent threshold for an exempted fishery.

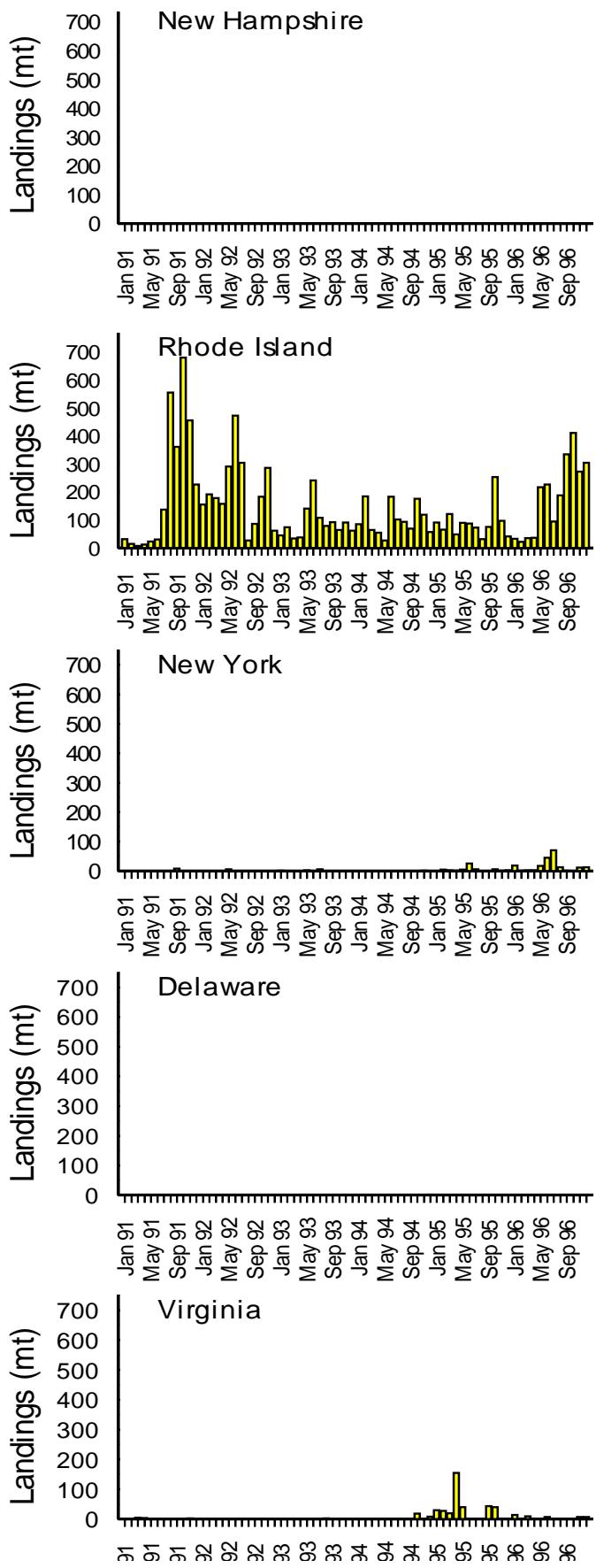
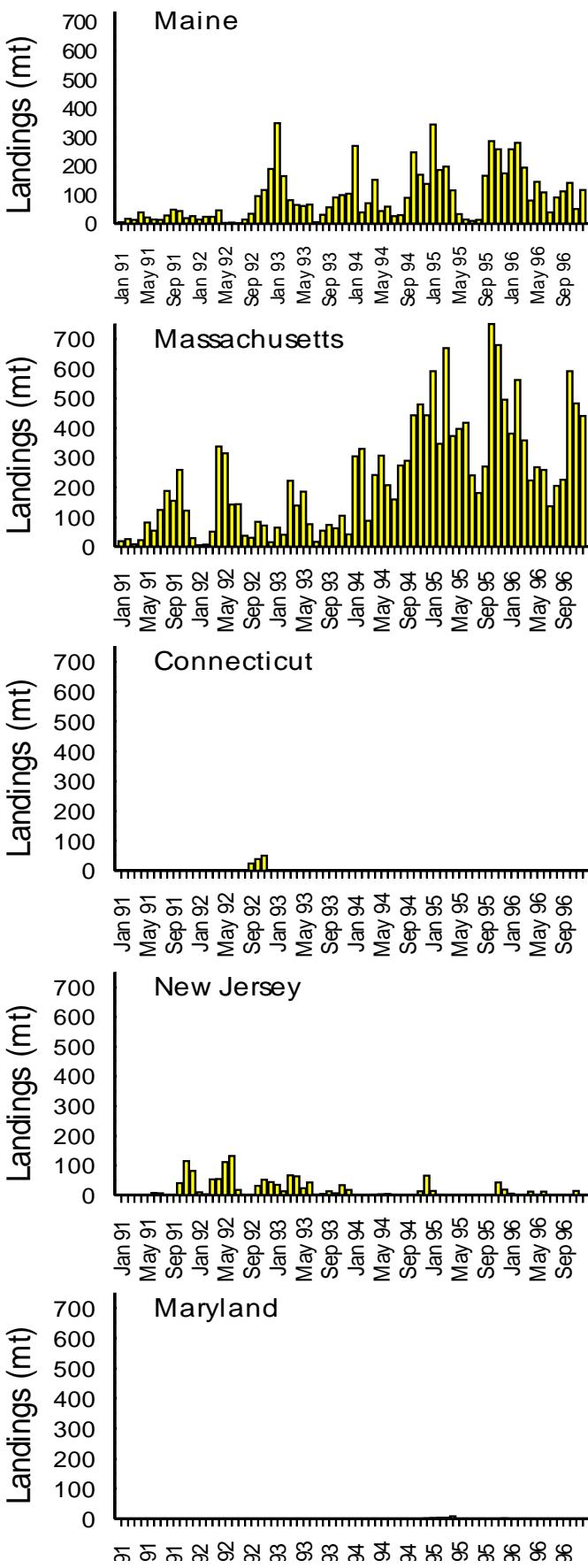
## Description of fishery

The directed trawl fishery for monkfish takes place mainly in the canyons and steep edges of the continental shelf lying south and east of Southern New England. Monkfish trawl vessels fish mainly from Gloucester MA, Boston MA, Woods Hole MA, Fairhaven and New Bedford MA, Point Judith RI, and the eastern end of Long Island, NY. The vessels use trawls with large mesh, sometimes 10 inches but often 12 inches or larger. Large mesh is also used by these fishermen in the wings and extension to make the net lighter and reduce drag. Because of the reduced drag, fishermen often extend the wings to cover a wider sweep without needing additional horsepower.

Trips for monkfish are often five to ten days long and individual tows are several hours in duration. Bycatch of other species is low because of the area and the size of mesh in the trawls. Some fishermen, however, use trawls with smaller mesh and rely on an incidental catch of lobsters while fishing the canyons.

## Distribution of effort, seasonality, and landings trends

Even though liver prices tend to be high during October to December, directed monkfish landings by trawl vessels do not seem to respond to the higher demand in all areas. The seasonal pattern of monkfish landings from trawl vessels that target monkfish has a different pattern than bycatch from trawls. Most of the directed trawl landings occur in Massachusetts and Rhode Island (Figure 10). Directed monkfish landing declined in Rhode Island, but increased in Massachusetts. High landings occurred during October to December in Rhode Island during 1991 and then appeared in Massachusetts in 1994. There also appears to be a more active directed trawl fishery in Massachusetts during March to June. Landings also peak in Maine during this spring period. The increase in spring landings in Maine may be partially attributed to higher catch per unit effort while spawning occurs, rather than to changes in fishing behavior.



**Figure 10.** Monthly landings of monkfish by vessels using trawls to target monkfish, 1991-1996.

### 6.4.3.2 Dredging

Monkfish revenue exceeded 30 percent of the trip's total on about ten percent of scallop dredge trips. Scallopers sometimes use standard scallop dredges to target monkfish on all or a portion of their trip, especially when scallop catches are low and monkfish prices are high. Before days-at-sea limits for scallopers (beginning April 1994), scallop vessels primarily targeted scallops, but occasionally targeted monkfish with dredges over a few tows or a couple of days. After days-at-sea limits were in place, some scallopers began targeting exclusively monkfish in the fall, when monkfish prices are at the highest levels.

More recently, scallopers have been using modified dredges that resemble beam trawls to target monkfish. Some scallopers switched to this gear and attached a cod-end of regulated mesh to a dredge frame to comply with Multispecies framework adjustment 9<sup>8</sup>. Like scallop dredges, the vessels tow two trawls, one on each side of the vessel. The trawls are made from a modified scallop dredge frame, so that it does not cut so deeply into the bottom. Scallopers often modify the frame by changing the angle on the cutting bar and increasing the thickness of the shoes on the bottom of the frame. A row or two of rings serve to attach a mesh bag to the frame.

#### Distribution of effort, seasonality, and landings trends

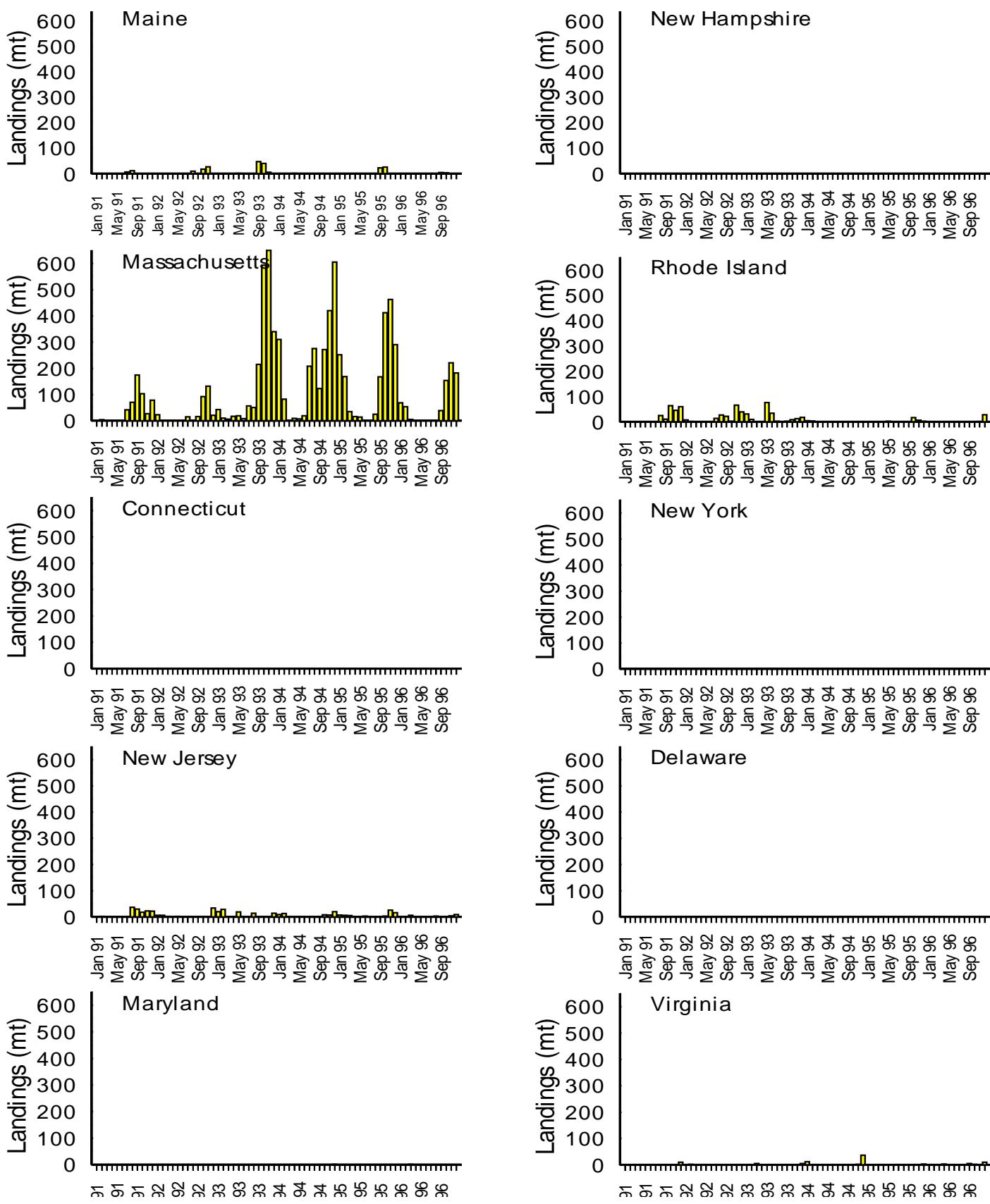
Most directed monkfish trips were landed in Massachusetts and, to a much lower extent, Rhode Island. A distinct seasonal pattern is evident, but unlike monkfish bycatch (Section 6.4.2.2) the landings peak later during October to December. The trend in Massachusetts appears to shift with time. During 1991, the directed monkfish landings peak in mid-summer, the same time as the peak in the monkfish bycatch. Directed landings of monkfish peaked in October and November 1992, then October through December in 1993 and again in 1994.

There are two explanations for the increased targeting on monkfish by scallopers during the fall. First, seasonal increases in the price of livers (Figure 18) helps drive seasonal landings patterns. Second, scallops grow most rapidly during the springtime and new year-classes recruit to the fishery during late spring and early summer. Scallop fishermen, therefore, are more likely to target scallops when they are more available in the spring and monkfish in the fall when scallop availability is lower.

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<sup>8</sup>

Framework adjustment 9, implemented during December 1994, prohibited the retention of monkfish above 10 percent of the total weight onboard when using small mesh. This regulation effectively stopped targeting of monkfish with scallop dredges, except when the vessel was fishing under its days-at-sea allotment.



**Figure 11.** Monthly landings of monkfish by vessels using dredges to target monkfish, 1991-1996.

### 6.4.3.3 Gillnet

Monkfish landings from gillnets account for about nine percent of total monkfish landings from the northern area (Figure 5). About twenty percent of the gillnet trips derive more than 25 percent of the total revenue from the landings of monkfish. Most of the gillnet trips in the northern area target regulated groundfish, primarily pollock, cod, white hake, and flounders. There is, however, increasing fishing effort on monkfish by fishermen using gillnets.

In the southern area, monkfish from gillnets contribute to seven percent of total landings. Most of the monkfish landings occur because of directed fishing effort (Figure 6), 92 percent of trips deriving more than 50 percent of the total revenue from monkfish.

#### Description of fishery

Two methods of using gillnets to target monkfish are commonly used by fishermen. Different methods are used in the two geographic areas, partly a result of the way the fishermen use gillnets to target other species and partly the result of the amount of bycatch of undesirable species. Although monkfish are more resistant to predation by lice while they are in the net, the abundance of lice also plays a part in the frequency that gillnet fishermen tend their monkfish nets.

Most gillnet fishermen that target monkfish in the Gulf of Maine set more panels of shorter nets and tend their gear more frequently than do fishermen in the Mid-Atlantic. An average fisherman sets 20 net-strings having a total of 170 nets, each net 300 feet long. This pattern translates into approximately 51,000 linear feet of net. Most use 12-inch mesh, but use lighter twine than do fishermen in the Mid-Atlantic. Except for periods of exceptionally inclement weather, these gillnets are hauled and reset daily.

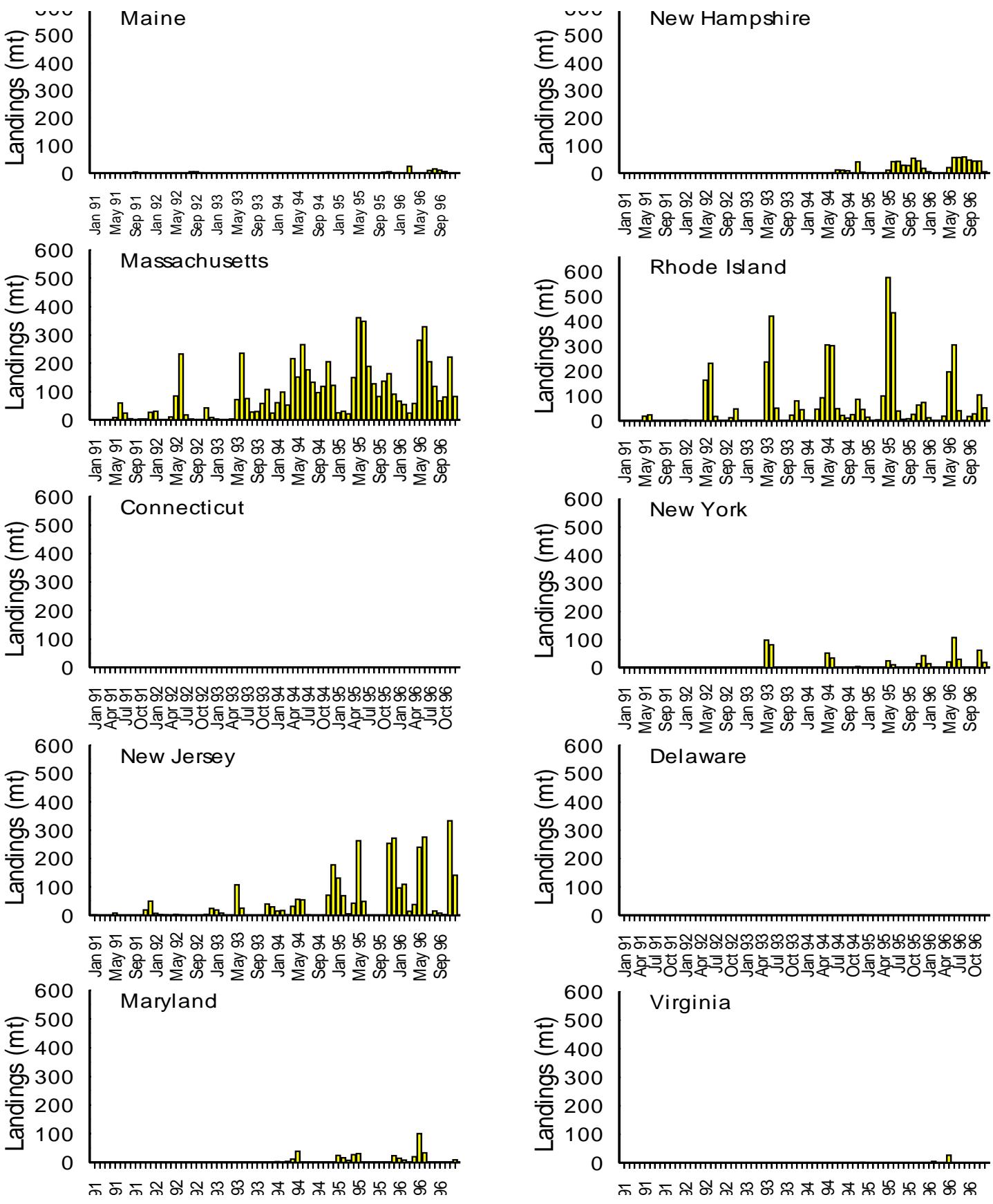
Gillnet fishermen in the Mid-Atlantic, on the other hand, set fewer nets and tend their gear less often. An average fisherman sets 12 nets every other day, each 1,000 yards long. By alternating sets, the fishermen fish a total of 72,000 linear feet of net, while using net reels that can hold about 48,000 feet of net. The frequency of net hauls varies seasonally. During the spring run, the Mid-Atlantic gillnet vessels try to fish every other day, but during the winter the fishermen haul their gear every two to three days. Because they tend their gear in alternating sets (12 nets one day and 12 other nets the next fishing day), the interval between hauls ranges from two days to a week. The longer interval between hauls is possible because the heavier twine used in the Mid-Atlantic has less bycatch of undesirable species, although it does not fish as well for monkfish.

#### Distribution of effort, seasonality, and landings trends

Nearly all landings by fishermen using gillnets to target monkfish occurs in Massachusetts, Rhode Island, New York, and New Jersey (Figure 12). Landings have a distinct seasonal pattern that corresponds to the monkfish spawning activity. Directed monkfish landings peak mainly in May and June.. A secondary peak in Rhode Island and New Jersey landings occurs in November and December, partly in response to higher liver prices during the winter months. Although a spring season for monkfish occurs in Massachusetts, there appears to be a trend of increasing landings in all seasons, especially during 1994.

Gillnet fishermen who target monkfish rely on the spring season because of the higher catch rate caused by greater availability of fish to the gear. Gillnets are stationary and work by capturing fish that are moving, either for extensive migrations or for localized redistribution. Although extensive migrations of monkfish have not been documented, monkfish may migrate at least short distances to spawn during May and June. The timing of spawning for monkfish in the southern area has been documented by Armstrong (1992). Additional evidence comes from Monkfish FMP

fishermen that have reported, during scoping hearings, that during the springtime near ledges (e.g. Coxes Ledge) they often catch monkfish that are emitting their egg veils on deck.

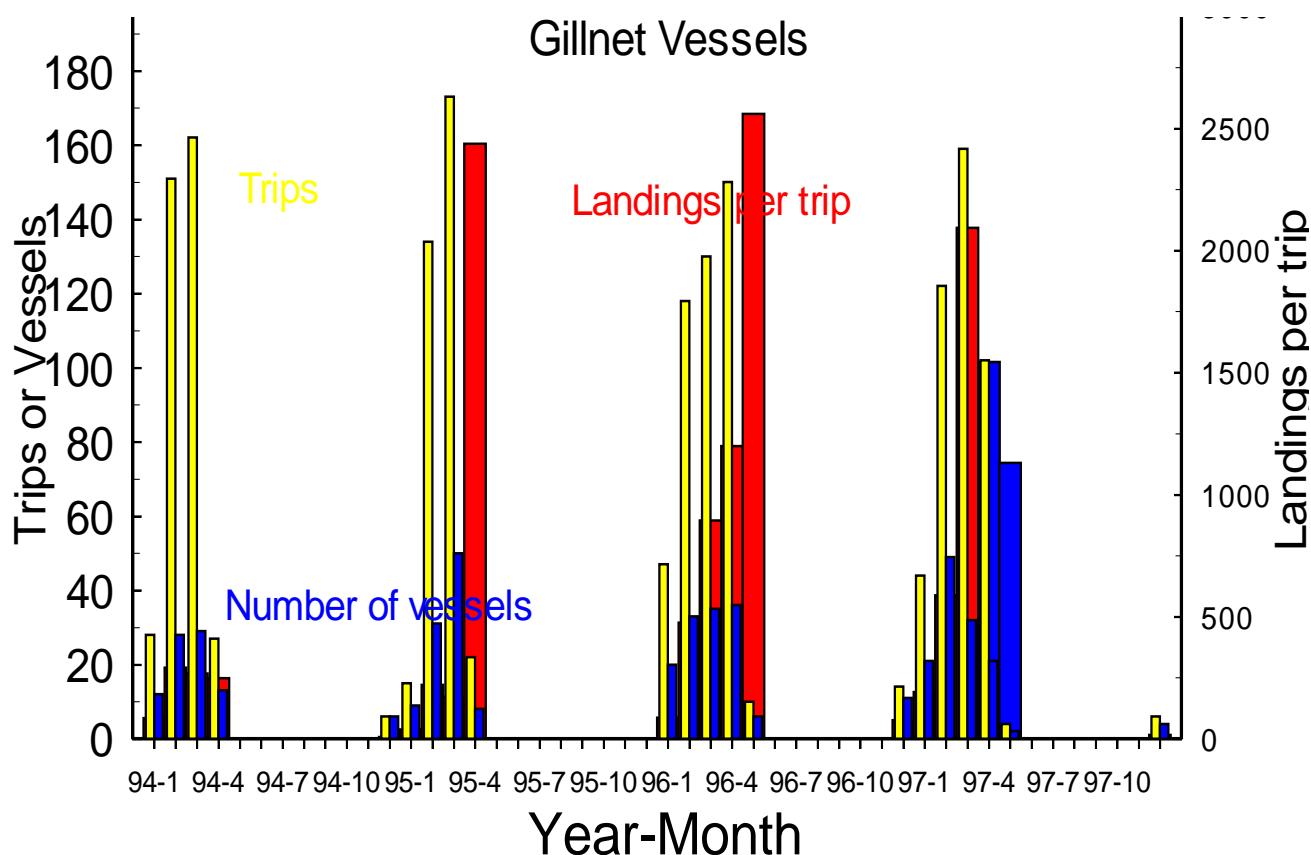


**Figure 12.** Monthly landings of monkfish by vessels using gillnets to target monkfish, 1991-1996.

## 6.4.4 North Carolina fisheries

### 6.4.4.1 Directed gillnet fishery

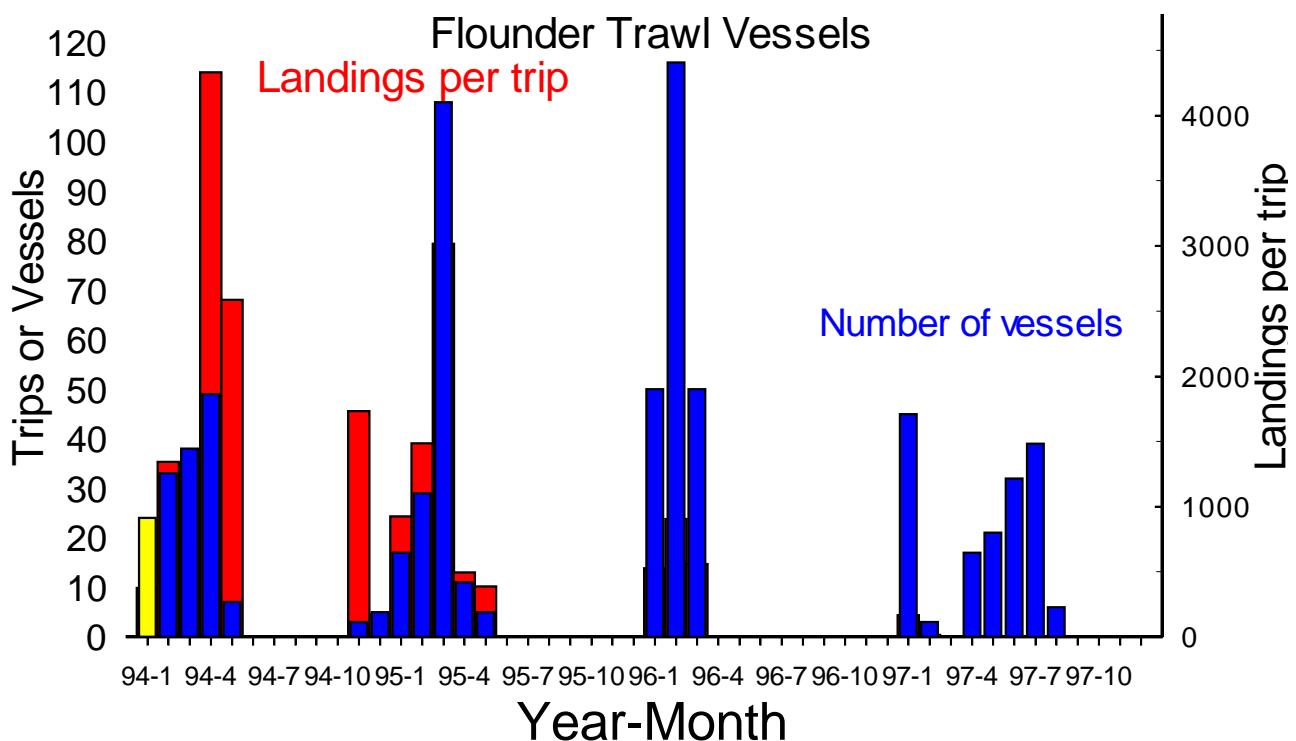
Monkfish landings in NC come from a directed fishery prosecuted by vessels using gillnets and as bycatch in the summer flounder trawl fishery. The directed gillnet fishery began during the spring of 1994 with approximately 30 vessels landing small amounts of monkfish (Figure 13). These vessels took about 370 trips during January to April and averaged less than 300 pounds per trip. It is possible that most gillnet vessels targeted other species in 1994 and landed small amounts of monkfish as a bycatch. During 1995, the number of vessels targeting monkfish peaked at about 50 vessels, making about 360 trips for the spring season. Landings per trip, however, exploded to over 2,500 pounds per trip in April of that year. About the same number of vessels made directed gillnet trips during 1996, but the number of trips increased to 450. Landings per trip increased to higher levels in the early season, when compared to the pattern in 1995. The number of vessels in the fishery in NC increased during 1997, but the number of trips and landings per trip remained nearly the same as in 1996.



**Figure 13.** NC monkfish trips and landings by gillnet vessels, 1994-1997. Source: NC DEHNR, July 1998. The number of vessels represents the maximum number landing monkfish within a calendar month.

#### 6.4.4.2 Monkfish bycatch

Monkfish landings by summer flounder trawlers (Figure 14) appeared to have the opposite trend as the one for the monkfish gillnet fishery. The number of trips landing monkfish and the landings per trip declined in 1996 and 1997, compared to prior years. The number of trawl vessels landing monkfish as a bycatch increased from 40 in 1994 to over 70 in 1995, then declined slightly in 1996 and to only 30 vessels in 1997. The number of trips increased throughout the period from 150 in 1994, to 180 in 1995, and to 220 in 1997. Landings per trip, conversely, declined from 2500-4500 pounds whole-weight per trip in 1994 to 3,000 pounds whole-weight per trip in 1995 and less than 1,000 pounds whole-weight per trip in 1996. Monkfish landings and trips by vessels using flounder trawls declined even more during 1997. It is unclear whether this decline in the catch rate is due to decreasing markets for trawl-caught monkfish<sup>9</sup>, less availability of monkfish to the trawl fishery, or due to shorter trip length.



**Figure 14.** NC monkfish trips and landings by flounder trawl, 1994-1997. Source: NC DEHNR, July 1998. The number of vessels represents the maximum number landing monkfish within a calendar month.

<sup>9</sup> Trawl-caught monkfish are generally in worse condition than that caught by gillnets, due to the longer trip length and the way the fish are caught. It is possible that NC dealers had fewer markets for the lower-quality monkfish once they began receiving gillnet-caught monkfish.

## 6.4.5 Socio-economic effects

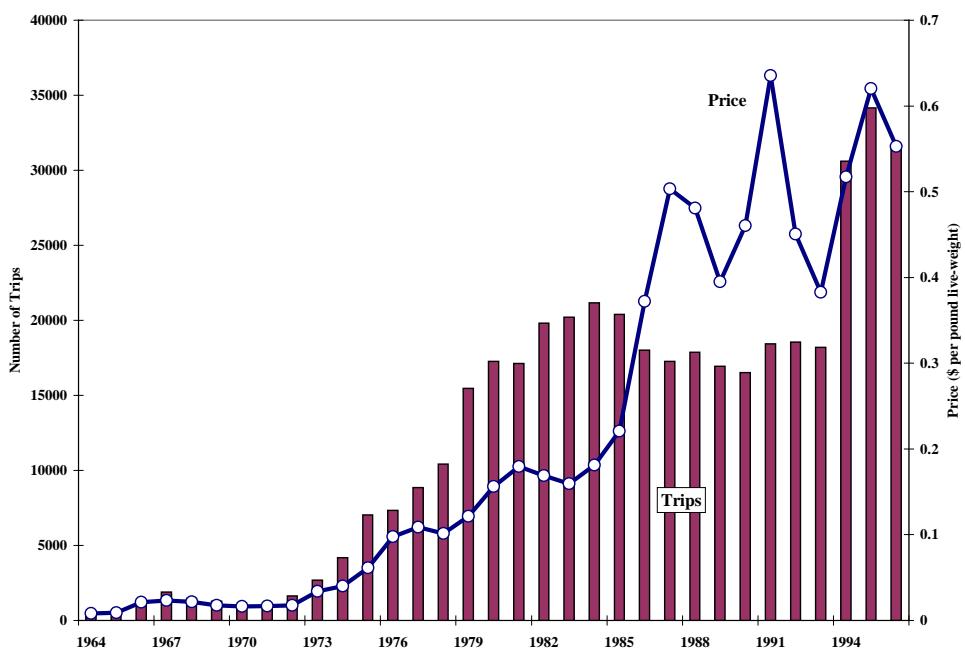
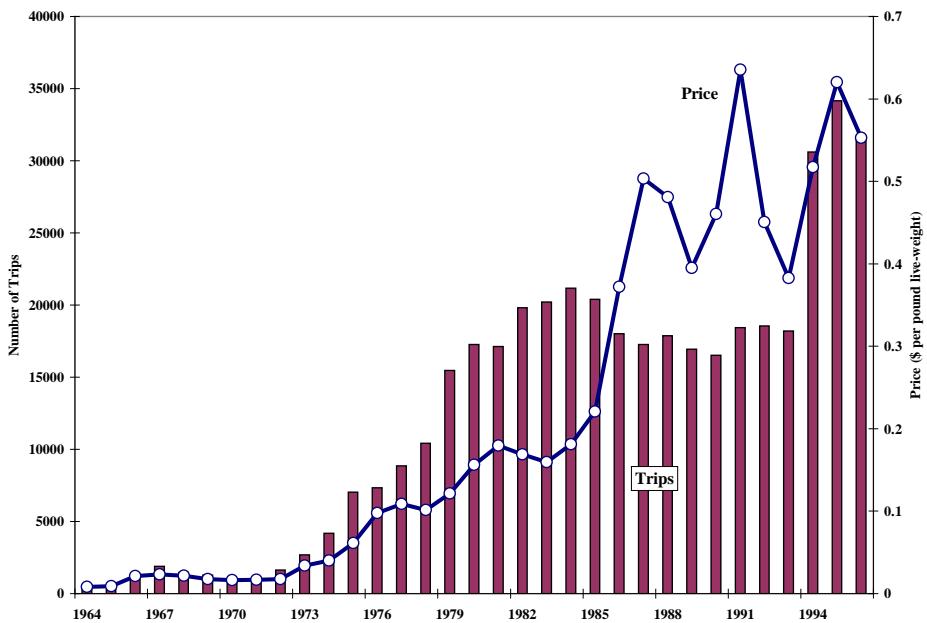
### 6.4.5.1 Development of monkfish fisheries

Until recently, monkfish--a.k.a. goosefish or angler--was an incidental catch in groundfish and sea scallop fisheries but had little or no commercial value. Around the turn of this century, fishermen had little use for monkfish: "*Two or more men, armed with pitchforks, attack a pile of fish in the checker, heaving overboard the skates, dogfish, monkfish, and other species considered worthless, and tossing haddock, cod, and other marketable fish into separate checkers*" (Alexander et al. 1915:21). Even by mid-decade, "[n]o commercial use has been made of the goosefish in America up to the present time" (Bigelow and Schroeder 1953: 541).

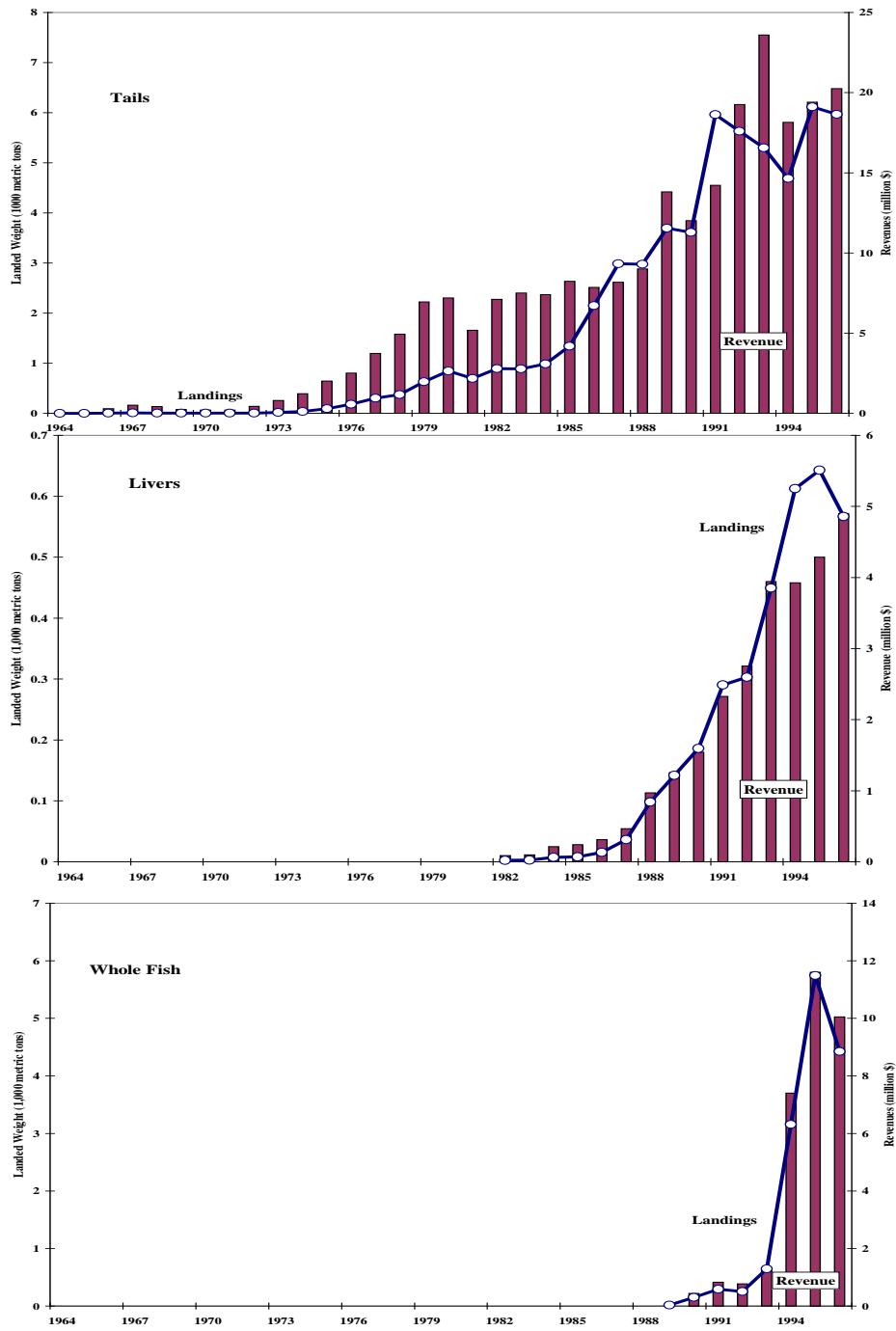
Government records of monkfish catches were not kept until the 1960s when reported landings averaged less than a million pounds and a few hundred thousand dollars a year (Figure 15, upper). During the 1970s, however, a ten-fold increase in the price of tails lead to a 17-fold increase in trips reporting landings (Figure 16, lower) and in landings themselves. Also during this decade, gillnet and sea scallop fishermen joined trawlers in reporting landings.

Further growth in the demand for tails by Europe and livers by Japan and other Asian countries fueled growth of U.S. dockside markets into the 1990s. Through 1987 landings stayed below 20 million pounds, and the total number of trips reporting monkfish landings began to decline after 1984; however, a trebling of prices resulted in a similar increase in dockside revenues (Figure 16, upper). By 1989, overfishing of the two European and Mediterranean species of monkfish resulted in restrictive regulations and greater demand for tails from the United States (Figure 17). At the same time, import markets for livers and whole monkfish in Asia vastly increased the demand for U.S. landings. On a live weight equivalent basis, monkfish landings passed 57 million pounds at mid-decade, and dockside revenues topped at \$34 million.

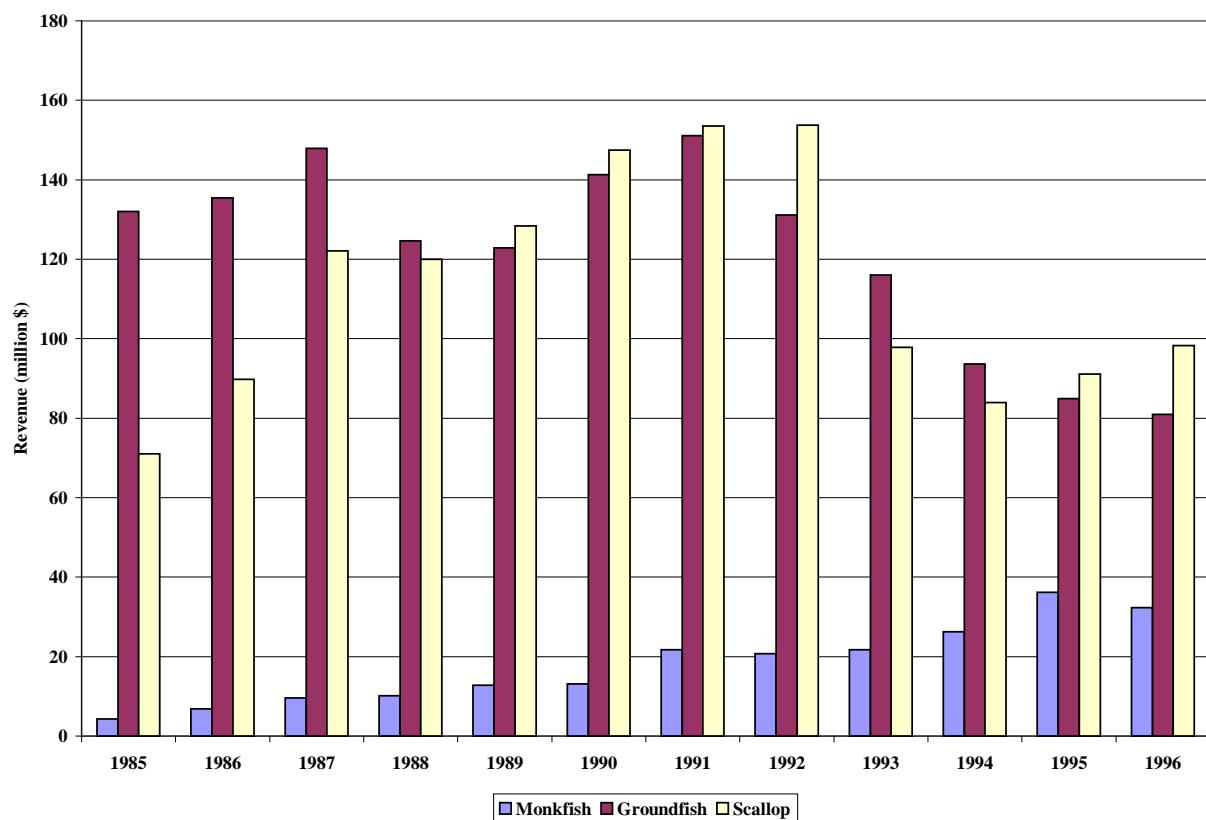
The spike in number of trips reporting monkfish landings after 1993 is partly a result of new mandatory reporting requirements, including for small vessels (Figure 16, lower). However, high dockside prices for monkfish products and reduced fishing opportunities in the multispecies and sea scallop fisheries since 1994 have made monkfish a target species, and created a new fishery for the gillnet fleet. As a result of these events, 1995 monkfish revenues amounted to nearly 40 percent of the combined 10 large mesh groundfish revenues and nearly 40 percent of sea scallop revenues (Figure 17). Tail prices are now comparable to the prices of Atlantic cod and most other traditional species, but up to 8 times greater than other alternatives to depleted groundfish. Even more striking, liver prices are on par with the price of sea scallops, 3 to 7 times greater than for traditional species, and up to 35 times higher than for alternative species such as spiny dogfish.



**Figure 15. Upper:** Total monkfish landings (live weight equivalent) and dockside revenues reported in the Northeast Region, 1964-1995. **Lower:** Monkfish prices (live-weight basis) and the total number of fishing trips reporting monkfish landings (tails, livers. And/or whole fish) in the Northeast Region, 1964-1996.



**Figure 16.** Total monkfish landings (landed-weight\_ and dockside prices reported in the Northeast Region, 1964-1996.



**Figure 17.** Comparison of total dockside monkfish revenues with dockside revenues of regulated multispecies and scallops in the Northeast Region, 1985-1996.

## 6.4.5.2 Dockside market

### 6.4.5.2.1 Dockside products

Fishermen currently land five types of monkfish products--tails, livers, whole or round fish, cheeks, and belly flaps. Tails were the initial product form landed, increasing exponentially since the 1960s to 13.6 million pounds and peaked at \$19 million in revenues in 1995 (Figure 15). The official landings data began to include liver statistics in 1982 and liver landings have since increased to over 1 million pounds and \$5.5 million in 1995. Whole fish landings were recorded for the first time in 1989, and by 1995 amounted to almost 12 million pounds (round weight) and \$9.5 million.

During 1994 to 1996, revenues from tails comprised more than half of total monkfish revenues, followed by whole or round fish and then livers (Table 16). Before 1994 and Korea's entry into the market for whole fish, however, revenues from livers were roughly 3 times greater than whole fish revenues. Landings of cheeks and belly flaps are currently negligible.

**Table 16.** Monkfish revenues by market category (million dollars)

Market Category	1996		1995		1994	
	Revenues	% total	Revenues	% total	Revenues	% total
<b>Tails</b>		57.25	19.0	56	14.6	56
a. Large	8.11		9.5		7.4	
b. Small	7.16		6.7		4.0	
c. Peewee	0.03		0.5		0.2	
d. Unclassified	3.04		2.4		3.0	
<b>Livers</b>	4.86	15.15	5.5	16	5.2	20
<b>Whole or Round</b>	8.85	27.60	9.5	28	6.2	24
<b>Cheeks</b>	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
<b>Belly Flaps</b>	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
<b>SUM</b>	32.05		34.0		26.1	

Monkfish tails are marketed in 3 size categories--large (generally over 2 pounds and 15 inches), small (from about  $\sim$  to 2 pounds and 12 to 15 inches), and peewee (less than  $\sim$  pound and 12 inches). Most tails revenues in 1994 to 1996 were received for landings of the large category (64 and 57 percent, respectively, excluding unclassified tails), followed by smalls (34 and 40 percent) and peewees (2 and 3 percent; respectively). However, growth overfishing is shifting the balance towards the smaller market categories. For example, in 1991 smalls and peewees contributed 18 percent and less than  $\sim$  percent, respectively, to total tails revenues, excluding landings of unclassified tails.

#### 6.4.5.2.2 Dockside demand

Dockside prices for monkfish have increased substantially since the days when monkfish was an incidental catch. The price of tails averaged only \$0.03 per pound in 1964 but were over \$1 in 1994 and 1995 (Table 17). Initial records put liver prices at about \$1 in 1985, but in 1994 and 1995 prices averaged \$5 or more. Finally, prices for whole or round fish have fluctuated between \$0.75 and \$1 since records began to be kept in 1989.

**Table 17.** Monkfish prices per pound by market category.

Market Category		1994	1995	1996
Tails	a. Large	1.50	1.70	1.76
	b. Small	0.88	1.25	1.07
	c. Peewee	0.39	0.60	0.56
	d. Unclassified	1.09	1.26	1.27
Livers		5.20	5.00	3.85
Whole or Round		0.83	0.96	0.88
Cheeks		0.78	0.70	1.13
Belly Flaps		0.70	1.10	0.77

As for most other species, tail prices also increase with fish size. For example, 1994 to 1996, large tails were around 50 cents higher than small tails and more than a dollar more than peewees. There are no size categories for livers or whole fish in the "weigh-out" database.

Prices also vary seasonally. Seasonal variation is most pronounced in the livers market where landings are affected by prices with peaks during winter when Japanese demand is strongest and lows during summer when monkfish spawn and liver quality is poorest (Figure 18, middle). During this cycle, prices swing by an order of magnitude and landings (supply) respond to the increase in demand (Pearson correlation,  $\rho$ , is 0.87 and  $P<0.0001$ ).

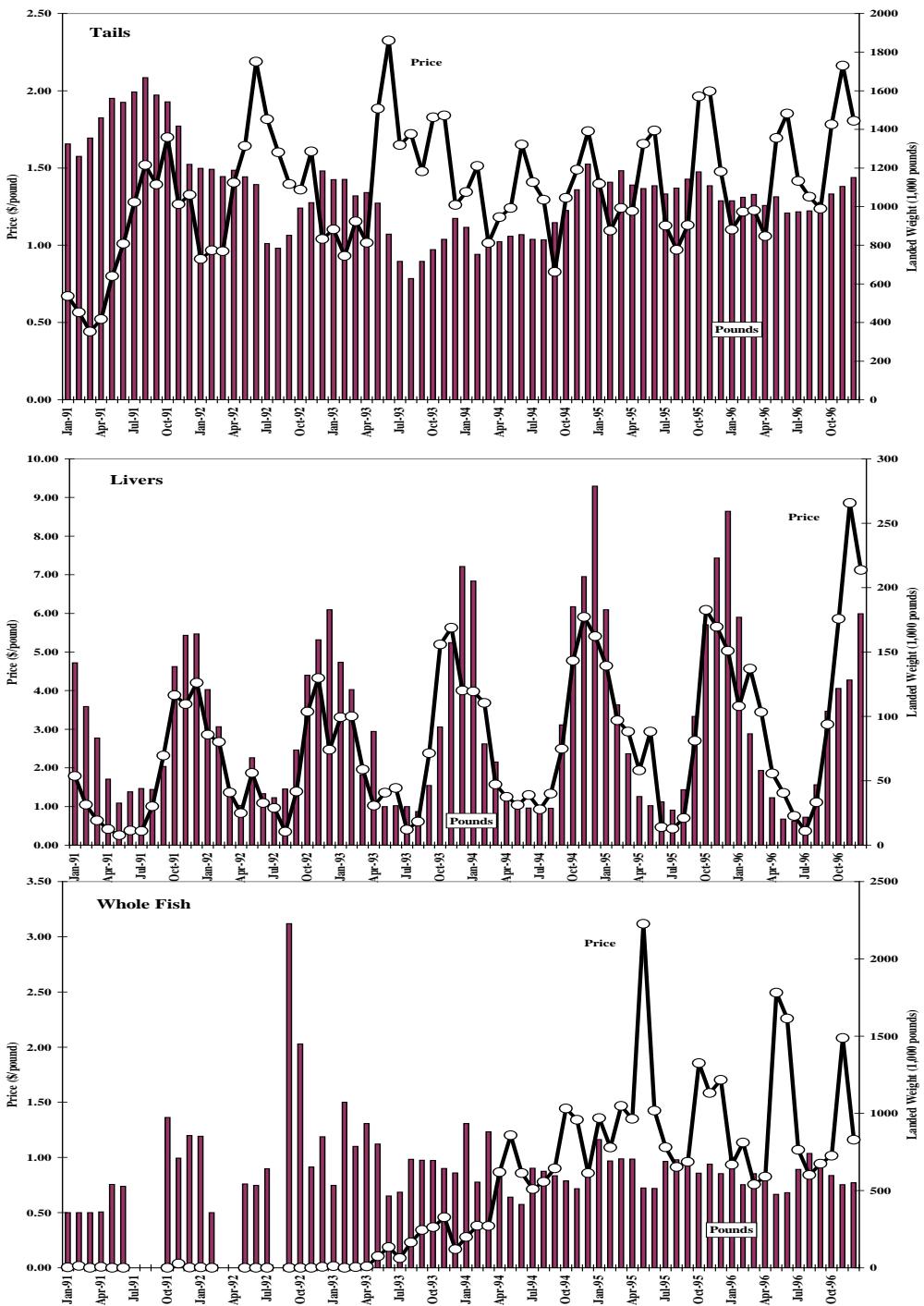


Figure 18. Total monthly landings and dockside prices of monkfish in the Northeast Region 1991-96. Landings of monkfish tails during 1993 are not reported because of a high percentage of landings not reported by month. Landings of whole and round monkfish during 1991, 1992, and 1994 are not reported because a high percentage of landings are not reported by month.

In contrast to livers, monkfish tails are landed in high quantities throughout the year, but there appears to be a bi-modal cycle in landings judging from 1994-1996 data, with peaks during late spring and early winter that coincide with European demand (Figure 18, upper). Prices tend to move with landings during the winter but otherwise stay flat regardless of landings. As a result, the correlation between monthly tail prices and landings is positive ( $\rho=0.38$ ) but statistically insignificant ( $P_r=0.22$ ).

Finally, available data on landings of whole or round fish during 1996 suggest a bi-modal pattern that seems to follow patterns for livers and tails (Figure 18, lower). In this case, though, the linear correlation between prices and landings is negative ( $\rho=0.74$ ) and statistically significant ( $P_r<0.01$ ).

Monkfish prices also vary widely on a daily basis and by port. For example, during 1995 the average price of monkfish tails in the Northeast was \$1.40, but daily prices ranged between \$0.22 and \$2.86. During the same year, livers and whole fish prices ranged from \$0.24 to \$13.56 and \$0.25 to \$3.94, respectively. Among top ports during 1995, average daily tail prices were highest in Portsmouth, NH (\$1.66) and lowest in Hampton, VA (\$1.17); liver prices were highest in Portland, ME (\$5.30) and lowest in Gloucester, MA (\$2.97); and whole fish prices were highest in Portsmouth, NH (\$0.94) and equally low in Westport, MA, Point Judith, RI, and Point Pleasant and Long Beach, NJ (\$0.77). Prices in New Bedford, MA, the top monkfish port overall, fell in the middle for these products.

Unlike dockside demands for most other species, including groundfish and sea scallops, there is no consistently inverse relationship between prices and landings. This is apparent from annual summaries of landings data (

**Figure 19)** and from the monthly correlations reported in Table 18, and from more detailed investigations of daily prices by major monkfish ports. Instead, U.S. monkfish landings probably compete with larger supplies in global markets where prices are determined primarily by factors influencing foreign demand in France (tails), Japan (livers), Korea (whole fish), and other countries importing monkfish products from the United States. Worldwide, the U.S. became the top producer of monkfish by 1993, but about 80 percent of world landings were from other countries, particularly France, Spain, and Scotland according to FAO statistics (

Figure 20).

**Table 18.** Linear correlations (Pearson product moment correlation) between monkfish daily dockside prices and landings at major ports during 1994 and 1995. Values in parentheses are the significance probability of the correlations (values less than or equal to 0.05 are generally considered statistically significant).

Port	Tails	Livers	Whole
Portland, ME	-0.06 (0.31)	-0.03 (0.64)	0.10 (0.29)
Gloucester, MA	-0.08 (0.15)	0.02 (0.77)	-0.10 (0.08)
Boston, MA	-0.05 (0.54)	0.27 (0.03)	-0.10 (0.38)
New Bedford, MA	0.04 (0.47)	0.44 (0.01)	-0.09 (0.18)
Newport, RI	-0.25 (0.01)	0.04 (0.49)	-0.14 (0.15)
Point Judith, RI	-0.13 (0.12)	-0.04 (0.58)	-0.09 (0.19)
Long Beach, NJ	0.04 (0.63)	0.02 (0.90)	-0.29 (0.48)

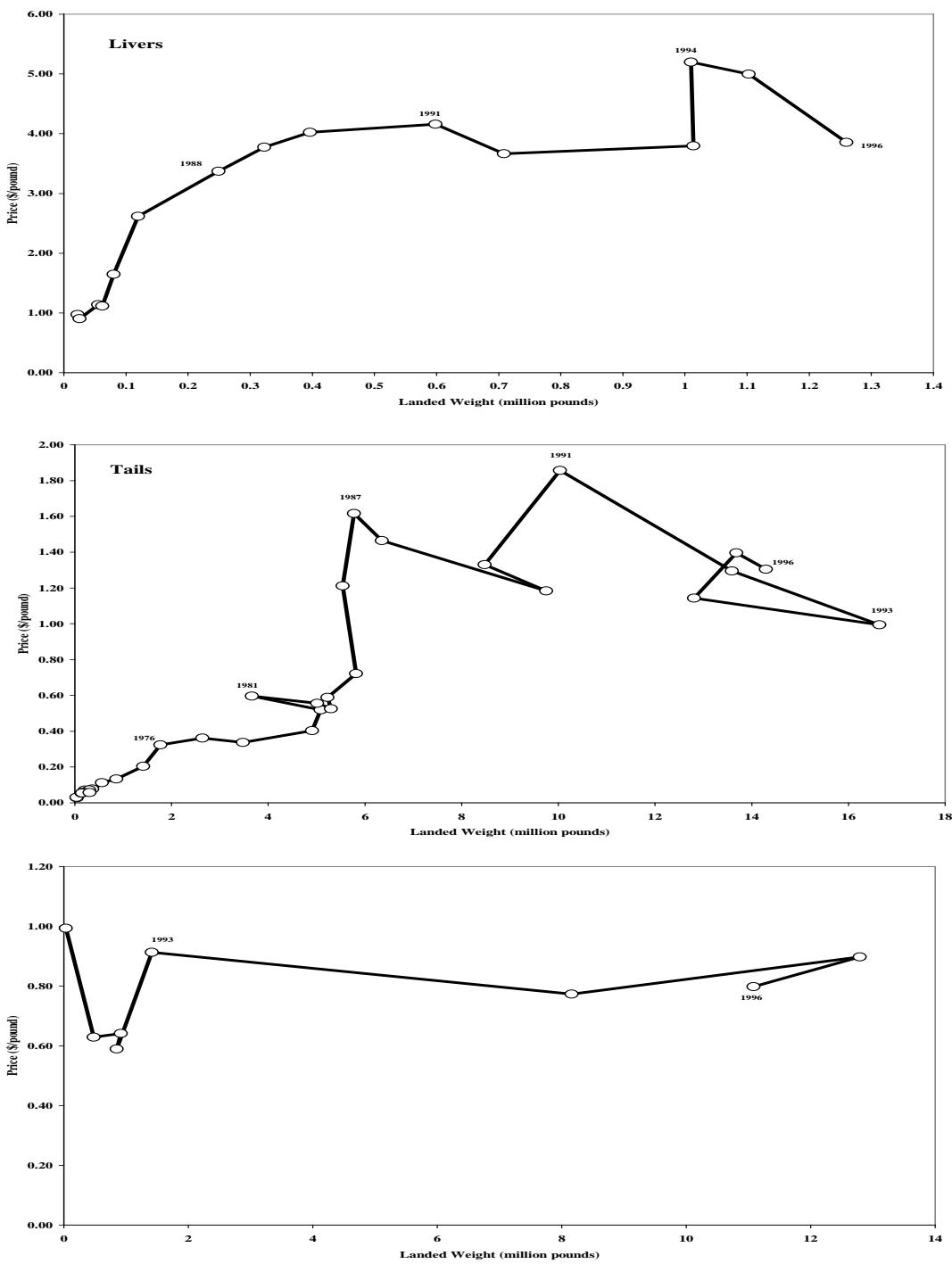
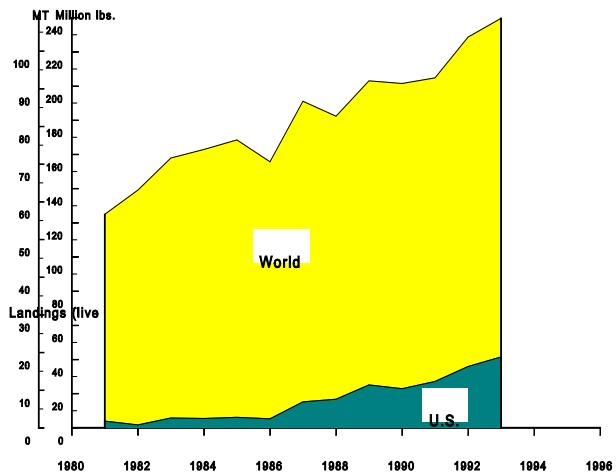


Figure 19. Time path of price-landings for monkfish tails, livers, and whole or round fish landed in the Northeast Region, 1964-1996.



**Figure 20.** Landings of monkfish species (*Lophius americanus*), *L. piscatorius*, and *L. upsicephalus*) from the Atlantic Ocean and Mediterranean Sea reported by the FAO, 1981-1993.

#### 6.4.5.3 Distribution of revenues across the fishing industry

##### 6.4.5.3.1 Distribution by port

Monkfish are landed throughout the Northeast, but especially in New England (Table 19). During 1994 - 1996, Massachusetts ports alone reported more than half of total monkfish revenues followed distantly by Maine (about 16 percent) and Rhode Island (about 13 percent). New Jersey led Mid-Atlantic states during these years with about 7 percent of total monkfish revenues.

New Bedford led all ports during 1994 - 1996 with about a third of total monkfish revenues (Table 20). Portland placed second during these years with up to nearly 15 percent of revenues, followed by Gloucester, Point Judith, Boston, Fall River, and Newport, each with about 5-7 percent of revenues. Long Beach, NJ, was the top port in the Mid-Atlantic area, with less than 5 percent of revenues.

**Table 19.** Distribution of monkfish revenues by state in the Northeast 1994-96. (million \$).

State	1994		1995		1996	
	Revenues	Percent	Revenues	Percent	Revenues	Percent
MA	14.41	54.98	20.05	55.51	15.86	49.04
ME	4.66	17.77	4.71	13.04	4.58	14.15
RI	3.62	13.80	4.11	11.38	4.60	14.22
NJ	1.51	5.76	2.65	7.34	2.72	8.40
VA	0.45	1.71	0.91	2.51	0.76	2.35
NH	0.39	1.49	0.74	2.05	0.81	2.49
NY	0.49	1.87	0.45	1.26	1.03	3.18
MD	0.09	0.36	0.44	1.23	0.43	1.33
CT	0.59	2.25	1.94	5.38	1.55	4.79
DE	0.00	0.00	0.11	0.30	0.02	0.05
<b>TOTAL</b>	<b>26.21</b>		<b>36.12</b>		<b>32.35</b>	

**Table 20.** Distribution of monkfish revenues by Northeast port, 1994-96 (million \$).

Port	1994		1995		1996	
	Revenues	Percent	Revenues	Percent	Revenues	Percent
New Bedford, MA	8.36	31.89	12.66	35.05	10.07	31.14
Portland, ME	3.81	14.53	4.16	11.50	4.08	12.62
Gloucester, MA	1.89	7.22	2.43	6.71	1.81	5.60
Point Judith, RI	1.94	7.38	2.31	6.41	3.27	10.12
Boston, MA	1.08	4.12	1.99	5.51	1.46	4.51
Newport, RI	0.73	2.77	0.44	1.21	0.46	1.42
Long Beach, NJ	0.64	2.46	1.52	4.21	1.64	5.06
Fall River, MA	2.17	8.29	1.29	3.56	1.11	3.44
Westport, MA	0.28	1.07	0.79	2.17	0.58	1.78
Portsmouth, NH	0.34	1.28	0.69	1.92	0.75	2.33
Hampton, VA	0.20	0.76	0.57	1.58	0.29	0.89
Point Pleasant, NJ	0.29	1.09	0.55	1.52	0.57	1.77
Other Ports	4.49	17.14	6.73	18.64	6.25	19.32
<b>TOTAL</b>	<b>26.21</b>		<b>36.12</b>		<b>32.35</b>	

#### 6.4.5.3.2 Distribution by proposed management area

Effort data from the 1994 and 1995 vessel logs are not ready for analysis; therefore, dependence on the proposed Northern and Southern Management Areas could not be evaluated under present management regulations, particularly limited access, area closure, and Days-At-Sea effort restrictions implemented in the multispecies and sea scallop fisheries since 1994. Instead, 1993 effort data were used for insights into area-dependence.

During 1993, more than half of total monkfish revenues--42 percent in New England and 13 percent in the Mid-Atlantic--were received for fish caught in the proposed Southern Management Area (Table 21). Seventy-five percent of the Southern-origin revenues were earned by vessels landing in New England ports.

Table 21. Distribution of 1993 monkfish revenues by management area and sub-region. Values in million dollars.  
 Percentages do not sum to 100% due to rounding.

Management Area	Measure	New England Sub-Region	Mid-Atlantic Sub-Region
Northern	Revenues	9.6	<0.1
	Percent of Area	99	<1
	Percent of Sub-Region	51	<1
	Percent of Total	44	<1
Southern	Revenues	9.1	3.0
	Percent of Area	75	24
	Percent of Sub-Region	48	99
	Percent of Total	42	13

Vessels landing in New England grossed nearly \$19 million, or 86 percent, of total monkfish revenues during 1993. Monkfish revenues for vessels landing in New England were roughly evenly split between the proposed management areas during 1993, but vessels landing monkfish in Mid-Atlantic ports concentrated in the Southern Management Area.

Regarding major ports, Maine concentrated on the proposed Northern Area, Rhode Island relied on the Southern Management Area, and Massachusetts' dependence was approximately evenly split between areas (Table 22). This distribution of New England's dependence can be mostly explained by emphasis of groundfish trawler activity in New England waters and scallop dredge and sink gillnet activity in waters off Mid-Atlantic states (Table 23). Scallop dredgers were also active in the Northern Management Area, however, where 30 percent of their monkfish revenues were obtained.

States in the Mid-Atlantic region depended almost exclusively on the Southern Management Area where summer flounder, sea scallop, and gillnet fishermen operate (Table 22; Table 23).

**Table 22.** Distribution of 1993 monkfish revenues by proposed Management Areas and Sub\_region and State where landings are reported. Values in million dollars. Percentages do not sum to 100% due to rounding.

Management Area	Measure	New England Sub-Region						Mid-Atlantic Sub-region				
		ME	NH	MA	RI	CT	TOTAL	NY	NJ	MD	VA	TOTAL
Northern	Revenues	4.5	0.2	4.6	0.3	0	9.6	0	<0.1	0	<0.1	<0.1
	% in State	96	100	46	8	0	-	0	1	0	2	-
	% in Sub-region	24	<1	24	1	0	51	0	<1	0	<1	<1
	% in Area	46	2	47	3	0	99	0	<1	0	<1	<1
	% in Northeast	20	<1	21	1	0	44	0	<1	0	<1	<1
Southern	Revenues	0.2	0	5.2	3.3	0.4	9.1	0.5	1.7	<0.1	0.7	3.0
	% in State	4	0	54	92	100	-	10	99	100	98	-
	% in Sub-region	<1	0	27	17	2	48	17	57	<1	24	99
	% in Area	1	0	42	27	3	75	4	14	<1	5	24
	% in Northeast	<1	0	24	15	2	42	2	7	<1	3	13

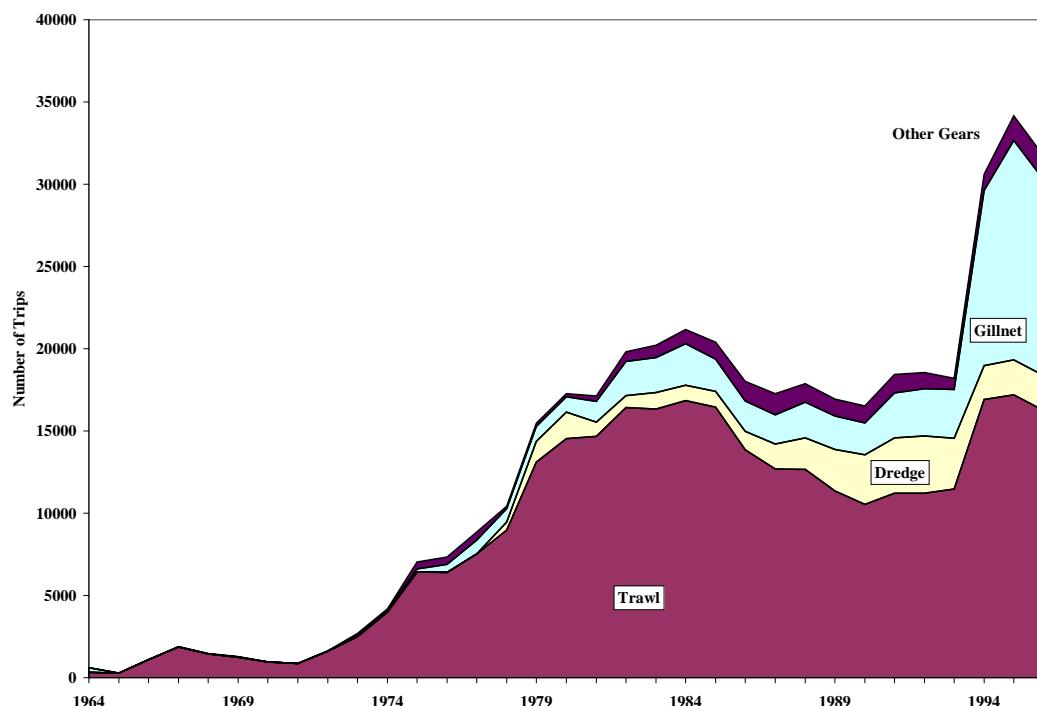
**Table 23.** Distribution of 1993 monkfish revenues by proposed Management Area, SubRegion where landings are reported, and gear. Values in million dollars. Percentages to not sum to 100% due to rounding.

Management Area	Measure	New England Sub-Region					Mid-Atlantic Sub-Region				
		Fish Trawl	Scallop Dredge	Sink Gillnet	Other Gear	TOTAL	Fish Trawl	Scallop Dredge	Sink Gillnet	Other Gear	TOTAL
<b>Northern</b>	Revenues	6.2	2.5	0.9	<0.1	9.6	0	<0.1	0	<0.1	<0.1
	% of Gear	59	30	31	11	-	0	<1	0	<1	-
	% in Sub-region	33	13	4	<1	51	0	<1	0	<1	<1
	% in Area	64	25	9	<1	99	0	<1	0	<1	<1
	% in Northeast	28	11	4	<1	44	0	<1	0	<1	<1
<b>Southern</b>	Revenues	3.4	4.1	1.5	<0.1	9.1	0.8	1.5	0.5	0.2	3.0
	% of Gear	32	50	51	30	-	7	18	17	57	-
	% in Sub-region	18	21	8	<1	48	26	50	16	6	99
	% in Area	28	33	12	<1	75	6	12	4	1	24
	% in Northeast	15	18	6	<1	42	3	6	2	<1	13

#### 6.4.5.3.3 Distribution by gear

Prior to the mid-1970s, only groundfish trawlers reported monkfish landings, and their number of trips remained below 2,000 annually (Figure 21). Reports of landings by sink gillnet fishermen and scallopers began to surface in 1973 and 1978, respectively.

The number of trips reporting monkfish landings by trawlers peaked at nearly 17,000 in 1984 and then declined to less than 12,000 by 1993. In contrast, trips by sink gillnet and scallop dredge vessels increased into the early 1990s to about 3,000 each in 1993. The sharp increase in trawler and gillnet trips after 1993 is most likely due to new logbook reporting requirements which subsumes small vessels. The decline in sea scallop dredge trips after 1993 may be due to the status of the sea scallop resource and/or exclusion of scallopers from parts of Georges Bank which are closed to protect groundfish.



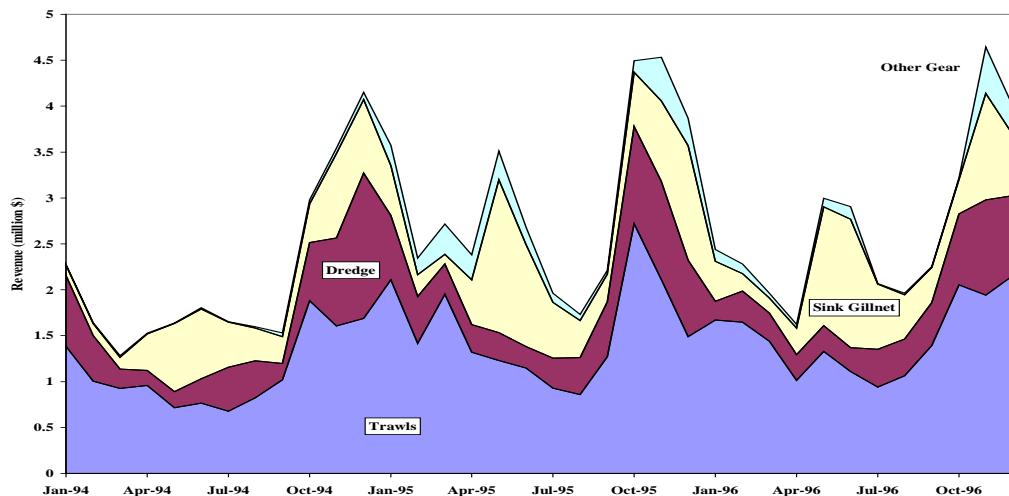
**Figure 21.** Total number of fishing trips reporting monkfish landings (tails, livers, and/or whole fish) in the Northeast Region by principle fishing gear, 1964-1996.

During 1994 and 1995, more than half of total monkfish revenues were received by trawlers (Table 24). Sea scallop dredge vessels ranked behind trawlers during 1994 with nearly a quarter of the revenues, followed closely by sink gillnet vessels. By 1995, however, targeting of monkfish moved sink gillnetters into second place. During both years, monkfish revenues returned to vessels using any other gear type were less than 5 percent of total. Monkfish revenues also vary seasonally with gear. In 1994 and 1995, fish trawlers and scallop dredgers reported highest revenues during the fall and early winter (Figure 22). In contrast, revenues reported by sink gillnet vessels exhibited a bi-modal pattern during these years with peaks during late spring as well as late fall.

**Table 24.** Distribution of monkfish revenues by gear type, 1994-96 (million \$).

Gear	1994		1995		1996	
	Revenue	Percent	Revenue	Percent	Revenue	Percent
<b>Fish Trawl</b>	13.45	51.33	18.55	51.36	17.75	54.88
<b>Scallop Dredge</b>	6.31	24.10	6.67	18.48	5.63	17.41
<b>Sink Gillnet</b>	5.55	21.18	8.17	22.62	7.53	23.29
<b>All Other</b>	0.89	3.40	2.72	7.54	1.43	4.41
<b>Total</b>	26.20		36.11		32.35	

There are also differences in products landed by gear. During 1994 and 1995, fish trawlers grossed the majority of total revenue from monkfish tails, followed by scallop dredge vessels with somewhat more than 25 percent and sink gillnetters with less than 15 percent (Figure 23). Although more evenly distributed, a similar distribution was reported for liver revenues. In contrast, revenues from whole or round fish were roughly equal for trawlers and sink gillnetters and nearly zero for sea scallop dredgers. These patterns are consistent with at-sea processing of sea scallops by dredge vessels.



**Figure 22.** Distribution of total dockside monkfish revenues in the Northeast Region by month and principle fishing gear, 1994-1996.



**Figure 23.** Distribution of total dockside monkfish revenues in the Northeast Region by Product Form and principal fishing gear, 1994-1996.

#### 6.4.5.4 Trade

The United States exports monkfish products to Europe (predominantly tails) and Asia (tails, whole fish, and livers). However, separate statistics on monkfish exports were not reported until 1995 and these statistics are only for tails or whole fish. No separate statistics are available for monkfish livers. The total value of US exports of fresh and frozen monkfish meat was \$14.1 and \$21.9 million in 1995 and 1996 respectively. Of these exports, the majority of exports were destined for European markets (\$11.5 and \$15.4 million in 1995 and 1996 respectively) with the vast majority being sold to France. Exports to Asia (Japan and South Korea) doubled from 1995 to 1996.

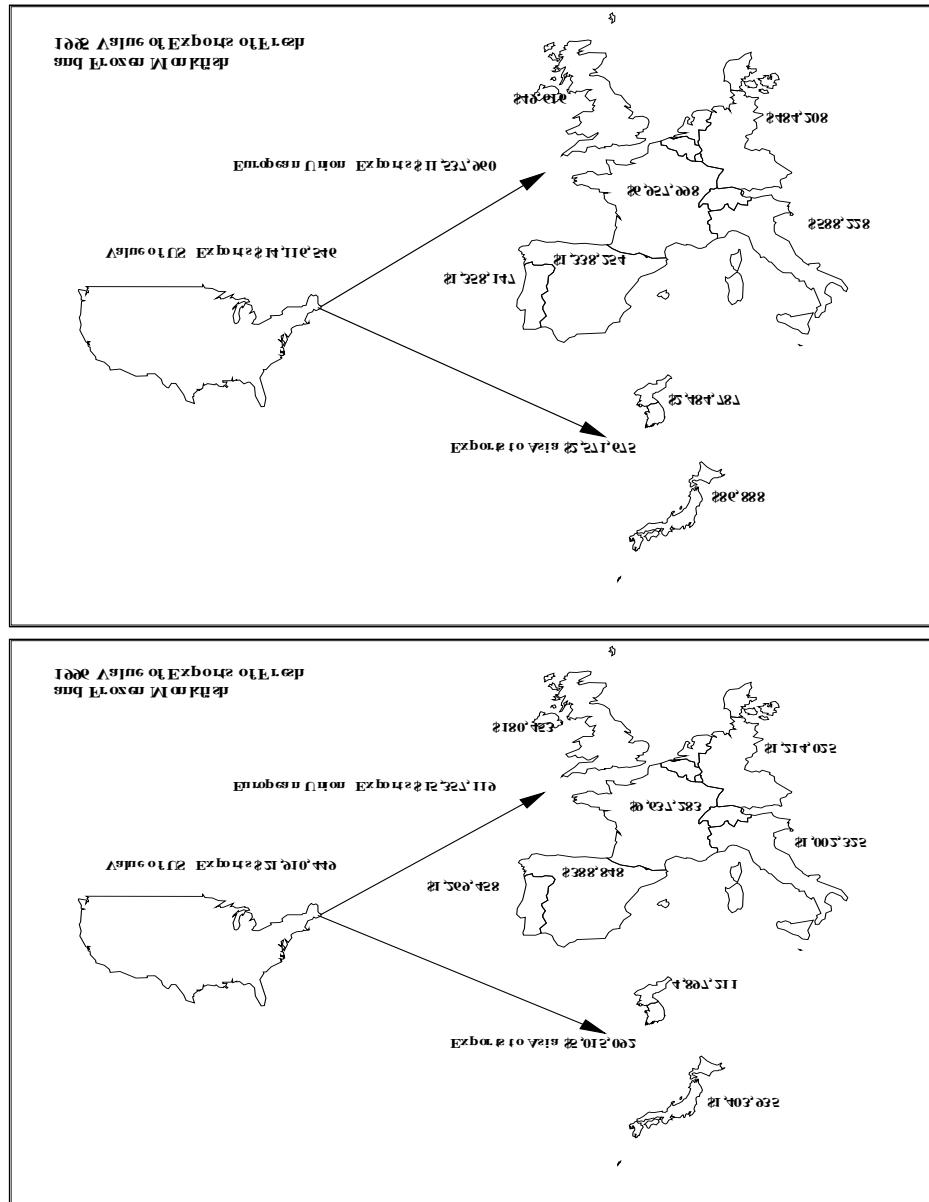


Figure 24. Value of Exports of fresh and frozen monkfish by country 1995 and 1996.

#### 6.4.5.5 Northeast Region Permit Data

This section describes the vessel characteristics shown on permit applications such as home port, primary port, horsepower, length, tonnage, and the 1997 federal permit status any vessel that could conceivably be affected by monkfish management (any that landed one or more pounds monkfish from 1991 (the beginning of the qualifying period) through 1997 plus all vessels with a 1997 federal multispecies or scallop limited access day-at-sea permit). All Northeast region federal fishing permits are examined below, with the exception vessels with surf clam and ocean quahog permits. These two species are managed by Individual Transferable Quotas (ITQs); thus, while permits still exist for these species and anyone can acquire one, these permits have no monkfish harvest rights associated with them. Also excluded from this analysis are the 78 vessels no longer fishing due to their participation in the Fishing Capacity Reduction Program.

There are 2,680 vessels that are potentially affected by the Monkfish FMP. Prior to 1994, however, landings from vessels under 5 GRT and vessels landing in small, rural ports were often aggregated and individual vessels cannot be identified. Thus this analysis may be missing some vessels which landed only in 1991-1993 in small, rural ports and have no 1997 federal permits in Northeast fisheries. In addition, prior to 1997 North Carolina landings were not available on a per vessel basis. Thus, while North Carolina vessels with other Northeast Federal permits will be in this set, any North Carolina vessels not holding a Northeast federal permit in 1997 and not landing monkfish during 1997 are excluded from further analysis. Vessels with unreported catch are therefore omitted from the analysis.

Only 1,893 of these 2,680 vessels landed at least one pound of monkfish during the qualifying period of January 1, 1991 through February 27, 1995, and only 599 of these met the qualifying criteria. But 2,201 vessels landed at least one pound of monkfish from 1991 through 1997. This means there are 308 vessels that began catching monkfish after February 27, 1995 (or returned after not fishing since before 1991) and 1,608 vessels that caught monkfish between 1991 and 1997 and would not qualify for limited access monkfish permits. These vessels will still be able to catch monkfish, but will be restricted to a 50 lb. trip limit. The extent to which this will actually be limiting is discussed in the Regulatory Impact Review (Section 1.1) and the Social Impact Analysis (Section 8.1.7). For vessels that landed monkfish without a 1997 federal Northeast permit, previous data were used to determine the vessel characteristics and ports provided at that time. Thus, while only 1997 permit categories are reported, some vessel characteristics are from previous years.

There are also 1,402 vessels that hold a 1997 limited access day-at-sea permit for groundfish or scallops (and therefore might qualify for a monkfish limited access permit). Of these, 498 have no history of catching monkfish from 1991 through 1997. For all limited access day-at-sea permits, 1,143 of the 1,402 have multispecies only; 202 have scallop only; and 57 have both, however only 15 are combination vessels (holding both scallop and individual multispecies day-at-sea permits). The other 42 have a scallop day-at-sea and multispecies fleet day-at-sea permits. For those with limited access day-at-sea permits in 1997 and monkfish landings, 1,149 have limited access day-at-sea permits: 904 of the 1,149 have multispecies permits only; 190 have scallop only; and 55 have both though only 14 are combination vessels.

The 2,680 vessels vary greatly in size and location, in primary gear and level of monkfish landed as a percent of all their landings. Table 25 breaks these out by length and Table 26 by tonnage. The vessel length and tonnage categories were chosen for their relevance to management measures as well as known distinctions among vessels of different sizes. Length categories, for instance, reflect both the fact that 60 feet is a good dividing line in the Northeast between small and large vessels and the fact that under Amendment 7 to the Multispecies Plan limited

access vessels under 30 feet are eligible for different regulations than those larger than 30 feet<sup>10</sup>. The largest groupings of vessels are in the 31-45 ft and the 61-100 ft category (Table 25). There are very few extremely small or extremely large vessels. Tonnage categories (Table 26) reflect the under-5- GRT distinction noted above, and the different qualifying rules for vessels under versus over 50 GRT -- as well as the fact that 50 GRT is very close to the 40 GRT line often used to divide small versus large vessels in the Northeast. The majority of vessels are in the middle category of 5-50 GRT.

For all 2,680 vessels potentially affected by the Monkfish FMP, average length is 53 feet and average tonnage is 58 GRT, though lengths range from 16 feet to 165 feet and 1 GRT to 485 GRT. For the 2,201 vessels with monkfish landings in 1991-1997, average length is 58 feet and average tonnage is 71 GRT, though vessels range from 16 feet to 140 feet and from 1 GRT to 372 GRT. Vessels that landed monkfish during 1991-1997 tend to be slightly larger than the overall fleet that have the potential to land monkfish due to the permits they hold.

**Table 25.** Length of vessels that are potentially affected by the Monkfish FMP, because they have multispecies permits, scallop permits or have had monkfish landings during 1991-1997.

Length	Number of vessels	Percent	Number of vessels with monkfish landings	Percent
0-30 ft	202	7.7	83	4
31-45 ft	1115	42.3	767	36.9
46-60 ft	395	15	355	17.1
61-100 ft	882	33.5	835	40.2
101+ ft	40	1.5	37	1.8
Total	2634	100	2077	100

**Table 26.** Tonnage of vessels that are potentially affected by the Monkfish FMP, because they have multispecies permits, scallop permits or have had monkfish landings during 1991-1997

Tonnage	Number of vessels	Percent	Number of vessels with monkfish landings	Percent
0-4 GRT	142	5.4	64	3.1
5-50 GRT	1373	52.1	963	46.4
51-100 GRT	482	18.3	432	20.8
101-150 GRT	354	13.4	339	16.3
151+ GRT	283	10.7	279	13.4
Total	2634	100	2077	100

Crew size was summarized from multispecies and scallop fishery permit applications to determine how many individual fishermen are associated with these vessels. The crew numbers for multispecies and scallop crews cannot be added together, because doing so would count people twice since these are crew for vessels with permits, not just vessels that actively fish a particular fishery. Also, crew numbers can be misleading; often this number reflects the number of berths rather than the actual crew size. The fact that the most common vessel size is small to medium and the most common crew size is 2 (see below) lends some credence to the figures.

<sup>10</sup> The New England Council has recently modified this management measure to exempt from the multispecies regulations only vessels less than 20 feet LOA.

It should be kept in mind, however, that in recent years many vessels in multispecies fisheries and scallop fisheries have been reducing their crews to a minimum as a cost-saving measure. That may not be being captured here. Further, scallop crews are legally set at a maximum of 7 under current regulation, yet some vessel owners have not updated their permit information to reflect this. Thus, though they have crews of no more than 7 their permits indicate crews larger than this.

Since not all of the 2,680 vessels in the data set under consideration actually caught monkfish, crew data are broken out for all vessels with multispecies or scallop permits and for vessels with NER permits that had monkfish landings in 1991-1997. For the 1,930 vessels with multispecies permits and reported crew size, the average in 1997 was four. The most frequent crew amount was two, however (Table 27). The total number of crew reported was 6,705, but this may be a considerable overestimate for the reasons given above. For the 1,552 scallop permitted vessels the average crew was also four and the most frequent crew size in 1997 was two (Table 28). These totals include general category permit holders, composed primarily of small vessels. The number of crew on full-time scallop vessels is higher than the averages and medians suggest. The total number of crew reported by scallop vessels in 1997 was 5,989.

For the 1,415 multispecies vessels that had monkfish landings, the average crew size in 1997 was four and the most frequently reported crew size was two or three (Table 27). The total number of crew reported by multispecies vessels with monkfish landings was 5,433. For scallop vessels, the average crew was also four and the most frequently reported crew size was two or three (Table 28). The total number of crew reported for scallop vessels with monkfish landings was 5,373. Georgianna and Cass (Appendix V) reported that New Bedford scallop vessels reduce crew members from seven to four or five, when targeting monkfish, while draggers normally maintain their customary crew size.

**Table 27.** Crew size reported on 1997 multispecies vessel permit applications.

Number of Crew	Number of multispecies vessels	Percent	Number of multispecies vessels and monkfish landings		Percent
			monkfish landings		
1	110	5.7	60		4.2
2	688	35.6	395		27.9
3	453	23.5	351		24.8
4	290	15	243		17.2
5	119	6.2	110		7.8
6	63	3.3	53		3.7
7	101	5.2	99		7
8	13	0.7	12		0.8
9	71	3.7	71		5
10	11	0.6	11		0.8
> 10	11	0.8	10		0.8
Average	3.5		3.8		

**Table 28.** Crew size reported on 1997 sea scallop vessel permit applications. Totals include limited access and general category permits.

Number of Crew	Number of scallop vessels	Percent	Number of scallop vessels and monkfish landings		Percent
			monkfish landings		
1	62	4	39		3
2	463	29.8	330		25.2
3	363	23.4	212		23.8
4	253	16.3	231		17.6
5	117	7.5	112		8.5
6	57	3.7	53		4
7	115	7.4	113		8.6
8	13	0.8	12		0.9
9	83	5.3	83		6.3
10	14	0.9	14		1.1
> 10	12	0.8	11		0.8
Average	3.8		4.2		

Vessel owners report two types of ports on permit applications. The home port is where the vessel is based, and the primary port is where the vessel lands most often. For many vessels, these definitions are equivalent. Massachusetts has the largest number of vessels under both scenarios, followed by Maine, New York, New Jersey, and Rhode Island (Table 29 and Table 30). There are slight differences between vessels with permits that could be affected versus vessels that landed monkfish. The order under one scenario versus another differs for some of the states with fewer of permits. This difference occurs because vessels do not always land primarily in their home port or even home port state.

**Table 29.** Ports reported by vessels in 1997 that could be affected by the Monkfish FMP.

<b>Home Port</b>	<b>Number of vessels</b>	<b>Primary Port</b>	<b>Number of vessels</b>
AL	<3	AL	4
CT	22	CT	41
DE	16	DE	8
FL	22	FL	18
LA	3	LA	4
MA	1265	MA	1117
MD	14	MD	26
ME	256	ME	400
NC	91	NC	114
NH	89	NH	110
NJ	144	NJ	218
NY	248	NY	200
PA	66	PA	5
RI	134	RI	219
TX	4	TX	3
VA	146	VA	131
WV	32	WV	<3
Other	7	Other	2
Unknown	120	Unknown	47

**Table 30.** Ports reported by vessels in 1997 that landed monkfish during 1991-1997.

<b>Home Port</b>	<b>Number of vessels</b>	<b>Primary Port</b>	<b>Number of vessels</b>
AL		AL	4
CT	7	CT	21
DE	15	DE	6
FL	17	FL	15
LA	3	LA	4
MA	931	MA	818
MD	13	MD	25
ME	208	ME	327
NC	86	NC	107
NH	66	NH	85
NJ	131	NJ	194
NY	183	NY	158
PA	59	PA	4
RI	110	RI	174
VA	141	VA	128
WV	25	WV	
Other	9	Other	6
Unknown	119	Unknown	47

Of the 2,633 vessels where both home port and primary port are listed, 1,328 (50%) list the same port for both home and primary landing site. This behavior varies by state, however (Table 31). Rhode Island, Maryland, Maine, New Hampshire and New Jersey all show 70% of home-ported vessels landing in their home port. In Virginia, Delaware, Pennsylvania and West Virginia this is true 20% or less of the time. For vessels that land in the same state (though not necessarily in the same port), however, then the overall average rises to 76%, with all states but Pennsylvania, Delaware, Florida West Virginia and Virginia above 50%, and Rhode Island, New Hampshire, Maine and Maryland all above 90%.

For vessels with monkfish landings, 49% of the 2,123 vessels land in their home port, while 74% land in their home state (Table 32). Rhode Island, Maryland, Maine, New Hampshire and New Jersey are all above 70% for landing in their home port. Massachusetts and New York are 90% or above for landing in their home state. Thus the tendency to land in the same port that is considered as a home port is slightly lower for vessels that landed monkfish than for other vessels. This trend may be attributable to the fact that vessels that landed monkfish are slightly larger.

**Table 31.** Port distribution and landings patterns for vessels that landed monkfish during 1991 –1997 and vessels that had multispecies or scallop permits.

Home Port State	Number of vessels	Percent where home port = primary port	Percent where home port state = primary port state
CT	22	68%	82%
DE	16	19%	25%
FL	22	32%	46%
MA	1264	52%	82%
MD	14	79%	93%
ME	256	73%	99%
NC	91	51%	78%
NH	89	75%	93%
NJ	144	74%	86%
NY	248	36%	77%
PA	66	5%	5%
RI	135	72%	95%
VA	145	27%	66%
WV	34	0%	0%

**Table 32.** Port distribution and landings patterns for vessels that landed monkfish during 1991 –1997.

Home Port State	Number of vessels	Percent where home port = primary port	Percent where home port state = primary port state
CT	21	24%	29%
DE	6	50%	50%
FL	15	33%	47%
LA	4	50%	50%
MA	818	59%	92%
MD	25	44%	48%
ME	327	46%	63%
NC	107	38%	62%
NH	85	58%	73%
NJ	194	50%	58%

<b>Home Port State</b>	<b>Number of vessels</b>	<b>Percent where home port = primary port</b>	<b>Percent where home port state = primary port state</b>
NY	158	42%	90%
PA	4	50%	50%
RI	174	44%	59%
VA	128	30%	73%

Table 33 and Table 34 show the number of permits per by port within each of these states. While clustering occurs, especially in large ports, often only 1-3 vessels have designated a particular port as home port or primary port. When describing fish communities, it is appropriate to group a number of geographically close ports together for analysis. This will depend on the degree to which the ports and fishermen share social and economic ties. The home ports (Table 33) with the largest number of permits (> 100) are Boston, New Bedford, Gloucester, New York and Norfolk. Those with 50-100 permits are Chatham, Philadelphia, and Point Judith. Primary ports (Table 34) with >100 permits are New Bedford, Gloucester, Point Judith, and Chatham. Those with 50-100 are Boston, Portland, Cape May and Montauk. Obviously, few of the vessels that are based in Philadelphia, New York City, and Norfolk land there, and few of the vessels that land in Montauk and Cape May are based in those ports. Boston, Chatham, Gloucester, New Bedford, and Point Judith are all large centers for both primary and home port.

**Table 33.** Distribution of vessels by home port listed on their 1997 permit application.

<b>State</b>	<b>Home Port</b>	<b>Vessels</b>	<b>Vessels with monkfish landings</b>	<b>Percent of all vessels with monkfish landings</b>
AL	Other	2		0.00%
CT	New London	5	4	80.00%
	Stonington	6		0.00%
	Other	11	3	27.27%
DE	Wilmington	10	9	90.00%
	Other	7	7	100.00%
FL	Cape Canaveral	4		0.00%
	Miami	8	7	87.50%
	Other	10	10	100.00%
LA	Other	3		0.00%
MD	Beverly	15	7	46.67%
MA	Boston	511	396	77.50%
	Brant Rock	5		0.00%
	Chatham	65	46	70.77%
	Dennis	4		0.00%
	Edgartown	5		0.00%
	Fairhaven	17	16	94.12%
	Fall River	4		0.00%
	Gloucester	170	135	79.41%
	Green Harbor	12		0.00%
	Harwich	8		0.00%
	Harwichport	9	5	55.56%
	Hull	9	4	44.44%
	Hyannis	14	12	85.71%
	Manchester	6	4	66.67%
	Marblehead	17	11	64.71%

<b>State</b>	<b>Home Port</b>	<b>Vessels</b>	<b>Vessels with monkfish landings</b>	<b>Percent of all vessels with monkfish landings</b>
MA	Marshfield	5		0.00%
	Nantucket	5		0.00%
	New Bedford	154	150	97.40%
	Newburyport	13	5	38.46%
	Orleans	5		0.00%
	Pigeon Cove	7	4	57.14%
	Plymouth	10	7	70.00%
	Provincetown	18	13	72.22%
	Rockport	15	11	73.33%
	Salem	4		0.00%
	Salisbury	5		0.00%
	Sandwich	8	5	62.50%
	Scituate	25	18	72.00%
	Swampscott	6	5	83.33%
	Tauton	4		0.00%
	Westport	10	5	50.00%
	Other	200	72	36.00%
	Ocean City	12	12	100.00%
	Other	2	1	50.00%
ME	Boothbay	7	5	71.43%
	Bremen	6	5	83.33%
	Bucks Harbor	4		0.00%
	Cape Porpoise	5		0.00%
	Cundys Harbor	12	6	50.00%
	Five Islands	4		0.00%
	Harpswell	6	6	100.00%
	Jonesport	4		0.00%
	Kittery	4	4	100.00%
	New Harbor	5	5	100.00%
	Owls Head	5	4	80.00%
	Port Clyde	9	8	88.89%
	Portland	39	37	94.87%
	Rockland	8	8	100.00%
	Saco	5	5	100.00%
	South Bristol	5	5	100.00%
	Southwest Harbor	10	10	100.00%
	Spruce Head	5	4	80.00%
	Stonington	6	5	83.33%
	York	4		0.00%
	Other	103	91	88.35%
NC	Atlantic	6	5	83.33%
	Beaufort/Morehead	9	9	100.00%
	Belhaven	6	6	100.00%
	Lowland	7	7	100.00%
	New Bern	6	5	83.33%

<b>State</b>	<b>Home Port</b>	<b>Vessels</b>	<b>Vessels with monkfish landings</b>	<b>Percent of all vessels with monkfish landings</b>
	Oriental	5	5	100.00%
	Vandemere	7	7	100.00%
	Wanchese	19	17	89.47%
	Other	26	25	96.15%
<b>NH</b>	Hampton	14	11	78.57%
	Portsmouth	26	23	88.46%
	Rye	15	8	53.33%
	Seabrook	20	16	80.00%
	Other	14	8	57.14%
<b>NJ</b>	Atlantic City	6	6	100.00%
	Barnegat Light	21	21	100.00%
	Belford	17	14	82.35%
	Brielle	4		0.00%
	Cape May	47	45	95.74%
	Point Pleasant	19	18	94.74%
	Sea Isle City	4	4	100.00%
	Wildwood	5	5	100.00%
	Other	21	18	85.71%
<b>NY</b>	Freeport	4		0.00%
	Greenport	7	7	100.00%
	Hampton Bays	6	6	100.00%
	Montauk	40	25	62.50%
	New York	158	119	75.32%
	Shinnecock	10	7	70.00%
	Other	23	19	82.61%
<b>PA</b>	Philadelphia	66	59	89.39%
<b>RI</b>	Galilee	4		0.00%
	Narragansett	4	4	100.00%
	Newport	16	9	56.25%
	Point Judith	69	60	86.96%
	Providence	8	7	87.50%
	Wakefield	11	8	72.73%
	Westerley	4	4	100.00%
	Other	19	18	94.74%
<b>VA</b>	Hampton	18	18	100.00%
	Newport News	13	13	100.00%
	Norfolk	102	100	98.04%
	Other	13	10	76.92%
<b>WV</b>	Falling Waters	32	25	78.13%
	Other	1		0.00%

**Table 34.** Distribution of vessels by primary port listed on their 1997 permit application.

State	Primary Port	Vessels	Vessels with monkfish landings	Percent of all vessels with monkfish landings
AL	Bayou La Batre	4		0.00%
CT	New London	9	4	44.44%
	Stonington	20	15	75.00%
	Other	12	2	16.67%
DE	Other	8	6	75.00%
FL	Cape Canaveral	4		0.00%
	Other	14	15	107.14%
LA	Other	4	4	100.00%
MA	Barnstable	7		0.00%
	Beverly	17	8	47.06%
	Boston	67	51	76.12%
	Brant Rock	5		0.00%
	Chatham	106	71	66.98%
	Fairhaven	38	34	89.47%
	Fall River	8	8	100.00%
	Falmouth	4		0.00%
	Gloucester	221	174	78.73%
	Green Harbor	20	5	25.00%
	Harwich	13	7	53.85%
	Harwichport	29	13	44.83%
	Hingham	5	4	80.00%
	Hull	10	5	50.00%
	Hyannis	17	13	76.47%
	Manchester	5		0.00%
	Marblehead	17	12	70.59%
	Marshfield	8		0.00%
	Menemsha	5		0.00%
	Nantucket	4		0.00%
	New Bedford	242	234	96.69%
	Newburyport	27	15	55.56%
	Orleans	7	4	57.14%
	Pigeon Cove	8	5	62.50%
	Plymouth	20	15	75.00%
	Provincetown	32	23	71.88%
	Rockport	13	10	76.92%
	Salisbury	6		0.00%
	Sandwich	15	12	80.00%
	Scituate	41	31	75.61%
	Swampscott	8	6	75.00%
	Wellfleet	6		0.00%
	Westport	17	10	58.82%
	Woods Hole	4		0.00%
	Other	72	48	66.67%
MD	Ocean City	25	24	96.00%
	Other	1	1	100.00%

<b>State</b>	<b>Primary Port</b>	<b>Vessels</b>	<b>Vessels with monkfish landings</b>	<b>Percent of all vessels with monkfish landings</b>
ME	Bar Harbor	6	6	100.00%
	Bass Harbor	4	4	100.00%
	Boothbay	9	8	88.89%
	Boothbay Harbor	16	11	68.75%
	Bremen	5		0.00%
	Bucks Harbor	4		0.00%
	Cape Porpoise	6		0.00%
	Cundys Harbor	19	11	57.89%
	Cushing	4		0.00%
	Five Islands	7		0.00%
	Harpswell	7	6	85.71%
	Jonesport	8	5	62.50%
	Kennebunkport	5	5	100.00%
	Kittery	9	7	77.78%
	New Harbor	9	8	88.89%
	Port Clyde	18	17	94.44%
	Portland	92	88	95.65%
	Rockland	10	8	80.00%
	Saco	6	6	100.00%
	Sebasco Estates	7		0.00%
	South Bristol	18	18	100.00%
	Southwest Harbor	11	11	100.00%
	Spruce Head	6	5	83.33%
	Stonington	13	9	69.23%
	Vinalhaven	6		0.00%
	West Point	5		0.00%
	Winter Harbor	4	4	100.00%
	York	4	4	100.00%
	York Harbor	5		0.00%
	Other	77	85	110.39%
NC	Beaufort	16	15	93.75%
	Belhaven	5	5	100.00%
	Engelhard	4	4	100.00%
	Lowland	7	7	100.00%
	New Bern	5	4	80.00%
	Oriental	12	12	100.00%
	Swan Quarter	6		0.00%
	Vandemere	10	10	100.00%
	Wanchese	30	28	93.33%
	Other	19	17	89.47%
NH	Hampton	22	16	72.73%
	Newington	4	4	100.00%
	Portsmouth	38	33	86.84%
	Rye	19	13	68.42%
	Seabrook	21	17	80.95%
	Other	6	2	33.33%

<b>State</b>	<b>Primary Port</b>	<b>Vessels</b>	<b>Vessels with monkfish landings</b>	<b>Percent of all vessels with monkfish landings</b>
<b>NJ</b>	Atlantic City	11	11	100.00%
	Barnegat Light	34	34	100.00%
	Belford	29	23	79.31%
	Brielle	4		0.00%
	Cape May	68	62	91.18%
	Point Pleasant	35	32	91.43%
	Point Pleasant Beach	4	4	100.00%
	Sea Isle City	4	4	100.00%
	Wildwood	7	7	100.00%
	Other	22	17	77.27%
<b>NY</b>	Freeport	14	7	50.00%
	Greenport	11	11	100.00%
	Hampton Bays	19	17	89.47%
	Mattituck	4	4	100.00%
	Montauk	72	42	58.33%
	New York	24	23	95.83%
	Point Lookout	6	6	100.00%
	Shinnecock	35	30	85.71%
	Other	26	18	69.23%
<b>PA</b>	Philadelphia	5	4	80.00%
<b>RI</b>	Galilee	12	7	58.33%
	Little Compton	6	5	83.33%
	Narragansett	14	11	78.57%
	Newport	36	26	72.22%
	Point Judith	118	101	85.59%
	Sakonnet Point	7	6	85.71%
	Tiverton	4	4	100.00%
	Other	22	14	63.64%
<b>VA</b>	Chincoteague	10	9	90.00%
	Hampton	42	40	95.24%
	Newport News	37	37	100.00%
	Norfolk	14	14	100.00%
	Seaford	24	24	100.00%
	Other	4	4	100.00%
<b>WV</b>	Other			

Of the 2,680 vessels that could be affected by the Monkfish FMP, 2,236 hold Northeast Region (NER) permits. Conversely, of the 2,123 vessels with monkfish landings, 1,696 hold NER permits. Since there are no fees for acquiring and renewing most Northeast permits and only an \$18 annual fee for tuna permits, many vessel owners have historically held a wide variety of permits, even in fisheries they do not normally prosecute. Holding multiple permits is a way of keeping their options open. With the advent of logbooks in the multispecies, scallop, fluke, and lobster fisheries and the requirement that a monthly report be filed even if the vessel is not currently engaged in that fishery (a so-called negative report simply notes that no fish were caught under that FMP), some vessel owners have allowed permits to lapse that they are not actively fishing. Overall, the NMFS estimates that historically only half to two-thirds of all permits were being fished at a given time, though this percentage may now be increasing as Monkfish FMP

inactive permits are not renewed. The landings pattern of these vessels is discussed below. Permit data, however, indicate what fisheries are current options for vessels that could be affected by the Monkfish FMP.

Table 35 and Table 36 show the types and combinations of permits held by the potentially affected vessels. In addition, there are different categories possible under each of these permits. For all vessels holding permits, for instance, of the 1,972 multispecies permits held, only 1,640 are limited access day-at-sea permits. Of the 1,581 sea scallop permits held, only 295 are limited access day-at-sea permits. Of the 984 summer flounder permits, 86 are recreational-only and 898 are commercial-only or commercial and recreational. On the other hand, all but three of the 1,500 lobster permits are commercial-only or commercial and recreational. For Squid-Mackerel-Butterfish, 88 are recreational-only and 1,249 commercial-only or commercial and recreational.

The most common combinations of permits held are: 1) all 8 permits, 2) Multispecies, Lobster, Scallop, and Tuna, 3) Multispecies, Lobster, Scallop, Tuna, and Squid-Mackerel-Butterfish, 4) Multispecies, Lobster and Tuna, and 5) Multispecies, Lobster, Scallop, Tuna, Squid-Mackerel-Butterfish, and Summer Flounder. Of the fisheries in these combinations, almost all are under limited access and most are under increasingly restrictive catch and/or effort regulations. Effort may shift to fisheries not yet under federal management or to non-fishing activities.

For the 1,418 vessels with multispecies permits, the majority (1,108) are limited access day-at-sea permits. Of the 843 summer flounder permits, 22 are recreational-only and 821 are commercial-only or commercial and recreational. On the other hand, all but 2 of the 1180 lobster permits are commercial-only or commercial and recreational. For Squid-Mackerel-Butterfish, 15 are recreational-only and 1,050 commercial-only or commercial and recreational.

For these vessels, the most common combinations of permits held are similar: 1) all 8 permits, 2) Multispecies, Scallop, Lobster, Tuna, Squid-Mackerel-Butterfish, 3) Multispecies, Lobster, Scallop, Tuna, 4) Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Tuna, Summer Flounder, and 5) all but Tuna. For vessels holding most of these permits, there is relatively little opportunity to increase fishing effort to compensate for the monkfish management measures.

**Table 35.** 1997 permits held by potentially affected vessels. The total number of permits is higher than total number of vessels, since many vessels hold more than one permit.

Permit group	Northeast permits held	Number of vessels	Percent
Individual permits	Multispecies	1973	19%
	Sea scallop	1582	15%
	Summer flounder	984	9%
	Lobster	1500	14%
	Squid-Mackerel-Butterfish	1338	13%
	Scup	795	8%
	Black Sea Bass	595	6%
	Tuna	1609	16%
Combinations with 50 or more vessels	Tuna only	65	3%
	All 8 permits	225	9%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Tuna	155	6%
	Multispecies, Lobster, Scallop, Tuna	156	6%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Scup, Summer flounder, Tuna	92	3%

Permit group	Northeast permits held	Number of vessels	Percent
	Multispecies, Lobster, Tuna	103	4%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Black sea bass, Scup, Summer flounder	74	3%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Summer Flounder, Tuna	98	4%
	Multispecies and Tuna	80	3%
	Multispecies, Scallop, Lobster, Summer flounder, Tuna	50	2%
	Multispecies, Scallop, Lobster	55	2%
	Multispecies, Scallop, Tuna	63	6%
	Multispecies, Scallop, Lobster, and Squid-Mackerel-Butterfish	50	2%

**Table 36.** 1997 permits held by potentially affected vessels that also landed monkfish 1991-1997. The total number of permits is higher than total number of vessels, since many vessels hold more than one permit.

Permit group	Northeast Region Permits held	Number of Vessels	Percent
Individual permits	Multispecies	1418	17%
	Sea scallop	1327	16%
	Summer flounder	843	10%
	Lobster	1180	14%
	Squid-Mackerel-Butterfish	1065	13%
	Scup	634	8%
	Black Sea Bass	483	6%
	Tuna	1207	15%
Combinations of 50 or more vessels	Tuna only	65	3%
	All 8 permits	217	10%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Tuna	123	6%
	Multispecies, Lobster, Scallop, Tuna	112	5%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Scup, Summer flounder, Tuna	86	4%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Black sea bass, Scup, Summer flounder	68	3%
	Multispecies, Scallop, Lobster, Squid-Mackerel-Butterfish, Summer Flounder, Tuna	93	5%

A slightly different picture is shown in Table 37, which illustrates not which, but how many permits are held by these vessels. While the largest single group (427) was those vessels holding no 1997 permits, this means that 2,253 vessels have 1997 permits. Of these, few people hold one permit only or all permits. Most have some combination in between, usually 3 to 5 permits. Those with landings follow a similar pattern.

**Table 37.** Number of Northeast region (NER) permits held by vessels that landed monkfish during 1991-1997 or had multispecies or scallop permits in 1997.

Number of permits held	Number of vessels, with 1991-1997 monkfish landings			
	Number of vessels	Percent	landings	Percent
0	427	15.9	426	20.1
1	137	5.1	128	6
2	255	8.4	136	6.4
3	360	13.4	213	10
4	387	14.4	269	12.7
5	397	14.8	307	14.5
6	285	10.6	218	10.3
7	238	8.9	209	9.8
8	225	8.4	217	10.2

#### 6.4.5.5.1 Distributions by Vessel Size

Smaller vessels are the most likely to have a multispecies permit (Table 38), especially a multispecies day-at-sea permit. By contrast, larger vessels are more likely to have scallop permits (except for the 101+ ft vessels, which is nearly as low as the frequency of 0-10 ft vessels, about 30%). For limited access day-at-sea scallop permits, especially, the larger vessels predominate. The 101+ ft vessels are the most likely to have such a permit, followed by the 61-100 ft vessels. In addition, from 1994-1996 multispecies limited access vessels under 45 ft and since 1996 vessels less than 30 ft were exempt from days-at-sea regulations. This may have created some incentive for smaller vessels in that fishery.

Summer flounder permits are most common on vessels 46-100 ft (Table 38). About half of all but the largest and the smallest vessels have lobster permits. Vessels 61-100 ft are the most likely to have Squid-Mackerel-Butterfish permits. Only a third at most of all but the largest and smallest vessels has a Scup permit, with Black Sea Bass being less common. Tuna permits are most common on smaller vessels, with all categories but the 101+ ft having a 50-70% possession rate. The vessels least likely to have any 1997 permit at all are the largest vessels (101+ ft), but in general smaller vessels are more likely to have at least one permit.

By tonnage (Table 39), the least likely to have a multispecies permit are the 51-150 GRT vessels. Smaller and larger vessels are nearly double the number of this intermediate size vessel. For limited access day-at-sea vessels, however, only the smaller (0-50 GRT) vessels predominate, although these vessels may be less active than the larger counterparts. For multispecies permits, the number of vessels holding a permit declines with size of the vessel. Conversely, the number of scallop permits increases with vessel size. This trend is even more striking for limited access day-at-sea permits. The number of summer flounder permits also rises with vessel size, with 63% of 151+ GRT vessels having a summer flounder permit versus 65 of 0-4 GRT vessels. All but the very largest and very smallest lobster vessels have about a 50% possession rate. Squid-Mackerel-Butterfish permits follow the scallop and fluke patterns, frequencies rising from 24% to 55% with increasing vessel size. Scup and Black Sea Bass follow this pattern too, except that vessels with scup and black sea bass permits are lower for largest tonnage category. For tuna permits, larger vessels are the less likely to have a permit, though all vessel categories have a 45-65% possession rate. The smallest (0-50 GRT) and largest (151+ GRT) vessels have few tuna permits, about 15-25% of the total number of permits.

**Table 38.** Number of 1997 permits held by vessel length.

<b>Length</b>	<b>Vessels</b>	<b>Multisp (DAS)</b>	<b>Scallop (DAS)</b>	<b>Fluke</b>	<b>Lobster</b>	<b>Squid/ Mackerel/ Butterfish</b>	<b>Scup</b>	<b>Black Sea Bass</b>	<b>Tuna</b>	<b>None</b>
0-30 ft	185	135 (135)	44 (0)	21	44	58	32	18	124	32
31-45 ft	1122	809 (804)	546 (6)	171	593	423	192	130	682	207
46-60 ft	414	288 (284)	241 (6)	166	225	188	138	74	234	90
61-100 ft	936	601 (414)	598 (273)	531	499	508	341	277	417	238
101+ ft	43	17 (11)	17 (10)	13	11	13	9	6	13	20
Unknown	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Table 39.** Number of 1997 permits held by vessel tonnage.

<b>Tonnage</b>	<b>Vessels</b>	<b>Multisp (DAS)</b>	<b>Scallop (DAS)</b>	<b>Fluke</b>	<b>Lobster</b>	<b>Squid/ Mackerel/ Butterfish</b>	<b>Scup</b>	<b>Black Sea Bass</b>	<b>Tuna</b>	<b>None</b>
0-4 GRT	129	90 (89)	32 (1)	8	31	31	12	10	84	21
5-50 GRT	1516	1083 (1073)	746 (12)	316	789	598	319	193	909	297
51-100 GRT	371	232 (204)	203 (42)	163	171	184	144	101	170	109
101-150 GRT	383	240 (172)	249 (102)	226	210	210	152	123	173	95
151+ GRT	302	205 (110)	216 (138)	189	171	167	85	78	134	66
Unknown	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

#### 6.4.5.5.2 Distributions by Port

Table 40 shows average length and tonnage by home port state on 1997 permit applications, while Table 41 shows these characteristics by primary port state. In both cases, the states in the southern range tend to have the largest vessels while the New England states have the smallest. Within each state, of course, there is also variation by port. Larger more urban ports often have larger vessels, while smaller and rural ports are more likely to have smaller vessels.

**Table 40.** Average vessel size reported on 1997 permit applications by home port.

State	Vessels	Average length	Standard Deviation	Average tonnage	Standard Deviation
CT	23	41	14	30	40
DE	14	64	22	93	68
FL	25	62	16	84	51
LA	3	60	15	57	23
MA	1291	51	21	55	60
MD	13	50	13	42	31
ME	259	46	13	34	42
NC	80	72	15	103	38
NH	88	41	10	19	17
NJ	134	61	23	83	69
NY	241	53	17	54	47
PA	70	69	22	98	67
RI	126	57	19	66	55
VA	131	74	13	120	47
WV	32	53	17	52	47
Other	8	N/A	N/A	N/A	N/A
Unknown	166	N/A	N/A	N/A	N/A

**Table 41.** Average vessel size reported on 1997 permit applications by primary port. Numbers in parentheses are the number of multispecies and scallop limited access day-at-sea permits.

State	Vessels	Average length	Standard Deviation	Average tonnage	Standard Deviation
AL	4	84	8	141	47
CT	38	54	21	65	62
DE	7	43	16	25	29
FL	13	62	16	81	49
LA	3	62	17	92	80
MA	1098	51	21	56	62
MD	25	57	17	56	51
ME	402	47	16	40	44
NC	93	72	14	108	39
NH	105	43	13	23	23
NJ	198	62	22	81	66
NY	195	50	16	50	45
PA	5	68	16	104	59
RI	209	56	21	66	57

<b>State</b>	<b>Vessels</b>	<b>Average length</b>	<b>Standard Deviation</b>	<b>Average tonnage</b>	<b>Standard Deviation</b>
VA	121	75	12	125	44
WV	3	54	26	78	104
Other	2	N/A	N/A	N/A	N/A
Unknown	185	N/A	N/A	N/A	N/A

Massachusetts has the largest number of permits in each fishery (Table 42 and Table 43). In general, Maine and New York follow, except for certain more southern fisheries like scup and black sea bass where Maine has very few permits. Rhode Island ranks higher by primary port than by home port. The fewest permits are found in Louisiana, Delaware, Florida and Connecticut. Also interesting is that the number of vessels with no permits follows the same pattern. Apparently, the broad distribution of permits follows the general distribution of vessels, rather than a strong difference across states by permitted fishery. The fact of multiple permit holdings probably contributes to this pattern too.

**Table 42.** 1997 permits issued to vessels by home port state. Numbers in parentheses are the number of multispecies and scallop limited access day-at-sea permits.

State	Vessels	Multisp (DAS)	Scallop (DAS)	Fluke	Lobster	Squid/ Mackerel/ Butterfish	Scup	Black Sea Bass	Tuna	None
CT	23	20 (20)	9 (0)	12	11	14	12	8	20	1
DE	14	5 (4)	4 (2)	4	5	5	2	1	5	6
FL	25	7 (3)	11 (9)	10	4	6	5	4	8	8
LA	3	0 (0)	0 (0)	0	0	0	0	0	2	2
MA	1291	1025 (956)	757 (99)	387	755	587	267	135	786	169
MD	13	5 (5)	4 (2)	4	3	3	3	4	4	6
ME	259	171 (163)	142 (9)	20	130	77	6	1	150	58
NC	80	49 (21)	50 (35)	49	27	46	43	37	20	25
NH	88	68 (68)	49 (0)	11	54	37	5	2	62	8
NJ	134	80 (53)	69(31)	67	60	65	57	56	73	37
NY	241	191 (188)	132 (5)	149	133	164	162	130	146	29
PA	70	35 (25)	27 (15)	25	25	25	19	19	33	25
RI	126	96 (96)	70 (1)	64	89	81	76	57	82	18
VA	131	65 (19)	91 (80)	86	50	57	42	42	52	31
WV	32	30 (26)	28 (4)	12	25	20	10	6	25	0
Other	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unknown	166	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Table 43.** 1997 permits issued to vessels by primary port state. Numbers in parentheses are the number of multispecies and scallop limited access day-at-sea permits

State	Vessels	Multisp (DAS)	Scallop (DAS)	Fluke	Lobster	Squid/ Mackerel/ Butterfish	Scup	Black Sea Bass	Tuna	None
AL	4	1(1)	1(1)	1	1	1	0	0	1	1
CT	38	35 (32)	26 (5)	28	24	30	26	20	29	2
DE	7	2 (2)	1 (0)	1	2	2	2	1	4	3
FL	13	2 (0)	5 (5)	4	1	1	1	0	6	2
LA	3	0 (0)	0 (0)	0	0	0	0	0	1	2
MA	1098	876 (807)	644 (96)	336	651	500	211	103	662	142
MD	25	9 (9)	7 (2)	7	5	5	5	6	4	13
ME	402	285 (276)	234 (12)	36	204	125	18	4	244	75
NC	93	60 (23)	60 (45)	59	33	54	53	43	22	27
NH	105	79 (79)	55 (0)	16	62	44	6	2	75	10
NJ	198	118 (87)	97 (40)	96	92	94	80	80	102	53
NY	195	153 (153)	101 (0)	120	102	131	133	104	120	24
PA	5	5 (2)	4 (3)	3	3	3	3	1	5	0
RI	209	161 (160)	118 (4)	111	142	140	135	99	136	28
VA	121	59 (13)	89 (82)	83	46	57	37	42	52	25
WV	3	3 (3)	3 (0)	0	3	2	0	0	3	0
Other	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unknown	185	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

#### 6.4.5.5.3 Distribution of Landings

Overall, monkfish forms a relatively small portion of the earnings of most vessels that landed monkfish during this 1994-1997 (Table 44). In many cases, though, that small fraction may nonetheless be critical to financial viability. The data also show a slow but steady increase in financial dependence on monkfish, either due to increases in monkfish landings or decreases in landings of other species. Ninety vessels targeted monkfish in 1994 (defined in the FMP as 30% of annual fishing income derived from monkfish), but differs from the per trip definition used in the Regulatory Flexibility Analysis (Section 1.1); 131 in 1995; 126 in 1996; and 126 in 1997. Thus, dependence has risen, but plateaued since 1995.

**Table 44.** Number of vessels ranked by the proportion of total revenue derived from monkfish landings, 1994-1997.  
Source: NMFS dealer data.

Proportion of total revenue from monkfish	1994	1995	1996	1997
10%	1036	994	976	922
20%	172	191	156	202
30%	64	86	67	74
40%	27	32	26	25
50%	17	20	28	19
60%	11	18	22	16
70%	9	13	13	13
80%	9	19	12	14
90%	9	14	12	17
100%	8	15	13	22
<b>TOTAL</b>	<b>1362</b>	<b>1402</b>	<b>1325</b>	<b>1324</b>

The highest ranked ports for monkfish revenue are Portland, New Bedford and Gloucester, and Point Judith (Table 45). Compared to the monkfish ports to primary ports reported on permit applications for vessels which landed monkfish (Table 30), the top ports with more than 100 permits is almost identical. The only difference is the addition of Chatham to the primary port list from permit data. In Chatham, the landings are lower than some other ports with fewer permitted vessels, such as Boston, Port Clyde, South Bristol, Cape May, Provincetown, and Newport.

**Table 45.** Monkfish revenue by port, 1994-1997. Top ports are bold-faced and ports with landings from less than three vessels are omitted. Numbered ports are coded, but had no association with a known municipality. Source: NMFS dealer data.

State	Port	1994	1995	1996	1997
<b>Maine</b>	Portland	3715602	4133101	4081832	3580267
	Rockland	98966	72306	68832	43253
	Bailey Island		104		
	Cundys Harbor		944		2006
	E. Harpswell				631
	Other Cumberland	5332		660	582
	Other Hancock	4363		5510	198
	Other Knox	11089	2429	5670	5631
	Other Lincoln	462	2270	3687	8506
	Other Sagahadoc	8604	96	280	
	Other Washington		397	446	3192
	Other York				68

<b>State</b>	<b>Port</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>
Maine	Port Clyde	215676	144135	168778	192475
	Sprucehead			2759	
	Bar Harbor	65197	27207	23377	29668
	Bass Harbor	76628	23759	17077	6323
	Southwest Harbor	11487	17885	7178	
	Stonington	20836	10143	6965	4031
	Sunshine/Deer Isle				78
	Winter Harbor	19444	2945	2305	711
	224107			374	
	Boothbay Harbor	48364	11563	10667	9211
	Medomak			516	
	New Harbor		1279	142	
	S. Bristol	197924	193112	151923	124724
	Five Islands		49	313	
	Phippsburg		9710	827	
	Sebasco Estates		943	2117	6001
	Small Point			10	876
	Jonesport	1387	2837	73	
	Milbridge		535	664	
	Camp Ellis	2161	1287	2287	4251
	Cape Porpoise	50	2146		2173
	Kennebunkport	24502	16352	1179	36
	Kittery	7081	1245		1247
	York	25493	492	250	6268
	York Harbor		8347	10503	34495
<b>Maryland</b>	Ocean City	89903	406365	423572	541444
<b>Massachusetts</b>	Boston	1079769	1985802	1459450	1433692
	Gloucester	1884992	2424917	1808711	1048341
	Chatham	235517	300622	209168	159216
	New Bedford	8286561	12646811	10054157	11607996
	Plymouth	25376	72164	43937	34495
	Provincetown	171586	166682	89648	47033
	Sandwich	4944	1335	466	33
	Scituate	54804	77430	55074	58778
	Other Mass./Hyannis	28266	8172	43800	18346
	Other Mass./Fall River	2168126	1285644	962155	333514
	Other Mass./Vineyard Haven	5204	456	257	1505
	Other Mass./Nantucket	682	591	670	14812
	Other Mass./Manomet	4518			
	Other Mass.		10070	48573	417
	Falmouth	71	2446	79614	515
	Rockport		36348	29021	36217
	Dartmouth				13190
	Other Mass./Woods Hole	2199			1177
	Other Mass./Westport	269092	785041	576407	514790
	Other Mass./Newburyport	32922	26244	75494	20113
	Other Mass./Harwichport	285	489	230	742
	Marblehead	4423	198539	79428	17077

<b>State</b>	<b>Port</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>
<b>New Hampshire</b>	New Hampshire	353	11782	12912	261
	Portsmouth	327331	693945	752120	744220
	Hampton/Seabrook	26091	20869	38874	48905
	Rye	28509	14014		8013
	Great Bay	3	15		
<b>New Jersey</b>	Pt. Pleasant	168812	456722	537935	1299193
	Atlantic City		2893	1576	64
	Cape May	449031	443055	456482	595942
	Wildwood	471	1377	67	19000
	Other Burlington				10469
	Other Atlantic	77319			
	Other Bergen		12892	4464	34195
	Other Monmouth				871
	Other Ocean	14989	60377	2469	27290
	Belford	14787	15622	9060	11042
	Long Beach	610926	1409235	1352167	1495658
<b>New York</b>	Brooklyn	7617	352	15971	660
	Freeport	14882	49732	29451	92123
	Islip	1742		19948	
	Greenport	7015	42598	40160	111911
	Montauk	20839	64016	91283	130663
	Hampton Bay	21382	145910	561499	655344
	Other Suffolk	339	34041	8315	70348
	Other New York				71629
	Mattituck	22			8
<b>North Carolina</b>	360109				9022
	360127				8191
	360209				34517
	360219				379422
	360537				2519
	Other Carteret				527
	Other Dare				39765
	Other Hyde				539
	Other Pamlico				415
<b>Rhode Island</b>	Newport	723307	436044	458397	676926
	Pt. Judith	1671337	2268301	3270548	4189787
	Tiverton				30175
	Other Newport	875530	1271809	772741	818550
	Other Washington	12694			
	421109			26	
	421209		61093		80
	421109		6		
	421209			36738	
	421409				12741
	421509		2171	54541	219
	421605				391
	421805				234714
<b>Virginia</b>	Hampton	198379	569144	288318	286747

State	Port	1994	1995	1996	1997
	Norfolk	32266	6507	3113	3572
	Chincoteague	2975	16558	43075	23930
	City of Seaford				189918
	Newport News	153257	274402	312537	363451
	Other York	61498	39517	111643	41795
	Other Virginia		303		

Most monkfish revenue comes from vessels using otter trawls, scallop dredges, and gillnets (Table 46), a pattern that has remained constant for the last four years. Table 47 shows the primary gears used by vessels to land monkfish. If a vessel landed over 50% of monkfish (live weight) with one type of gear, the trip was classified by the vessel's primary gear on that trip. There were 1,609 vessels classified by this manner. Bottom trawl, scallop dredge and gillnet are the largest gear categories using this type of classification.

**Table 46.** Total revenue and percent monkfish landings by gear type, 1994-1997. Source: NMFS vessel trip reports.

Gear Type	1994		1995		1996		1997	
	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
<b>Surf Clam Dredge</b>	1832	0.01%	14683	0.04%	5484	0.02%	2577	0.01%
<b>Fish Pot</b>					2400	0.01%		
<b>Fish Bottom Trawl</b>	12857198	52.66%	18368446	54.79%	16381360	54.81%	17106289	53.09%
<b>Bottom Trawl, Other</b>			29294	0.09%	12123	0.04%	2032	0.01%
<b>Midwater Trawl</b>					2614	0.01%		
<b>Gillnet</b>	4977199	20.39%	7871488	23.48%	6906505	23.11%	6890082	21.39%
<b>Coastal Gillnet</b>	8315	0.03%	253914	0.76%	964911	3.23%	1083436	3.36%
<b>Handline, Other</b>	823		726		1048		4238	0.01%
<b>Longline</b>	495	0.00%	8819	0.03%	99	0.00%		
<b>Line Trawl</b>	36599	0.15%	30491	0.09%	51845	0.17%	17944	0.06%
<b>Floating Trap</b>	455	0.00%	402	0.00%				
<b>Inshore Lobster Pot</b>			26864	0.08%	15354	0.05%	13116	0.04%
<b>Offshore Lobster Pot</b>					5284	0.02%	3244	0.01%
<b>Scallop Dredge</b>	6308914	25.84%	6669613	19.89%	5424328	18.15%	6610062	20.52%
<b>Pair Trawl</b>	274	0.00%	390	0.00%				
<b>Scallop Trawl</b>	29700	0.12%	81330	0.24%	87008	0.29%	116658	0.36%
<b>Shrimp Trawl</b>	5363	0.02%	8010	0.02%	18993	0.06%	41049	0.13%
<b>Beam Trawl, Other</b>	173715	0.71%	136085	0.41%				
<b>Beam Trawl, Shrimp</b>	1436	0.01%	1934	0.01%				
<b>Scottish Seine</b>					600	0.00%		
<b>Danish Seine</b>	3614	0.01%	2393	0.01%	826	0.00%		
<b>Other</b>	7660	0.03%	22867	0.07%	9156	0.03%	327619	1.02%
<b>TOTAL</b>	24413592	100%	33527749	100%	29889938	100%	32218346	100%

**Table 47.** Number of monkfish trips by primary gear, 1994-1997. Source: NMFS vessel trip reports. Only gears with 20 or more instances of being primary gear for a vessel are shown.

Gear Type	1994	1995	1996	1997
	N=1282	N=1323	N=1250	N=1256
Surf Clam Dredge	6	27	14	6
Fish Bottom Trawl	744	731	667	675
Gillnet	251	273	269	278
Longline	62	52	35	48
Scallop Dredge	183	180	184	185
Scallop Trawl	12	18	20	20

Table 48 shows monkfish revenue by gear and limited access category. These data are summarized by vessels that held a multispecies limited access day-at-sea permit but not a scallop limited access day-at-sea permit (Multisp. DAS only), vessels that held a scallop limited access day-at-sea permit but not a multispecies limited access day-at-sea permit (Scallop DAS only), vessels that held both permits, and vessels that held neither permit. For otter trawls, gillnets, and longlines, the most monkfish revenue was from vessels that held only Multispecies day-at-sea permits. For scallop dredge and scallop trawls, the highest monkfish revenue came from vessels with scallop limited access day-at-sea permits only. Nonetheless, the highest dependence on monkfish revenue was for otter trawls and scallop dredges. For vessels using gillnets, monkfish revenue for Multispecies only vessels were slightly higher than for the vessels that held neither permit. This pattern is similar to the ‘Other’ category.

Table 49 shows monkfish revenue by gear and tonnage. For otter trawls, the highest monkfish revenue comes from larger vessels (100 GRT or more). Reflecting the smaller vessels that use gillnets, the highest monkfish revenue comes from the 5-50 GRT category. Most scallop dredge revenue comes from larger vessels, while scallop trawl revenue is highest for the 100-150 GRT vessels. The highest average revenue per trip is for larger otter trawl and scallop dredge vessels. For gillnets and ‘other’ vessels, the highest monkfish revenue is in the 51-100 GRT category. Scallop trawls in the 100-151 GRT category have the highest average monkfish revenues.

**Table 48.** Monkfish revenue during 1997 by gear and limited access permit category. Source: NMFS dealer data.

Gear	Permits	Percent of monkfish revenues	Average monkfish revenue (\$ per trip)	Monkfish trips
Fish Trawl	Multisp. DAS Only	44.72%	477	16207
	Scallop DAS Only	0.65%	267	291
	Multisp & Scallop DAS	2.82%	1001	422
	Neither	4.25%	323	1370
Gillnet	Multisp. DAS Only	17.22%	467	9521
	Scallop DAS Only	0.00%	8	10
	Multisp & Scallop DAS	0.00%	0	0
	Neither	5.11%	502	2103
Scallop	Multisp. DAS Only	0.17%	155	12
	Scallop DAS Only	15.93%	2495	1700
	Multisp & Scallop DAS	3.84%	3135	310
	Neither	0.33%	99	33
Dredge	Multisp. DAS Only	0.01%	1765	1
	Scallop DAS Only	0.26%	313	208
	Multisp & Scallop DAS	0.09%	655	33
	Neither	0.00%	155	3
Scallop Trawl	Multisp. DAS Only	0.05%	5	435
Longline/Li	Multisp. DAS Only	0.05%	5	435

Gear	Permits	Percent of monkfish revenues	Average monkfish revenue (\$) per trip	Monkfish trips
Otter Trawl	Scallop DAS Only	0.00%	4	7
	Multisp & Scallop DAS	0.00%	0	0
	Neither	0.01%	2	25
Other	Multisp. DAS Only	1.07%	20	383
	Scallop DAS Only	0.06%	51	19
	Multisp & Scallop DAS	0.00%	<1	2
	Neither	3.40%	53	832

**Table 49.** Monkfish revenue during 1997 by gear and vessel size. Source: NMFS dealer and permit data. The number of permits exceeds the number of vessels, because many vessels hold more than one permit.

Gear	Permits	Percent of monkfish revenues	Average monkfish revenue (\$) per trip	Monkfish trips
Fish Trawl	0-4 GRT	0.03%	48	453
	5-50 GRT	3.64%	86	5495
	51-100 GRT	8.24%	214	6526
	101-150 GRT	19.77%	1025	3967
	151+ GRT	20.76%	2006	2187
Gillnet	0-4 GRT	0.11%	76	289
	5-50 GRT	17.15%	424	10352
	51-100 GRT	4.89%	1299	965
	101-150 GRT	0.12%	1013	9
	151+ GRT	0.06%	204	19
Scallop Dredge	0-4 GRT	0.00%	0	0
	5-50 GRT	0.18%	128	22
	51-100 GRT	0.60%	889	129
	101-150 GRT	4.35%	1749	631
	151+ GRT	15.15%	3350	1273
Scallop Trawl	0-4 GRT	0.00%	0	0
	5-50 GRT	0.00%	0	0
	51-100 GRT	0.07%	263	65
	101-150 GRT	0.26%	417	155
	151+ GRT	0.03%	287	25
Longline/Line Trawl	0-4 GRT	0.00%	<1	7
	5-50 GRT	0.02%	2	365
	51-100 GRT	0.03%	24	75
	101-150 GRT	0.00%	8	19
	151+ GRT	0.00%	3	1
Other	0-4 GRT	0.00%	<1	12
	5-50 GRT	2.31%	50	901
	51-100 GRT	1.24%	89	199
	101-150 GRT	0.40%	65	76
	151+ GRT	0.59%	70	48

The gear group most dependent on monkfish revenue is gillnet vessels, followed by otter trawls (Table 50). Overall, 28% of gillnet revenue came from monkfish in 1997. Both gillnet and otter trawl vessels have multiple

species upon which they depend heavily, as opposed to scallop vessels that rely very heavily on scallop revenue (greater than 90% of total revenue from all species landed).

**Table 50.** Percent of 1997 revenue from other species by vessels that landed monkfish. Source: NMFS dealer data.

Gear Type	10 Regulated		Sea Scallops	Small Mesh Groundfish	Other Species
	Monkfish	Large Mesh Groundfish			
Fish Trawl	11%	38%	1%	8%	43%
Gillnet	28%	47%	0%	<1%	25%
Longline/Line Trawl	<1%	21%	<1%	<1%	79%
Scallop Dredge	8%	<1%	91%	<1%	<1%
Scallop Trawl	3%	<1%	96%	<1%	1%
Other	1%	1%	1%	1%	97%

Total fishing effort on monkfish trips also varies by gear (Table 51- Table 53). Most gillnet vessels fished for monkfish for 1-30 days in each of the past four years. Scallop dredge fishing effort is more variable in the past four years, but shows an increase in the number of days fishing for monkfish during 1997 compared to the previous three years. Otter trawl vessels had a similar pattern to gillnet vessels, most vessels fishing for monkfish from 1-30 days per year.

These distributions are skewed to lower fishing effort and the averages are higher than the medians (Table 54). Scallop vessels have the highest averages, followed by otter trawls, scallop trawls, and then gillnets. Additionally, scallop dredge and trawl vessels show a constant increase in the average number of days on trips where monkfish were caught, while gillnets and otter trawls increased fishing effort for monkfish through 1996, followed by a slight decrease in 1997.

**Table 51.** Total annual fishing effort for vessels targeting monkfish with gillnets. Source: NMFS Vessel Trip Reports.

Days fishing for monkfish	Percent			
	1994	1995	1996	1997
1-10	41.8	39.9	37	42.5
11-20	15.8	15.8	16.1	17.3
21-30	9.5	7.9	9.4	7.3
31-40	7	5.7	3.6	7.3
41-50	7	4.4	5.2	7.8
51-60	2.5	6.6	3.1	3.4
61-70	5.1	3.5	3.1	2.8
71-80	2.5	3.1	7.3	1.1
81-90	3.2	1.8		4.5
91-100	0.06	2.2	4.7	
101-110	1.9	2.2	2.1	
111-120		2.2	1.6	
121-130	1.3		2.6	
131-140	1.3	1.8	1.6	
141-150	0.6	1.3	1.6	
151-160		0.9	0.5	
161-170		0.4	0.5	
171-365				

**Table 52.** Total annual fishing effort for vessels targeting monkfish with scallop dredges. Source: NMFS Vessel Trip Reports.

Days fishing for monkfish	Percent			
	1994	1995	1996	1997
1-10	5.3	8	3.6	4.7
11-20	15.1	8	10.4	6.7
21-30	13.1	9.1	2.6	2.6
31-40	10.5	4.8	5.2	3.6
41-50	10.5	7	6.8	2.6
51-60	5.3	4.8	3.1	6.2
61-70	4.6	6.4	2.6	5.2
71-80	5.3	4.8	5.7	8.3
81-90	6.6	2.7	7.3	5.2
91-100	3.3	4.8	7.8	5.7
101-110	3.9	4.8	3.6	6.7
111-120	2.6	3.7	3.6	8.8
121-130	2.6	4.8	7.3	5.2
131-140	2	4.8	3.6	8.3
141-150	4.6	6.4	7.3	7.3
151-160	0.7	4.8	3.1	2.6
161-170	3.3	3.2	4.2	2.6
171-180		1.6	2.6	3.6
181-190		1.6	1.6	0.5
191-200			2.6	
201-210		1.1	0.5	1
211-220			1	
221-230		1.6	1	
231-240		0.5	0.5	
241-250				1
251-260				
261-270				
271-280				
281-290			0.5	
291-300				
301-310			1	
311-320			0.5	
321-330				0.5
331-340				
341-350				0.5
351-365	0.7	0.5		0.5

**Table 53.** Total annual fishing effort for vessels targeting monkfish with otter trawls. Source: NMFS Vessel Trip Reports.

Days fishing for monkfish	Percent			
	1994	1995	1996	1997
1-10	27	20.1	20.9	21.2
11-20	11.7	14.4	12.5	13.6
21-30	10.5	11.6	11.3	10.4
31-40	7.8	7.9	5.6	6.1
41-50	6.2	8.1	5.2	6.2
51-60	6.3	5.1	4.4	5.7
61-70	5	4.1	3.9	6.6
71-80	4.4	2.8	4.8	3.7
81-90	4	3.3	3.5	2.9
91-100	4.5	2.7	2.7	3.3
101-110	2.8	3.1	3.1	3
111-120	3.3	2.3	3	2.5
121-130	1.9	2.5	2.3	2.1
131-140	1.5	1.8	3.4	2.8
141-150	1.1	2.2	1.8	1.4
151-160	0.4	1.5	1.8	1.9
161-170	0.6	1	2	1.4
171-180		1.5	1.7	1.5
181-190	0.3	1.1	1.2	0.4
191-200	0.3	0.9	1.4	1.4
201-210	0.1	0.1	0.7	0.3
211-220	0.1	0.6	0.4	0.4
221-230	0.3	0.5	0.8	0.6
231-240		0.4	0.7	
241-250				0.3
251-260		0.2	0.3	0.1
261-270		0.1	0.1	
271-280			0.1	0.1
281-290				
291-300			0.3	0.1
301-365				

**Table 54.** Average annual days absent by gear for trips where monkfish were landed. Source: NMFS Vessel Trip Reports.

Gear	1994	1995	1996	1997
Fish Trawl	45	55	63	57
Gillnet	28	34	37	29
Scallop Dredge	62	84	99	98
Scallop Trawl	24	30	33	59
Longline	14	12	16	17
Other	14	12	16	17

## **7.0 DESCRIPTION OF FISHERY IMPACTS**

Vessels that will be affected the most by the proposed management measures include those that historically targeted monkfish, but are not expected to qualify for a limited access monkfish permit. There are at least 331 vessels that targeted monkfish (greater than 30 percent of a trip's revenue came from monkfish landings) during 1995-1996 and are not expected to qualify for limited access. Since these vessels would not qualify, they would receive no days for targeting monkfish and could not exceed the applicable bycatch allowances. There are therefore three possible responses by vessels that would not qualify: shift fishing effort onto other species in fisheries that are open to the vessel, fish for monkfish without exceeding the bycatch limits, or reduce fishing activity.

The response by these 331 vessels is governed by the permits that the vessel holds (or are available to the vessel), the capability of the vessel and its equipment to function in another fishery, and the experience of the captain and crew in another fishery. The Fisheries Impact Statement addresses the likelihood of these highly-affected vessels to shift fishing effort into other fisheries. The ability for the vessel to continue fishing for monkfish without exceeding the monkfish bycatch limits and the likelihood of reducing fishing activity involves a radical change in behavior and is governed by economics. Predicting large changes in fishing behavior requires data, knowledge, and models that are not available.

This chapter therefore focuses on identifying which fisheries are most vulnerable to increases in fishing effort due to the effects of the Monkfish FMP. It augments the information presented in the description of the human environment (Section 6.4) that describes the various fisheries in terms of gear use and dependence on monkfish. The discussion below has a narrower focus, i.e. what is the likely effect on other fisheries by vessels that are displaced because they can no longer target monkfish. A much broader discussion of all vessels that catch monkfish is given in the Social Impact Analysis (Section 8.1.7).

### **7.1 Permit status**

About 2/3<sup>rd</sup>s of the vessels that have insufficient history to qualify for a limited access monkfish permit, but targeted monkfish during 1995-1996 have multispecies fleet days-at-sea and lobster commercial lobster permits (Table 55). Many multispecies vessels appear to have commercial lobster permits to land their incidental catch of lobsters when they are trawling for groundfish and other finfish. Some vessels also use trawls to target lobster and monkfish in the canyons and the edge of the continental shelf.

The next most frequent permit holdings by these vessels are summer flounder limited access, surf clam, ocean quahog, and the open-access squid/mackerel/butterfish permits (Table 55). About half of these vessels hold these permits, although the individual vessels hold different combinations of these permits. The number of vessels holding summer flounder permits reflects the overlap in the Mid-Atlantic large mesh fishery and the monkfish fishery. Similarly the number of vessels that hold squid/mackerel/butterfish permits also reflects the overlap between the Mid-Atlantic small mesh fishery and the monkfish fishery. In addition to the number of squid/mackerel/butterfish open access permits, there are also 67 vessels that hold Loligo/butterfish moratorium permits. The high number of vessels holding surf clam and ocean quahog permits is surprising, but it is not known how many of these vessels also own quota shares. Without owning or leasing quota shares, it would be impossible for these vessels to shift effort into the surf clam and ocean quahog fisheries, however. These permit characteristics are similar to the ones for vessels that are expected to qualify for a limited access monkfish permit, described in Section 4.1.2.

Based on permit-holdings only, it is most likely that the vessels that fish in the Gulf of Maine and Georges Bank will continue to fish in the multispecies fishery if they can no longer target monkfish. Some vessels may increase their utilization of their annual days-at-sea allocations to compensate for their inability to fish for monkfish. Others may be able to continue targeting monkfish and groundfish during their multispecies days if it is profitable to do so and comply with the 300 pounds tail-weight per day-at-sea trip limit. This response, however, is an intended outcome of the bycatch allowances selected by the Councils for the Northern Fishery Management Area, accommodating the traditional mixed-fishery while preventing the vessels from targeting exclusively monkfish outside of their multispecies days-at-sea.

In Southern New England and the Mid-Atlantic, the permit-holdings suggest that vessels that use large mesh may shift fishing effort into the summer flounder fishery. Summer flounder landings are however regulated by the Summer Flounder FMP. Instead of increasing fishing mortality on summer flounder, any shifts of fishing effort into this fishery would shorten the season or possibly require lower trip limits to extend the season in response to the increased fishing effort.

Based on permit-holdings, vessels that would not qualify for monkfish limited access and use small mesh are likely to shift effort into the squid/mackerel/butterfish and whiting fisheries in Southern New England and the Mid-Atlantic. Landings of squid, mackerel, and butterfish are controlled by a quota, while fishing effort for whiting will be regulated by a hake amendment to the Multispecies FMP, now under development.

**Table 55.** Northeast Region fishing permits held by vessels that targeted monkfish during 1995-1996, for vessels that are not expected to qualify for a limited access monkfish permit. Permit status is as of March 7, 1998. Source: NER permit data.

Permit	Number of vessels
Scup limited access	0
Scup charter/party	0
Summer flounder limited access	141
Summer flounder charter/party	4
Multispecies individual day-at-sea	8
Multispecies fleet day-at-sea	209
Multispecies small vessel	0
Multispecies hook	1
Multispecies combination	0
Multispecies large mesh individual day-at-sea	0
Multispecies large mesh fleet day-at-sea	3
Multispecies open-handgear	7
Multispecies open charter/party	1
Multispecies scallop possession limit	27
Multispecies non-regulated	13
Scallop general	0
Scallop limited access full time	31
Scallop limited access part time	6
Scallop limited access occasional	2
Scallop limited access full time small dredge	0
Scallop limited access part time small dredge	0
Lobster commercial	230
Lobster charter/party	1
Surf clam	160
Ocean quahog	137
Loligo/butterfish moratorium	67
Illex moratorium	2
Squid/mackerel/butterfish charter/party open	124
Squid/mackerel/butterfish incidental catch open	166
Mackerel open	8
Total vessels	331

Permit-holdings, however, only provide an indication of the propensity for displaced vessels to target other federally-regulated species. The discussion below examines this issue in greater detail by evaluating what these vessels caught when they were not targeting monkfish, i.e. the revenue from monkfish landings was less than 30 percent of the total trip revenue. The gear that vessels historically used and the areas fished determines the species that a vessel's catch in alternative fisheries. Both factors impose significant costs to the vessel if it were to switch gears or areas. In the first case, there are costs associated with modifying the vessel, purchasing new gear, and gaining experience using unfamiliar equipment. In the second case, there are costs associated with travelling to and from distant fishing grounds, finding dealers in remote ports to handle the vessel's landings, and fishing in unfamiliar waters. Landings of other species by these vessels therefore provide a reasonable indication of how these vessels would respond to limits on their ability to target monkfish.

## 7.2 Maine to New York

Most important in terms of landings of these vessels when targeting other species with trawls are regulated multispecies (3.7 million pounds live weight) and whiting (aka silver hake, 3.1 million pounds live weight, Table 56). These species groups accounted for 50 and 17 percent of the total value of trips by these vessels (Table 57), when they were targeting other species besides monkfish. About 95 percent by weight and 92 percent by value of these and other species are landed by vessels that have multispecies permits. Next in importance are monkfish and spiny dogfish. The former appears to come from the mixed-species fishery that includes monkfish and occurs in the Gulf of Maine, while the latter appears to come from a seasonal fishery off Massachusetts. Also notable are the landings of multispecies by vessels that do not have multispecies limited access permits. Some of these landings during 1995-1996 may have occurred from landings by vessels that had open-access multispecies permits, or by vessels that have since relinquished their multispecies limited access permit (either through the vessel capacity reduction program or because of other factors).

For vessels that used gillnets to target species other than monkfish, spiny dogfish (18.6 million pounds live weight, Table 58) was the most important alternative landings for these vessels that targeted monkfish during 1995-1996. The second-ranked species in terms of total landings on trips not targeting monkfish were regulated multispecies (5.1 million pounds live weight). These species groups accounted for 55 and 38 percent of the value on all trips not targeting monkfish (Table 59). As for vessels using trawls, vessels with multispecies permits accounted for about 95 percent of the total landings and value on trips not targeting monkfish. For vessels that had no NER permit as of March 1998, however, spiny dogfish was the most important alternative species, accounting for nearly 90 percent of landings (Table 58) and 60 percent of value (Table 59). Reflecting the small mesh fishery in Southern New England, vessels with squid/mackerel/butterfish permits, the most important species group in terms of value was multispecies, followed by spiny dogfish. Spiny dogfish landings were greater, but had lower value.

The most important species for vessels using scallop dredges were, of course, scallops. Scallops accounted for over 75 percent by weight (Table 60) and 93 percent by value (Table 61) of landings on trips targeting species other than monkfish. Most of the landings came from vessels that had multispecies permits, most likely those with combination multispecies permits and scallop permits. Even on these vessels, monkfish was a secondary contributor to landings, due to the amount of monkfish bycatch and incidental catch on trips targeting scallops.

**Table 56.** 1995-1996 landings of species in ME to NY, by permit and species on trips not targeting monkfish by vessels using trawls that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked in the following order to determine the highest ranking permit for each category of permit combinations: multispecies, sea scallops, summer flounder, lobster, squid/mackerel, surf clams/ocean quahogs, no Northeast region fisheries permit. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>11</sup>	Primary permit							Total
	Lobster	Multispecies	No permit	Scallop	Squid/Mackerel	Summer flounder	Surf Clam	
Unclassified		444						444
Black sea bass		33,204	349	1	45	22		33,621
Bluefish	22	114,100	150	64	90		36	114,462
Dogfish	82	397,388	794				1,260	399,524
Summer flounder	869	268,130	11,790	1,007	3,005	1,585		286,386
Herring		35,525			6		6	35,537
Lobster	2,931	30,633	688			24	3,114	37,390
Monkfish	3,563	416,356	51,300	21	1,935	221	919	474,315
Multispecies	41,886	3,314,244	291,402	72	4,341	11,358	26,734	3,690,037
Other Fish	271	144,367	11,345	15	1,525	66	490	158,079
Other Invertebrates	250	5,172	88		201		50	5,761
Scallops	2	1,994	25					2,021
Scup		174,773	286	1	6,047	954		182,061
Skates	472	186,967	7,781		52	242	715	196,229
SQM	152	1,361,460	34,934	1	41,416	64	120	1,438,147
Whiting	135	3,102,836	7,499		5,102	1,526	126	3,117,224
Total	50,635	9,587,593	418,431	1,182	63,765	16,062	33,570	10,171,238

<sup>11</sup> Groupings are as follows:

Multispecies includes cod, haddock, pollock, white hake, redfish, r&w hake, yellowtail, winter fl., witch, fl. windowpane, am plaice, fl. unc.

Bluefish includes bluefish, spot, croaker, and weakfish

Dogfish includes smooth and spiny dogfish

Herring includes Atlantic herring, shad, and menhaden

SQM includes Loligo, Illex, squid unclassified, at. mackerel, butterfish

Whiting includes silver hake, red hake, offshore hake, kingfish

Other Fish includes all other finfish

Other Invertebrates includes all other invertebrates.

**Table 57.** Percent of 1995-1996 revenue derived from landed species by vessels in ME to NY, by permit and species on trips not targeting monkfish by vessels using trawls that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>12</sup>	Primary permit								Total
	Lobster	Multispecies	No permit	Scallop	Squid/Mackerel	Summer flounder	Surf Clam		
Unclassified	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Black sea bass	0.00%	0.74%	0.08%	0.04%	0.13%	0.19%	0.00%	0.00%	0.69%
Bluefish	0.01%	0.64%	0.02%	1.07%	0.24%	0.00%	0.03%	0.00%	0.59%
Dogfish	0.02%	0.98%	0.04%	0.00%	0.00%	0.00%	0.84%	0.00%	0.91%
Fluke	2.82%	7.54%	5.34%	94.25%	15.64%	18.52%	0.00%	0.00%	7.43%
Herring	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.08%
Lobster	13.92%	1.36%	0.49%	0.00%	0.00%	0.27%	22.77%	0.00%	1.51%
Monkfish	7.33%	6.79%	13.34%	0.90%	5.29%	1.70%	3.83%	0.00%	7.12%
Multispecies	74.81%	48.73%	71.86%	2.96%	17.83%	71.21%	70.79%	0.00%	50.23%
Other Fish	0.30%	0.96%	1.65%	0.70%	1.34%	0.27%	0.47%	0.00%	0.99%
Other Invertebrates	0.19%	0.04%	0.01%	0.00%	0.11%	0.00%	0.07%	0.00%	0.04%
Scallops	0.02%	0.08%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%
Scup	0.00%	2.26%	0.11%	0.04%	6.38%	4.40%	0.00%	0.00%	2.13%
Skates	0.34%	1.12%	0.85%	0.00%	0.06%	0.53%	0.86%	0.00%	1.09%
SQMB	0.14%	10.86%	5.17%	0.04%	49.60%	0.15%	0.17%	0.00%	10.55%
Whiting	0.09%	17.83%	1.02%	0.00%	3.38%	2.76%	0.15%	0.00%	16.56%
Percent of total	0.82%	92.44%	5.53%	0.03%	0.45%	0.25%	0.49%	0.00%	100.00%

<sup>12</sup> See Table 56.

**Table 58.** 1995-1996 landings of species in ME to NY, by permit and species on trips not targeting monkfish by vessels using gillnets that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>13</sup>	Primary permit					Total
	Lobster	Multispecies	No permit	Squid/Mackerel	Surf Clam	
Black sea bass		27				27
Bluefish	661	337,097	10,529	1,000	2,619	351,906
Dogfish	71,570	16,912,006	759,508	139,156	700,385	18,582,625
Summer flounder		603	11			614
Herring		14,824	261	229	15	15,329
Lobster		4,871	59		522	5,452
Monkfish	702	275,189	15,143	4,758	3,051	298,843
Multispecies	5,848	4,956,247	67,165	62,529	18,254	5,110,043
Other Fish	66	97,151	3,126	2,420	204	102,967
Other Invertebrates		781		251		1,032
Scup		56				56
Skates	127	28,122	1,156	578	186	30,169
SQMB	10	66,428	3,645	223	805	71,111
Whiting	38	59,926	780	360	2,087	63,191
Total	79,022	22,753,328	861,383	211,504	728,128	24,633,365

<sup>13</sup> See Table 56.

**Table 59.** Percent of 1995-1996 revenue derived from landed species by vessels in ME to NY, by permit and species on trips not targeting monkfish by vessels using gillnets that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>14</sup>	Primary permit					Total
	Lobster	Multispecies	No permit	Squid/Mackerel	Surf Clam	
Black sea bass	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Bluefish	0.82%	1.11%	1.81%	0.40%	0.40%	1.11%
Dogfish	63.68%	36.93%	59.77%	26.40%	84.87%	38.33%
Summer flounder	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%
Herring	0.00%	0.04%	0.05%	0.07%	0.01%	0.04%
Lobster	0.00%	0.21%	0.09%	0.00%	1.10%	0.22%
Monkfish	3.62%	3.59%	6.27%	6.82%	2.36%	3.67%
Multispecies	31.22%	56.77%	30.65%	64.37%	10.25%	55.27%
Other Fish	0.11%	0.60%	0.62%	1.41%	0.07%	0.59%
Other Invertebrates	0.00%	0.00%	0.00%	0.04%	0.00%	0.00%
Scup	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Skates	0.46%	0.15%	0.23%	0.30%	0.06%	0.15%
SQMB	0.03%	0.30%	0.39%	0.07%	0.30%	0.30%
Whiting	0.06%	0.30%	0.11%	0.13%	0.58%	0.30%
Percent of total	0.19%	94.23%	2.62%	1.13%	1.83%	100.00%

<sup>14</sup> See Table 56.

**Table 60.** 1995-1996 landings of species in ME to NY, by permit and species on trips not targeting monkfish by vessels using scallop dredges that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>15</sup>	Primary permit			Total
	Multispecies	No permit	Scallop	
Summer flounder	1,235			1,235
Monkfish	123,739	10,268	4,478	138,485
Multispecies	15,798	547		16,345
Other Fish	128	36		164
Scallops	479,673	65,043	24,309	569,025
Skates	9			9
Total	620,582	75,894	28,787	725,263

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<sup>15</sup> See Table 56.

**Table 61.** Percent of 1995-1996 revenue derived from landed species by vessels in ME to NY, by permit and species on trips not targeting monkfish by vessels using scallop dredges that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>16</sup>	Primary permit			Total
	Multispecies	No permit	Scallop	
Summer flounder	0.05%	0.00%	0.00%	0.04%
Monkfish	6.50%	4.39%	5.31%	6.23%
Multispecies	0.59%	0.11%	0.00%	0.51%
Other Fish	0.00%	0.00%	0.00%	0.00%
Scallops	92.86%	95.50%	94.69%	93.21%
Skates	0.00%	0.00%	0.00%	0.00%
Percent of total	85.44%	10.46%	4.10%	100.00%

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<sup>16</sup> See Table 56.

## **7.3 New Jersey to Virginia**

For vessels that fish from NJ to VA with trawls, over 90 percent of the landings of alternative species come from vessels that have multispecies permits (Table 62). Even though landings by vessels with these permits predominate, most of the landings are of summer flounder (900 thousand pounds live weight) and squid/mackerel/butterfish (600 thousand pounds). These two species groups also contribute to 51 and 10 percent of the total landed revenue on trips targeting species other than monkfish (Table 63). Secondary in importance as alternative species to these vessels is scup, black sea bass, and dogfish. This mix of alternative species, when the vessels are not targeting monkfish reflect the type of fisheries that are available in the Mid-Atlantic, rather than their permit holdings. Even though the vessels hold multispecies permits, they appear to more frequently target other species and have summer flounder or squid/mackerel/butterfish permits. Although most of the remaining landings are from vessels with scallop permits, these vessels target summer flounder more frequently than vessels that hold multispecies permits. Over half of the landings and 66 percent of the value (Table 62 and Table 63) come from summer flounder on trips targeting species other than monkfish. These vessels may be scallop dredge vessels that also use trawls (they are not combination vessels, because they would have a multispecies permit) or scallop trawl vessels that target summer flounder seasonally. Landings are negligible of other species beside monkfish by vessels without NER permits.

When using gillnets, vessels pursued spiny dogfish when they didn't target monkfish. Over 85 percent of the landings were dogfish and most of the vessels landing species other than monkfish also had multispecies permits. Dogfish contributed to 75 percent of the value of the landings of alternative species (Table 65). Negligible landings on trips not targeting monkfish occurred for vessels that held summer flounder and surf clam permits. Dogfish landings also were a primary alternative species for vessels without NER permits (Table 64 and Table 65), but the landings of bluefish, spot, croaker, and weakfish were surprisingly low. It's possible that local dealers did not report the landings of these species, especially since the federal government does not regulate spot and croaker.

As expected, scallops were the most important alternative species for vessels that targeted monkfish and used dredges. Scallops contributed to nearly 85 percent of the poundage (Table 66) and 96 percent of the value (Table 67) of landings from trips targeting species other than monkfish. About 60 percent of the landings came from vessels that held multispecies permits during 1998, most probably combination boats. Some scallop landings were attributable to vessels without NER permits, and may represent 1995-1996 landings by combination vessels that were in the Vessel Capacity Reduction Program.

**Table 62.** 1995-1996 landings of species in NJ to VA, by permit and species on trips not targeting monkfish by vessels using trawls that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>17</sup>	Primary permit				Total
	Multispecies	No permit	Scallop	Summer flounder	
Black sea bass	98,654		19,144	4,373	122,171
Bluefish	31,621		1,611		33,232
Dogfish	188,449		63,100		251,549
Summer flounder	792,133	2,874	110,431	13,693	919,131
Herring	6,435				6,435
Lobster	2,774		89		2,863
Monkfish	59,982	396	8,339	818	69,535
Multispecies	123,513		693	29	124,235
Other Fish	34,857		2,000		36,857
Other Invertebrates	19,837		189		20,026
Scallops	13,428	204	5,520	67	19,219
Scup	192,778		1,454	7	194,239
Skates	12,020		61		12,081
SQMB	586,181		5,349	400	591,930
Whiting	415,300		55		415,355
Total	2,577,962	3,474	218,035	19,387	2,818,858

<sup>17</sup> See Table 56.

**Table 63.** Percent of 1995-1996 revenue derived from landed species by vessels in NJ to VA, by permit and species on trips not targeting monkfish by vessels using trawls that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>18</sup>	Primary permit				Total
	Multispecies	No permit	Scallop	Summer flounder	
Black sea bass	5.45%	0.00%	10.06%	21.19%	6.03%
Bluefish	0.70%	0.00%	0.19%	0.00%	0.65%
Dogfish	1.71%	0.00%	4.21%	0.00%	1.92%
Summer flounder	49.17%	70.08%	66.09%	73.07%	51.02%
Herring	0.05%	0.00%	0.00%	0.00%	0.04%
Lobster	0.54%	0.00%	0.14%	0.00%	0.49%
Monkfish	3.53%	9.16%	4.09%	3.59%	3.59%
Multispecies	6.96%	0.00%	0.23%	0.09%	6.25%
Other Fish	0.97%	0.00%	0.05%	0.00%	0.88%
Other Invertebrates	0.83%	0.00%	0.08%	0.00%	0.75%
Scallops	3.49%	20.76%	13.34%	1.40%	4.42%
Scup	6.17%	0.00%	0.79%	0.01%	5.60%
Skates	0.14%	0.00%	0.01%	0.00%	0.13%
SQMB	11.31%	0.00%	0.70%	0.65%	10.19%
Whiting	8.97%	0.00%	0.01%	0.00%	8.03%
Percent of total	89.52%	0.20%	9.25%	1.02%	100.00%

<sup>18</sup> See Table 56.

**Table 64.** 1995-1996 landings of species in NJ to VA, by permit and species on trips not targeting monkfish by vessels using gillnets that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>19</sup>	Primary permit					Total
	Multispecies	No permit	Summer flounder	Surf Clam		
Black sea bass	39			6		45
Bluefish	9,381	359	1,510			11,250
Dogfish	701,654	60,878	3,659	529		766,720
Summer flounder	153					153
Herring	3,990		661	6		4,657
Lobster	184	16		1		201
Monkfish	17,112	2,334	90	162		19,698
Multispecies	548	50				598
Other Fish	3,963	602	58	28		4,651
Other Invertebrates	2,839	115	1	18		2,973
Scup	7					7
Skates	15,400	455		46		15,901
SQMB	49,939	4,390	37	4,999		59,365
Whiting	28					28
Total	805,237	69,199	6,016	5,795		886,247

<sup>19</sup> See Table 56.

**Table 65.** Percent of 1995-1996 revenue derived from landed species by vessels in NJ to VA, by permit and species on trips not targeting monkfish by vessels using gillnets that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>20</sup>	Primary permit				Total
	Multispecies	No permit	Summer flounder	Surf Clam	
Black sea bass	0.02%	0.00%	0.00%	0.46%	0.02%
Bluefish	2.07%	0.60%	5.61%	0.00%	1.96%
Dogfish	75.24%	76.36%	54.73%	17.96%	74.83%
Summer flounder	0.13%	0.00%	0.00%	0.00%	0.12%
Herring	0.50%	0.00%	26.81%	0.38%	0.63%
Lobster	0.42%	0.42%	0.00%	0.31%	0.42%
Monkfish	10.28%	14.76%	6.94%	12.97%	10.65%
Multispecies	0.32%	0.27%	0.00%	0.00%	0.31%
Other Fish	1.90%	1.76%	5.39%	2.15%	1.91%
Other Invertebrates	0.73%	0.40%	0.07%	0.69%	0.69%
Scup	0.00%	0.00%	0.00%	0.00%	0.00%
Skates	4.19%	1.24%	0.00%	1.23%	3.90%
SQMB	4.20%	4.19%	0.44%	63.85%	4.56%
Whiting	0.01%	0.00%	0.00%	0.00%	0.01%
Percent of total	90.31%	8.38%	0.67%	0.64%	100.00%

<sup>20</sup> See Table 56.

**Table 66.** 1995-1996 landings of species in NJ to VA, by permit and species on trips not targeting monkfish by vessels using scallop dredges that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>21</sup>	Primary permit			Total
	Multispecies	No permit	Scallop	
Black sea bass		81	569	650
Summer flounder	36,272	8,716	17,918	62,906
Monkfish	166,728	18,461	99,847	285,036
Multispecies	1,405	15		1,420
Scallops	1,026,208	77,073	683,213	1,786,494
Scup			230	230
SQMB			825	825
Whiting	12			12
Total	1,230,625	104,346	802,602	2,137,573

<sup>21</sup> See Table 56.

**Table 67.** Percent of 1995-1996 revenue derived from landed species by vessels in NJ to VA, by permit and species on trips not targeting monkfish by vessels using scallop dredges that would not qualify for monkfish limited access. These vessels had at least one trip during 1995-1996 that targeted monkfish. Permits were ranked as in Table 56. Source: NMFS dealer data for 1996 and permit data as of March 1998.

Species <sup>22</sup>	Primary permit			Total
	Multispecies	No permit	Scallop	
Black sea bass	0.00%	0.02%	0.01%	0.00%
Summer flounder	0.74%	2.23%	0.56%	0.74%
Monkfish	3.49%	4.06%	2.44%	3.13%
Multispecies	0.02%	0.00%	0.00%	0.01%
Scallops	95.75%	93.69%	96.99%	96.10%
Scup	0.00%	0.00%	0.00%	0.00%
SQMB	0.00%	0.00%	0.01%	0.00%
Whiting	0.00%	0.00%	0.00%	0.00%
Percent of total	58.84%	4.72%	36.44%	100.00%

<sup>22</sup> See Table 56.

## **7.4 Conclusions**

### **7.4.1 Effort shifts caused by failure to qualify for monkfish limited access**

Shifts in fishing effort from the Monkfish FMP will most likely be greatest by vessels that targeted monkfish, but would not qualify for a limited access monkfish permit. Many of these vessels entered the monkfish fishery after the control date and therefore would fail to qualify. The owners of these vessels could purchase another vessel that qualifies for monkfish limited access or they could pursue other species in fisheries that the vessel is equipped for and where the crew has experience. Therefore the permits held by the vessel and the history of landings on trips targeting species other than monkfish give an indication of the least costly responses by fisherman whose vessels do not qualify for a limited access monkfish permit.

Some generalities are apparent from the detailed analysis of permit holdings and landings history described above. In the Gulf of Maine and in Southern New England, most vessels have multispecies permits and are likely to target groundfish and sea scallops, to the extent that regulations allow. Vessels that use gillnets will most likely target spiny dogfish, skates, and groundfish. Skates are a low-value fishery and a fishery management plan for spiny dogfish is under development and would all but eliminate directed fishing by 2000.

In the Mid-Atlantic states, vessels that would not qualify for a limited access monkfish permit would have more options. Instead of groundfish, vessels using trawls would most likely target summer flounder, squid, mackerel, butterfish, scup, and/or black sea bass. Since these species are managed with quotas, the most likely outcome would be a shorter season, possibly increasing the prevalence of discards when the fisheries closed. Vessels that use dredges will probably increase effort on sea scallops, but the Sea Scallop FMP limits fishing effort. Gillnet vessels are likely to shift fishing effort onto dogfish as long as there is a directed fishery and potentially target inshore species, such as bluefish, spot, croaker, and/or weakfish.

The above conclusions are only based on permit status and experience by the vessels in the fishery. As always, some fishermen will look to other opportunities that are outside the bounds of the fishery, as we know it. In addition to the options identified above, the fishermen (working with dealers and processors) could begin targeting other species and develop new markets. One recent example of this in the region is the conch fishery in the Mid-Atlantic. At one time, the monkfish fishery was also in a similar condition.

Development of markets for unexplored resources can be a healthy economic outcome (diversifying the fishery), but in general the newly exploited species tend to be vulnerable to higher rates of exploitation because they grow slowly and have low fecundity. Spiny dogfish is another perfect example of this problem. Species that live in deep, cold water beyond the continental shelf tend to also display similar biological characteristics.

### **7.4.2 Effort shifts caused by the Monkfish FMP management measures**

Within the plan, there are some measures that could lead to changes in fishing effort and gear use. Scallop vessels would no longer be able to use dredges to target monkfish as they had in the past. Two options that a vessel that qualifies for monkfish limited access has are to use large mesh in a beam trawl or to re-equip the vessel to use gillnets. Both options are thought to involve significant cost in terms of gear, equipment, and training. The Councils do not believe that many scallop vessels will pay this added costs when they also have to use scallop days-at-sea when targeting monkfish. Increases in gillnet and beam trawl fishing effort is expected to be low.

The management measures in the plan tend to be somewhat more restrictive in the Southern Fishery Management Area than in the Northern Fishery Management Area. Beginning year 2, the FMP proposes directed fishery trip limits and a larger (14") minimum size limit for the Southern Fishery Management Area. As a result, it may become more attractive to fish in the northern area, especially for vessels that use gillnets. Countering this incentive, however, are the multispecies regulations which allow for only a short exempted monkfish fishery in two areas in the Gulf of Maine and the Multispecies Regulated Mesh Area. Otherwise, a vessel that fished in the

Southern Fishery Management Area would have to possess a multispecies permit and use multispecies days-at-sea to fish in the Northern Fishery Management Area. Also the net limits are more conservative, compared to prevailing practices, in the Northern Fishery Management Area than in the Southern Fishery Management Area. Although vessels operating in both areas would be limited to 160 monkfish nets, it is customary to set more gear for longer periods in the northern area to accommodate weather and other factors. As a result, shifts in gillnet fishing effort from the Southern Fishery Management Area will probably be low.

In the last several years, however, the multispecies regulations induced multispecies vessels to fish in the Mid-Atlantic when they were not on a multispecies day-at-sea. Under the Monkfish FMP, this incentive will evaporate because a vessel with a multispecies permit will have to use a multispecies and monkfish day-at-sea when targeting monkfish. Coupled with the net limits, it is expected that the amount of gillnets in the Mid-Atlantic area is therefore likely to substantially decline under the proposed monkfish management measures.

## **8.0 RELATIONSHIP TO OTHER APPLICABLE LAW**

### ***8.1 Environmental Impact Statement – National Environmental Policy Act***

#### **8.1.1 Table of Contents**

The Table of Contents for the FEIS is integrated into the FMP on page ii.

#### **8.1.2 Summary**

##### **8.1.2.1 Background**

The background of the FMP is presented in Section 3.1 of this document.

##### **8.1.2.2 Major conclusions**

###### **8.1.2.2.1 Rationale for the Adoption of the Preferred Alternative**

The preferred alternative addresses an overfished condition of the monkfish resource in the Northwest Atlantic. Responding to the requirements of Section 304(e)(1) of the Magnuson-Stevens Act, the Secretary of Commerce notified the Councils on September 30, 1997 that the monkfish resource was in an overfished condition due to low biomass. Section 304(e)(3) of the Act therefore requires the Councils to prepare a fishery management plan for monkfish that will end overfishing and rebuild the stock. This FMP proposes to reduce mortality in a series of steps, stop overfishing in year 4, and rebuild stock biomass to target levels by year 10, fully complying with Section 304(e) of the Act.

The Councils considered a wide range of alternatives and various management options within those alternatives. Sections 8.1.4.2, 8.1.4.3, and 8.1.4.4 contain a discussion of the range of alternatives considered and the rationale for rejecting those not adopted. The No Action alternative was rejected because it would not stop overfishing and achieve the goals of the FMP. The Councils considered other mortality reduction schedules. The initial proposal taken to public hearings in February 1997 included a seven-year schedule to reduce mortality below the overfishing threshold and a schedule to rebuild stock biomass in eight-years from plan implementation. This schedule was ultimately rejected because it was unlikely that the stock would rebuild one year after reducing mortality below the overfishing threshold and seven years was not sufficiently risk-adverse. The Councils rejected mortality reduction schedules less than four years because the transitional and opportunity costs were too high, considering the uncertainty in the biological reference points and management targets. Qualitatively, these costs outweigh the calculated economic benefit of a faster mortality reduction schedule, given that the economic results are contingent on highly uncertain yields at the biomass target. The preferred alternative is therefore a compromise between these competing concerns. The four-year mortality reduction schedule, coupled with annual monitoring and a comprehensive third-year review will enable the Councils and NMFS to collect information that will be necessary to fine tune this management plan.

Alternative 1 was rejected because quotas would not work well for many mixed-species fisheries that include monkfish and the proposed bycatch trip limits were anticipated to cause unacceptably high discarding. No positive comments for alternative 1 were given at the February 1997 public hearings. Alternative 2 was an attempt to increase the bycatch trip limits and accommodate incidental catches of monkfish in fisheries that targeted a mixed catch where monkfish was a component. The Council rejected Alternative 2 prior to the February 1997 public hearings because it relied too heavily on trip limits to manage the fishery and had unacceptably low directed fishery

quotas. Alternative 4 is a modification of day-at-sea management proposed by alternative 3, but with lower bycatch allowances to boost the allocation of monkfish to the limited access fishery. The added allocation would enable the Councils to allocate some days to all vessels that qualify for monkfish limited access while meeting the mortality goals of the plan. Some favorable comments for alternative 4 were given at public hearing, but the overwhelming majority of people supported alternative 3. The Council ultimately rejected alternative 4 because the day-at-sea allocated to limited access vessels were too low and the bycatch trip limits would create unacceptable discarding.

One of the major sources of concern about alternative 3 was the automatic qualification of all multispecies vessels and the proposal to allow them to use any and all of their 88 annual multispecies days to target monkfish. Many believed that this proposal was too liberal and the Councils had underestimated the opportunity for vessels to increase monkfish fishing effort. There is a significant proportion of multispecies days that are allocated, but not used to target groundfish. If a significant amount of these days were re-deployed (via vessel activation or replacement) to target monkfish, alternative 3 would not have met the mortality reduction goals. Various permutations of qualification criteria, days-at-sea allocations, and trip limits were proposed as variants of the preferred alternative and taken to public hearing in February 1998. The new management alternative proposed to require all multispecies to qualify for monkfish limited access and it would only allow multispecies and scallop vessels to use 40 of their days-at-sea to target monkfish. The alternatives (labeled as non-preferred alternatives 3a and 3b) taken to public hearing in February 1998 and the preferred alternative that evolved from those proposals are evaluated and analyzed in the EIS.

The preferred alternative is expected to reduce fishing mortality in the Northern Fishery Management Area by 25 percent in year 1, by 33 percent in year 2 and by 50 percent in year 4 due to day-at-sea and trip limits alone. These results compare to a 55 percent mortality reduction goal in years 1 to 3 and a 68 percent mortality reduction goal in year 4. The Councils expect that the size limit (contributing 4 percent), area closures for other fisheries (e.g. the Gulf of Maine closures for cod), unanalyzable changes in behavior caused by day-at-sea management, and the synergistic effect of proposed management changes in other plans (5 percent for the preferred alternative in Amendment 7 to the Atlantic Sea Scallop FMP) will be sufficient to meet the mortality goals. The non-preferred alternatives 3a and 3b are expected to achieve similar mortality reductions, but discards are estimated to be substantially higher.

In the Southern Fishery Management Area, the proposed limited access program, the day-at-sea restrictions, and the trip limits are expected to reduce fishing mortality by 32 percent in year 1, by 49 percent in years 2 and 3, and by 65 percent in year 4. These results compare to mortality reduction goals of 59 percent in years 1 to 3 and 78 percent in year 4. As in the northern area, the Councils expect that the size limit (6 percent in year 1 and 27 percent in year 2), area closures in other fisheries (e.g. the Mid-Atlantic scallop closure), unanalyzable changes in behavior caused by days-at-sea management, and the synergistic effects of proposed management changes in other plans (7-8 percent reduction for the preferred alternative in Amendment 7 to the Atlantic Sea Scallop FMP) will be sufficient to meet the mortality goals. The non-preferred alternatives 3a and 3b are expected to achieve similar mortality reductions, but discards are estimated to be substantially higher.

The preferred alternative is therefore the best choice of all possible alternatives. It integrates monkfish management into pre-existing programs to manage fisheries, thus reducing administrative and enforcement costs. It comes closest to achieving the monkfish mortality objectives without increasing discards to unacceptable levels. Rebuilding is expected in 10 years, relying on framework adjustments to make mid-course corrections should the proposed measures fail to achieve the desired results. The transitional costs are kept to a minimum and the burdens appear to be distributed equitably. Communities and fishing sectors that share a larger burden of the costs during the rebuilding phase appear to also be the ones that will benefit from a rebuild stock biomass. Net benefits, measured by comparing expected revenue to No Action, are positive (\$20 million) over 20 years. Other alternatives could have slightly lower costs or higher economic yield, but have other undesirable effects.

The preferred alternative is based on a high degree of uncertainty about the biological reference points, the effectiveness of management to meet the mortality reduction goals, and the response of the stock to lower fishing mortality. If the combined effect of all measures and the realized mortality reductions are insufficient to meet the Magnuson-Stevens Act requirements and the FMP objectives, the flexibility and monitoring provided under the framework adjustment procedure will enable the Councils to respond to recent information as it becomes available.

The framework procedure also provides a contingent authority for the Regional Administrator to implement adjustments in the event the Councils fail to do so.

#### **8.1.2.3 Areas of controversy**

Controversial issues are discussed in Section 3.2 of the FMP.

#### **8.1.2.4 Issues to be resolved**

Issues to be resolved are discussed in Section 3.3 of the FMP.

### **8.1.3 Purpose and need**

The purpose and need for taking action are described in Section 3.5 of the FMP.

### **8.1.4 Alternatives Including the Proposed Action**

#### **8.1.4.1 Description of the preferred alternative**

The proposed action is described in Section 4.0 of the FMP.

#### **8.1.4.2 Alternatives to the preferred alternative**

##### **8.1.4.2.1 Summary**

The Councils took two non-preferred alternatives to public hearing in January 1998. The alternatives had the same basic management framework, but had preferred and non-preferred management measures. The major differences between these two non-preferred alternatives are explained in the Sections that follow. The specific management measures that the Councils proposed are summarized in the tables below.

Table 68. Summary of principal management measures by permit category.

Management measure	Multispecies vessels	Scallop vessels	Monkfish-only vessels
Qualification criteria - preferred	7,500 pounds tail-weight	See footnote 1	See footnote 1
Qualification criteria – non-preferred	7,500 pounds tail-weight for vessels less than 51 GRT 50,000 pounds tail-weight for all other vessels	7,500 pounds tail-weight for vessels less than 51 GRT 50,000 pounds tail-weight for all other vessels	7,500 pounds tail-weight for vessels less than 51 GRT 50,000 pounds tail-weight for all other vessels
Can vessel target monkfish during days-at-sea?	During fishing years 1-3: yes, but must qualify for monkfish limited access and be on a multispecies day-at-sea  During subsequent fishing years: bycatch only	During fishing years 1-3: yes, but must qualify for monkfish limited access, be on a scallop day-at-sea, and use monkfish mesh  During subsequent fishing years: bycatch only	During fishing years 1-3: yes, but must qualify for monkfish limited access, be on a monkfish-only day-at-sea, and use monkfish mesh  During subsequent fishing years: No directed days-at-sea; bycatch only in other fisheries
Annual allocation (mt)	Not specified	Not specified	Target TAC
Monkfish-only fleet days-at-sea	Monkfish trips counted against multispecies days-at-sea	Counted as a scallop day-at-sea	40
Monkfish-only individual days-at-sea	None	Up to 40 for combination vessels	None
Spring spawning closure	Not applicable	Not applicable	Yes

Qualification criteria options: Vessels would qualify for monkfish limited access, by meeting one of the following four criteria:

- For vessels less than 51 gross registered tons, monkfish landings of at least 7,500 pounds tial weight or 24,900 pounds whole-weight, or
- For any vessel, monkfish landings of at least 1,000 pounds tail-weight or 3,320 pounds whole-weight on 50 or more trips, or
- For any vessel, monkfish landings of at least 5,000 pounds tail-weight or 16,600 pounds whole-weight on 8 or more trips, or
- For any vessel, monkfish landings of at least 10,000 pounds tail-weight or 33,200 pounds whole-weight on 5 or more trips.

Table 69. Summary of principal management measures for all vessels.

<b>Management measure</b>	<b>Fishing years from May 1, 1998 to April 30, 2001</b>	<b>Fishing years following May 1, 2001</b>
Total Allowable Landings (TAL)	Target	Target
Minimum size limits	North: 11" tail, 17" whole South: 14" tail, 21" whole	North: 11" tail, 17" whole South: 14" tail, 21" whole
Maximum liver to fish landings ratio	25% liver-to-tail 10% liver-to-whole fish	25% liver-to-tail 10% liver-to-whole fish
Dealer and vessel permits	Yes	Yes
Dealer reports	Mandatory	Mandatory
Logbook reports	Mandatory for all day-at-sea vessels and other vessels with federal permits that require logbooks	Mandatory for all day-at-sea vessels and other vessels with federal permits that require logbooks

Table 70. Summary of trip limits for qualifying vessels (criteria defined in Table 68) by permit and gear type.

Trip limits for primary vessels fishing under a day-at-sea.	Fishing years from <b>May 1, 1998 to April 30, 2001</b>		Fishing years following <b>May 1, 2001</b>	
	Preferred	Non-preferred (west of 72°30' W)	Preferred	Non-preferred (west of 72°30' W)
Monkfish-only (all areas)	No trip limit	<u>300 pounds tail-weight per day-at-sea</u>	<u>No monkfish-only days would be allocated; bycatch limits would apply</u>	Up to 300 pounds tail-weight per day-at-sea on monkfish days, if monkfish-only days-at-sea are allocated
Multispecies (all areas and gears)	No trip limit	No trip limit	300 pounds tail-weight per day-at-sea or 25 percent of total weight of fish onboard, whichever is less	Up to 300 pounds tail-weight per day-at-sea on monkfish days, if monkfish-only days-at-sea are allocated
	Preferred and Non-preferred		Preferred	Non-preferred
Scallop dredge (SFMA)	No trip limit, provided the vessel has no dredge aboard 300 pounds tail-weight per day-at-sea, if the vessel has a dredge aboard		200 pounds tail-weight per day-at-sea or 25 percent of total weight of fish onboard, whichever is less	Up to 300 pounds tail-weight per day-at-sea on monkfish days, if monkfish-only days-at-sea are allocated

Table 71 Summary of trip limits for non-qualifying vessels (criteria defined in Table 68) by permit and gear type.

<b>Trip limits for primary fisheries</b>	<b>Fishing years from May 1, 1998 to April 30, 2001</b>	<b>Fishing years following May 1, 2001</b>
Multispecies trawl (NFMA)	300 lbs. tail-weight per day-at-sea or 25% of total weight of fish onboard, whichever is less	300 lbs. tail-weight per day-at-sea or 25% of total weight of fish onboard, whichever is less
Multispecies trawl (SFMA)	50 lbs. tail-weight per day-at-sea	50 lbs. tail-weight per day-at-sea
Multispecies gillnet (SFMA)		
Multispecies gillnet (NFMA)	300 lbs. tail-weight per day-at-sea or 25% of total weight of fish onboard, whichever is less	300 lbs. tail-weight per day-at-sea or 25% of total weight of fish onboard, whichever is less
Scallop dredge (SFMA)	300 lbs. per day-at-sea	200 lbs. tail-weight per day-at-sea or 25% of total weight of fish onboard
Summer flounder trawl (SFMA)	5 percent total weight of fish on-board	5 percent total weight of fish on-board
Small mesh fisheries (All areas)	50 lbs. per trip	50 lbs. per trip

#### **8.1.4.2.2 Non-preferred alternative 3a**

This alternative is the one taken to public hearings in January 1998 as the preferred alternative. It has many of the same features as the (final) preferred alternative, but differs mainly in the qualification criteria for limited access, the amount of multispecies days-at-sea that could be used to target monkfish, no trip limits for the directed fishery, and eligibility for monkfish-only days-at-sea by vessels in the scallop day-at-sea program.

Unlike the preferred alternative, non-preferred alternative 3a would qualify fewer scallop and monkfish-only vessels. The qualification criteria for these vessels would be approximately 50,000 pounds, but vessels would have to qualify by exceeding these criteria on a threshold number of trips. Multispecies vessels that qualify for monkfish limited access could target monkfish during any number of the multispecies days that are allocated to that vessel, as much as 88 days in 1998 for multispecies vessels that receive fleet days. Combination scallop vessels would also be eligible for additional monkfish-only days, so the vessel's combination and monkfish-only days totaled 40 per year. Any vessel that qualifies for monkfish limited access would be able to use its monkfish-only, multispecies, or scallop days-at-sea to target monkfish.

#### **8.1.4.2.3 Non-preferred alternative 3b**

This alternative is the one taken to public hearings in January 1998 as the non-preferred alternative. It has many of the same features as the (final) preferred alternative, but differs mainly in the qualification criteria for limited access, the amount of multispecies days-at-sea that could be used to target monkfish, no trip limits for the directed fishery, and eligibility for monkfish-only days-at-sea by vessels in the scallop day-at-sea program.

Non-preferred alternative 3b is similar to non-preferred alternative 3a described above, but all vessels would have to qualify according to the same criteria. Vessels less than 51 gross registered tons could qualify for monkfish limited access if the vessel has monkfish landings during the four-year qualification period that exceed 7,500 pounds tail-weight, or 24,900 pounds whole-weight. To qualify for monkfish limited access, all other vessels would need monkfish landings during the qualification period that exceed 50,000 pounds tail-weight, or 166,000 pounds whole-weight. Certain other options to other management measures were considered as part of a non-preferred alternative during the January 1998 public hearings. These options are summarized in Section 8.1.4.2.1.

#### **8.1.4.3 No action (status quo)**

Taking no action will continue current regulations pertaining to landing or possessing monkfish. Two types of regulations apply: state landings limits and restrictions on non-exempt fisheries because of groundfish bycatch concerns. If these regulations remain in place, taking no action would allow unlimited fishing effort in the Mid-Atlantic regulated mesh area and only allow monkfish effort by sink gillnet vessels in portions of the Gulf of Maine and Southern New England. Multispecies and scallop vessels could target monkfish with legal gear during a day-at-sea. Other fisheries (for example using beam trawls or large mesh otter trawls) that target monkfish are currently prohibited. It may be possible, however, that they could be certified to have low groundfish bycatch, because of area, season, or type of fishing gear.

Presently, the states of NJ, NY, CT, RI, MA and NH have minimum size and liver-to-tail landings limits for monkfish. All of these states have implemented an 11" minimum tail size and a 17" minimum length limit in response to the Councils' request in October 1993. These states also have maximum liver to tail weight landings limits, but the details vary from state to state. All but NJ has a 25 percent liver to tail weight limit, but the way it is measured varies. NJ has a 30 percent liver to tail weight limit. Maine is the remaining state with significant monkfish landings. It has not implemented monkfish minimum size restrictions because state regulators believe that discarding will be excessive, with no tangible gain.

Many areas of the northeast region are closed to directed monkfish fishing because of measures to limit mortality and enhance rebuilding of the depressed groundfish stocks. The only time a vessel could fish for monkfish is when it is fishing with legal gear during a multispecies or sea scallop day-at-sea, or when it is participating in an exempted fishery. Any fishery west of 72°30' W longitude using legal mesh in the Mid-Atlantic regulated mesh area [50 CFR 648.80(c)] is not prohibited from retaining any amount of monkfish. The only other fisheries that

have been certified to have less than five percent groundfish bycatch, are the monkfish sink gillnets in Southern New England (west of 70° W longitude) and portions of the Gulf of Maine.

#### 8.1.4.4 Alternatives considered and rejected

Alternatives 1, 2, and 4 were taken to public hearings in January 1997 as non-preferred alternatives. Due to the preponderance of public comment for (then) preferred alternative 3 and the opposition to Alternative 1, the Councils chose to continue development of Alternative 3 for inclusion in the FMP. Non-preferred alternative 1 would manage monkfish with a limited access permit moratorium and set seasonal quotas for monkfish limited access vessels. Trip limits for vessels that do not qualify for limited access would control bycatch, so these vessels do not begin targeting monkfish. Non-preferred alternative 2 would use the same approach as non-preferred alternative 1, but the trip limits for vessels that do not qualify would be much higher to accommodate monkfish landings when they are part of a targeted mixed-species complex. Non-preferred alternative 4 would restrict days-at-sea use by vessels that qualify for limited access (similar to the preferred alternative), but the trip limits for vessels that do not qualify were set low to allow for higher days-at-sea allocations for the directed monkfish fishery. These non-preferred alternatives and other management measures that were initially considered by the Councils are described in more detail in the following sections.

##### 8.1.4.4.1 Non-preferred alternative 1

###### Bycatch trip limits and quota controlled limited access fishery

Non-preferred alternative 1 would establish regulations for two broadly-defined monkfish fishing sectors (Table 72). Vessels that target other species and have a modest monkfish bycatch would be regulated by other FMPs, but would have limits on the amount and size of monkfish that could be landed. Any vessel permitted in another fishery (e.g. sea scallops, summer flounder, multispecies) or participating in an unregulated fishery would be able to land their monkfish bycatch up to the trip limit considered to be customary in that fishery. Vessels would not have to qualify to land monkfish bycatch based on historic participation by that vessel. Vessels fishing in some fisheries, however, have negligible monkfish bycatch (e.g. surf clam fishery) and would not be able to land monkfish.

The other fishing sector would be vessels that target monkfish on an entire fishing trip or only for portions of a trip. These vessels could land their entire catch of monkfish, subject to limitations on minimum size and liver to tail landings ratios, as long total monkfish landings by this fishery had not yet exceeded the seasonal quota. Vessels would be eligible to participate in this fishery to target monkfish if their historic landings of monkfish exceeded the qualification criteria. The Council is offering a choice of three qualification criteria. The most liberal will qualify any vessel with a history of landing monkfish during the four years prior to the control date. Over 1,870 vessels would qualify and if many of these vessels used the opportunity to target monkfish, the seasonal quotas will not last very long. More restrictive entry criteria will decrease the number of vessels that participate in the directed fishery and the quotas could last considerably longer.

**Table 72.** Outline of management measures within non-preferred alternative 1, depending on whether a vessel qualified for limited access and whether the quota was available or not.

Class	Qualification criteria	Trip limit before reaching limited entry quota	Trip limit after reaching limited entry quota
Limited entry fishery	Based on historic performance	No trip limit	Trip limit ranging from 100 to 1,000 pounds tail weight or 332 to 3,320 pounds whole weight
Bycatch fishery	Must have a permit to fish for another federally regulated species	Trip limit based on historic distribution of landings within broadly defined fisheries and/or based on maximum ratios of monkfish to total weight of fish on-board	

The management measures in common to all three alternatives would apply to these vessels. The minimum size and liver to tail ratios would apply to both fishery sectors. The minimum mesh size would apply only to the limited access fishery. Dealer permits would be required of any primary dealer that accepts the landings of monkfish, whether from targeted fishing activity or from bycatch of monkfish. Vessel and operator permits for monkfish would only be required of vessels that qualify for limited access and the captains that operate them. Logbook data would be required of any vessel that qualifies for limited access or any other vessel that otherwise would be required to submit a logbook for another fishery, e.g. sea scallops, multispecies, summer flounder, etc.

#### 8.1.4.4.1.1 **Bycatch trip limits**

Any vessel participating in the fisheries listed in Table 73 would have limits on the amount of monkfish that could be landed. Fisheries where the length of the trip is monitored (sea scallops and multispecies) could also have higher monkfish limits based on the trip length, measured in total days-at-sea. In the trawl fishery for multispecies, for example, a vessel landing monkfish after a three day trip could only land up to 1,000 pounds of monkfish tails or 3,320 pounds of whole monkfish. That same vessel landing monkfish after a ten-day trip could only land up to 2,000 pounds of monkfish tails or 6,640 pounds of whole monkfish.

Other fisheries, notably those using small mesh, would also be limited by to a maximum proportion of monkfish landings to the trip's total landings. A vessel that had 500 pounds of fish (summer flounder and monkfish) on board would be allowed to possess 250 pounds of monkfish, in any form. That same vessel that had 3,000 pounds of fish on board would be able to possess only 1,000 pounds of monkfish, in any form.

Fishery categories with a single monkfish limit (e.g. 100 pounds tail weight per trip) or those with lesser of two trip limits (e.g. 50 percent of total weight of fish on-board, or 1,000 pounds tail weight per trip, **whichever is less**) would be subject to a possession limit. Vessels with greater amounts of monkfish on board would be in violation of the trip limits while at sea. It is impractical to measure large quantities of fish at sea, and these limits would more likely be enforced at the point of landing. Fishery categories with the greater of two trip limits (1,000 pounds tail weight) per trip or 200 pounds per day-at-sea, **whichever is more**) would be subject to a landing limit. The landing limit is necessary, because law enforcement would be unable to determine trip length until the end of the trip.

There are cases where vessels that fish with like gear would be subject to more than one trip limit. A vessel with gillnets and dredges, for example, would have different trip limits in the NFMA and the SFMA (Table 73). Trip limits that depend on where the vessel fished are impossible to enforce and easily circumvented. In cases where a vessel transits through an area to fish in the other one, or when a vessel fishes in more than one area, the trip or possession limit for that vessel will be the lesser of the two limits. Vessel monitoring systems (aka VTS) tell

where a vessel has been, but not necessarily where it fished. The VMS will, therefore, be helpful in monitoring which trip limit would apply to each vessel, depending on its record of location during the trip.

A scallop dredge vessel, for example, that fishes on Georges Bank and lands its catch in Gloucester, MA would have a trip limit of 1,600 pounds tail weight or 200 pounds tail weight per day-at-sea, whichever is more. These limits would apply because the vessel transited the NFMA and possibly fished there, too. Likewise, a scallop dredge vessel from New Bedford, MA that fishes on Fippinees Ledge in the Gulf of Maine would also have a monkfish trip limits of 1,600 pounds tail weight or 200 pounds tail weight per day-at-sea, whichever is more.

#### **8.1.4.4.1.2      *Limited access fishery measures***

The limited access fishery would be managed by limiting the number of vessels that can land monkfish in excess of the trip limits and by quotas. Their landings would be monitored through mandatory reporting to determine when the quota is reached. When the landings are expected to equal or exceed the seasonal quota, NMFS will notify these vessels and they will not be able to land monkfish above the close season possession limits.

##### **8.1.4.4.1.2.1 Qualification**

Vessels would be eligible for the monkfish limited access fishery under one of the four criteria listed the preferred option (Table 68).

**Table 73.** Monkfish bycatch allowances for non-preferred alternative 1, defined by gear and fishery.

Gear	Target species	Proposed trip limit	
		Northern area	Southern area
Trawl	Any fishery that requires a minimum regulated trawl mesh and is regulated by days-at-sea allocations, including multispecies and scallops	1,000 pounds (tail weight) per trip or 200 pounds (tail weight) per day-at-sea, whichever is more	1,000 pounds (tail weight) per trip or 200 pounds (tail weight) per day-at-sea, whichever is more
	Any fishery that requires a minimum regulated trawl mesh and is not regulated by days-at-sea allocations, including summer flounder	Possession limit of 50 percent of total weight of fish on-board, or 1,000 pounds (tail weight) per trip, whichever is less.	Possession limit of 50 percent of total weight of fish on-board, or 1,000 pounds (tail weight) per trip, whichever is less.
	All other species and permits, including fisheries targeting whiting, squid, scup, and dogfish	Possession limit of 10 percent of total weight of fish on-board, or 1,000 pounds (tail weight) per trip, whichever is less.	Possession limit of 10 percent of total weight of fish on-board, or 1,000 pounds (tail weight) per trip, whichever is less.
Gillnet	Multispecies (with permit)	300 pounds (tail weight) per trip or 100 pounds (tail weight) per day-at-sea, whichever is more	200 pounds (tail weight) per trip or 100 pounds (tail weight) per day-at-sea, whichever is more
	Dogfish (not under days-at-sea program or without groundfish permit)	100 pounds (tail weight) per trip	200 pounds (tail weight) per trip
	All other species and permits	No possession permitted	
Dredge	Scallops (with limited access permit and fishing under days-at-sea)	1,600 pounds (tail weight) per trip or 200 pounds (tail weight) per day-at-sea, whichever is more	4,000 pounds (tail weight) per trip or 400 pounds (tail weight) per day-at-sea, whichever is more
	All other species and permits	100 pounds (tail weight) per trip	
All other gears		100 pounds (tail weight) per trip	

**Table 74.** TAL allocations for non-preferred alternative 1.

Year beginning July 1	Total allowable landings		Expected fishing mortality		Expected landings with trip limits and multispecies DAS		Target allocation for monkfish-only fishery
	Northern area	Southern area	Northern area	Southern area	Northern area	Southern area	
1991-1993					6,505	10,488	
1996	5,500	8,500	0.13	0.37	2,487	4,184	7,329
1997	3,000	6,000	0.07	0.26	2,097	3,631	3,290
1998	2,937	5,757	0.07	0.25	2,016	3,388	3,290
1999	2,937	5,757	0.07	0.25	2,016	3,388	3,290
2000	2,874	5,522	0.07	0.24	1,952	3,153	3,290
2001	2,811	5,286	0.07	0.23	1,889	2,917	3,290
2002	2,148	4,927	0.05	0.22	1,889	2,917	2,268

#### 8.1.4.4.1.3 Seasonal quotas

Annual quotas for the limited access fishery would be determined by deducting the expected annual bycatch from the annual TAL objectives (Table 74). The TAL for the fishing year beginning July 1, 1996 is 5,500 mt whole weight in the NFMA and 8,500 mt in the SFMA. Based on historical landings, adjusted for the regulations already in place for multispecies, sea scallops, and summer flounder and adjusted for the proposed non-preferred alternative 1 trip limits (Table 73), the Council anticipates the landings of monkfish from fisheries managed via trip limits to be 2,487 mt in the NFMA and 4,184 mt in the SFMA. This expected landings would leave 7,329 mt to be allocated to the limited access fishery in the fishing year beginning July 1, 1996. This allocation would not be further subdivided by management area, because the number of vessels would be determined by area non-specific qualification criteria. Vessels in the limited access fishery will, therefore, be able to fish anywhere within U.S. waters for monkfish.

The annual limited access fishery quota would be allocated in unequal portions during four fishing seasons. The allocation of the quota would be weighted to allow more landings during the early winter season when prices, especially liver prices, are higher. The allocation would also be weighted to reduce monkfish landings during the spawning season (April to June), when monkfish are more vulnerable to exploitation. The Council proposes the following seasonal allocations to meet these objectives:

**Table 75.** Seasonal TAL allocations proposed for non-preferred alternative 1.

	<b>July 1 to October 14</b>	<b>October 15 to January 15</b>	<b>January 16 to March 31</b>	<b>April 1 to June 30</b>
Percent of annual quota	25%	50%	25%	0%
Year beginning July 1, 1996	1,832	3,664	1,832	0
“ 1997	823	1,645	823	0
“ 1998	823	1,645	823	0
“ 1999	823	1,645	823	0
“ 2000	823	1,645	823	0
“ 2001	823	1,645	823	0
“ 2002	567	1,134	567	0

During the second year of management, beginning July 1, 1997, the annual quota would be determined by deducting the expected bycatch from the TALs for that year. The TAL objective for the second year would be 3,000 mt in the NFMA and 6,000 mt in the SFMA. The expected bycatch during the same time period is 2,097 mt and 3,631 mt, respectively (Table 74). This calculation would leave an allocation of 3,290 mt for the limited access fishery. The annual quota of 3,290 mt would be allocated by season as shown in Table 75.

Consistent with the biological objectives when monkfish are overfished (Section 3.4.1.1), the limited access quota would remain constant at 3,290 mt each year through year seven (2001). Reductions in bycatch between fishing year 1998 and fishing year 2002 would contribute to reducing fishing mortality toward the overfishing definition threshold (Section 3.4.1.1).<sup>23</sup>

Although it is difficult to anticipate all the changes in monkfish bycatch that might occur in other regulated fisheries over the next seven years, the TAL objective to meet the overfishing definition threshold mortality would be 2,148 mt in the NFMA and 4,927 mt in the SFMA. The expected bycatch for the same period is 1,889 mt in the NFMA and 2,917 mt in the SFMA, leaving 2,268 mt for the limited access fishery.

#### *8.1.4.4.1.4      Closed season possession limits for monkfish limited access vessels.*

Monkfish vessels would be regulated by a reduced trip limit when the monkfish limited access fishery was closed. Monkfish landings by these limited access vessels would continue to be counted against the quota, even though the cumulative monkfish landings to date already exceeded it. The additional monkfish landings by limited access vessels, even though controlled by a restrictive trip limit, would create a quota overage. NMFS would make adjustments in the following two fishing seasons, under the framework notice action procedure, to account for the previous overage.

The Council will choose a trip limit based on public comments for one of the two trip limit options: a) 100 pounds tail weight or 332 pounds whole weight, or b) 1,000 pounds tail weight or 3,320 pounds whole weight.

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<sup>23</sup> The values of the reference points and associated TALs had changed since this alterantive taken to public hearing in 1997, due to a new stock assessment. This revision had not been carried through to the TAL calculaions in non-preferred alternatives.

#### 8.1.4.4.1.5 Framework adjustments

After July 1, 1997<sup>24</sup>, any overages or underages of a seasonal quota would be corrected by adjusting (up or down) the subsequent two seasonal quotas. These adjustments could apply across fishery years to adjust for previous overages or underages in the previous year's annual quota. Changes to the seasonal quota will be made by NMFS via notice action, without prior approval of the Council and without first publishing a proposed rule. The effectiveness of this published rule would take place no less than 10 days before the projected end of the fishing season to allow fishermen to prepare for the seasonal fishery closure and to complete their trips already underway. Adjustments can be made mid-season, even if the affect of such adjustment causes the fishery to close.

Upward adjustments can be made to change the (zero) closure in the spring season (April 1 to June 30), if the quota adjustment is larger than 5 percent of the annual quota. The adjustment if the amount is less than 5 percent of the annual quota would otherwise be reserved to adjust the following two seasons that would be expected to have a quota allocation (July 1 to October 14 and October 15 to January 15).

**Table 76.** Example of in-season quota adjustments to account for seasonal overharvest of the previous season's quota.

	Seasonal Quota	Adjustment	Revised Quota	Landings	Overage/(Underage)
97-S1	823	0	823	1,223	400
97-S2	1,645	(200)	1,445	1,500	55
97-S3	823	(227.5)	595.5	0	0
97-S4	0	(27.5)	(27.5)	0	27.5
98-S1	823	(13.75)	809.25	0	0
98-S2	1,645	(13.75)	1,631.25	0	0

Consider, for example, a season when the seasonal quota allocation is 1,645 mt. As of the date of publication to make a seasonal adjustment, the fishery had already taken 1,250 mt, at a rate of 25 mt per day. An adjustment for an overage within the preceding season calls for a reduction of 200 mt (and 200 mt in the next season, too), leaving a total adjusted quota of 1,445 mt. The public notice, however, must be published 10 days in advance of when the season was projected to end. Since the adjustment would result in 1,445 mt and 1,250 mt had already been taken, the season under the proposed framework action would be required to remain open for 10 days when 1,500 mt would be taken. The net result of the adjustment and the seasonal closure would result in an overage of 55 mt, to be accounted for by adjusting the next two seasons in equal amounts (Table 76). Obviously, earlier adjustments to the quota would be less complex and would be less likely to result in mismatches between landings and the quota.

<sup>24</sup> Overages of the annual quota created by the date of implementation would not be carried forward into the following fishing year.

**Table 77.** Example of a quota adjustment that would be carried forward into the next fishing year.

	Seasonal Quota	Adjustment	Revised Quota	Landings	Overage/(Underage)
97-S1	823	0	823	1,223	400
97-S2	1,645	0	1,645	1,645	0
97-S3	823	(200)	623	100	0
97-S4	0	(200)	(200)	0	200
98-S1	823	(100)	723	0	0
98-S2	1,645	(100)	1,545	0	0

If the fishing season following one where an overage or underage occurred has concluded, either by quota closure or by the passage of time, the adjustment would be applied to the next two periods that adjustments could be made (Table 77). If an adjustment would result in a negative quota, it would automatically cause an overage that would be applied to the next two periods (Table 76)

#### 8.1.4.4.2 Non-preferred alternative 2

##### Mixed catch trip limits and quota-controlled limited access fishery

Non-preferred alternative 2 is a hybrid between non-preferred alternative 1 (quota management) and preferred alternative 3 (vessels with a multispecies permit can target monkfish). The Council has chosen this management system as a non-preferred alternatives because it does not adequately control fishing mortality, imposes trip limits on fisheries that target monkfish, and leaves a very small monkfish allocation for the limited access fishery. The high trip limits would allow opportunities for fishermen that formerly landed monkfish as a bycatch to begin targeting monkfish under a 'trip-limit' directed fishery. Even at these high trip limits, some fishermen could continue to fish for monkfish and high-grade their catch, i.e. discard fish and retain livers up to the liver to tail maximum ratio.

The main reason to retain this proposed management program as a non-preferred alternative is to demonstrate the effect of increasing trip limits under non-preferred alternative 1. The higher landings anticipated with these trip limits (without taking into account possible effort shifts within a trip limit fishery) reduce the quota for the limited access fishery. This reduced allocation occurs because more vessels would be able to land, and possibly target, monkfish without discarding fish or moving to other areas to fish for other species. Some of the discarded monkfish survive, although the actual discard survival varies by season, depth, and gear type. The trip limits, therefore, can reduce mortality and allow for increased landings in a targeted fishery, one that may have better size selectivity than the bycatch fisheries.

Non-preferred alternative 2 also would establish two broadly-defined monkfish fishing categories (Table 78), a bycatch or days-at-sea fishery and a limited access fishery. All but the largest vessels that target monkfish would be able to retain monkfish as bycatch or as a mixed catch when monkfish is one a few target species. These vessels would be regulated by the days-at-sea programs for other species (e.g. sea scallops and multispecies), but would also have high limits on the amount of monkfish they could land and a minimum monkfish size limit. Any vessel permitted in another fishery (e.g. summer flounder, squid, mackerel, and butterfish, etc.) would be able to land their monkfish catch up to the trip limit considered customary in a mixed species fishery where monkfish was a bycatch. These vessels (days-at-sea or permitted vessels where monkfish is a bycatch) would not have to qualify to landing monkfish based on historic participation by that vessel. Vessels fishing in some fisheries, however, have negligible monkfish bycatch (e.g. surf clam fishery), do not catch monkfish as a target species, and would be unable to land monkfish.

**Table 78.** Outline of management measures within non-preferred alternative 2, depending on whether a vessel qualified for limited access and whether the quota was available or not.

Class	Qualification criteria	Trip limit before reaching limited entry quota	Trip limit after reaching limited entry quota
Limited entry fishery	Based on historic performance, no DAS permit	No trip limit	Landings prohibited or a minimal amount
Days-at-sea fisheries	Must have DAS permit	Higher trip limits that allow targeting	Landings prohibited if they exceed the TAL
Bycatch fishery	Must have a permit to fish for another federally regulated species	Trip limit based on historic averages for broadly defined fisheries	
Not qualified	All others	Landings prohibited or a minimal amount	

The other fishing sector would be vessels that target monkfish on an entire fishing trip or only for portions of a trip. These vessels could land their entire catch of monkfish, subject to limitations on minimum size and liver to tail landings ratios, as long total monkfish landings by this fishery had not yet exceeded the seasonal quota. Vessels would be eligible to participate in this fishery to target monkfish if their historic landings of monkfish exceeded the qualification criteria. The Council is offering a choice of three qualification criteria. The most liberal will qualify any vessel with a history of landing monkfish during the four years prior to the control date. Over 775 vessels would qualify and if many of these vessels used the opportunity to target monkfish, the seasonal quotas will not last very long. More restrictive entry criteria will decrease the number of vessels that participate in the directed fishery and the quotas could last considerably longer.

The management measures in common to all three alternatives would apply to these vessels. The minimum size and liver to tail ratios would apply to both fishery sectors (mixed catch and limited access). The minimum mesh size would apply only to the limited access fishery. Dealer permits would be required of any primary dealer that accepts the landings of monkfish, whether from targeted fishing activity or from bycatch of monkfish. Vessel and operator permits for monkfish would only be required of vessels that qualify for limited access and the captains that operate them. Logbook data would be required of any vessel that qualifies for limited access or any other vessel that otherwise would be required to submit a logbook for another fishery, eg. sea scallops, multispecies, summer flounder, etc.

#### 8.1.4.4.2.1      *Bycatch trip limits*

Any vessel participating in the fisheries listed in Table 79 would have limits on the amount of monkfish that could be landed. Fisheries where the length of the trip is monitored (sea scallops and multispecies) could also have higher monkfish limits based on the trip length, measured in total days-at-sea. In the trawl fishery for multispecies, for example, a vessel landing monkfish after a three day trip could land up to 3,500 pounds of monkfish tails or 11,620 pounds of whole monkfish in the NFMA. That same vessel landing monkfish after a ten-day trip in the NFMA could only land up to 7,000 pounds of monkfish tails or 23,240 pounds of whole monkfish.

Other fisheries, notably those using small mesh, would also be limited by to a maximum proportion of monkfish landings to the trip's total landings. A vessel that had 500 pounds of fish (whiting and monkfish, for example) on board would be allowed to possess 50 pounds of monkfish, in any form. That same vessel that had 3,000 pounds of fish on board would be able to possess only 300 pounds of monkfish, in any form.

Fishery categories with a single monkfish limit (e.g. 100 pounds tail weight per trip) or those with a proportional limit (eg. 10 percent of total weight of fish on-board) would be subject to a possession limit. Vessels

with higher amounts of monkfish on board would be in violation of the trip limits while at sea. It is impractical to measure large quantities of fish at sea, and these limits would more likely be enforced at the point of landing. Fishery categories with the greater of two trip limits (1,000 pounds tail weight per trip or 200 pounds per day-at-sea, **whichever is more**) would be subject to a landing limit. The landing limit is necessary, because law enforcement would be unable to determine trip length until the end of the trip.

There are cases where vessels that fish with like gear would be subject to more than one trip limit. Vessels with gillnets and dredges, for example, have different trip limits in the NFMA and the SFMA (Table 79). Trip limits that depend on where the vessel fished are impossible to enforce and easily circumvented. In cases where a vessel transits through an area to fish in the other one, or when a vessel fishes in more than one area, the trip or possession limit for that vessel will be the lesser of the two limits. Vessel monitoring systems (aka VTS) tell where a vessel has been, but not necessarily where it fished. The VMS will, therefore, be helpful in monitoring which trip limit would apply to each vessel, depending on its record of location during the trip.

A scallop dredge vessel, for example, that fishes on Georges Bank and lands its catch in Gloucester, MA would have a trip limit of 5,500 pounds tail weight or 1,200 pounds tail weight per day-at-sea, whichever is more. These limits would apply because the vessel transited the NFMA and possibly fished there, too. Likewise, a scallop dredge vessel from New Bedford, MA that fishes on Fippinees Ledge in the Gulf of Maine would also have a monkfish trip limits of 5,500 pounds tail weight or 1,200 pounds tail weight per day-at-sea, whichever is more.

**Table 79.** Monkfish bycatch allowances for non-preferred alternative 1, defined by gear and fishery.

Gear	Target species	Proposed trip limit	
		Northern area	Southern area
Trawl	Regulated groundfish (with permit and fishing under days-at-sea)	3,500 pounds (tail weight) per trip or 700 pounds (tail weight) per day-at-sea, whichever is more	5,000 pounds (tail weight) per trip or 600 pounds (tail weight) per day-at-sea, whichever is more
	Summer flounder (with permit and fishing under quota)	No possession permitted	5,000 pounds (tail weight) per trip
	Whiting, squid, and scup (with permit)	Limit under small mesh regulations set at 10 percent of all other species on-board.	Limit under small mesh regulations set at 10 percent of all other species on-board.
	Dogfish (not under days-at-sea program or without groundfish permit)	100 pounds (tail weight) per trip	200 pounds (tail weight) per trip
	Scallops (with limited access permit and fishing under days-at-sea)	No category	2,500 pounds (tail weight) per trip or 500 pounds (tail weight) per day-at-sea, whichever is more
	All other species and permits	100 pounds (tail weight) per trip	100 pounds (tail weight) per trip
Gillnet	Multispecies (with permit)	1,100 pounds (tail weight) per trip or 1,100 pounds (tail weight) per day-at-sea, whichever is more	3,000 pounds (tail weight) per trip or 3,000 pounds (tail weight) per day-at-sea, whichever is more
	Dogfish (not under days-at-sea program or without groundfish permit)	100 pounds (tail weight) per trip	200 pounds (tail weight) per trip
	All other species and permits	No possession permitted	
Dredge	Scallops (with limited access permit and fishing under days-at-sea)	5,500 pounds (tail weight) per trip or 1,200 pounds (tail weight) per day-at-sea, whichever is more	17,000 pounds (tail weight) per trip or 1,400 pounds (tail weight) per day-at-sea, whichever is more
	All other species and permits	No possession permitted	
All other gears		100 pounds (tail weight) per trip	

#### **8.1.4.4.2.2      *Limited access fishery measures***

The limited access fishery would be managed by limiting the number of vessels that can land monkfish in excess of the trip limits and by quotas. Their landings would be monitored through mandatory reporting to determine when the quota is reached. When the landings are expected to equal or exceed the seasonal quota, NMFS will notify these vessels and they will not be able to land monkfish above the close season possession limits.

##### **8.1.4.4.2.2.1 Qualification**

Vessels would be eligible for the monkfish limited access fishery under one of the four criteria listed in Table 68.

##### **8.1.4.4.2.2.2 Seasonal quotas**

Annual quotas for the limited access fishery would be determined by deducting the expected annual bycatch from the annual TAL objectives (Table 80). The TAL for the fishing year beginning July 1, 1996 is 5,500 mt whole weight in the NFMA and 8,500 mt in the SFMA. Based on historical landings, adjusted for the regulations already in place for multispecies, sea scallops, and summer flounder and adjusted for the proposed Alternative 2 trip limits (Table 79), the Council anticipates the landings of monkfish from fisheries managed via trip limits to be 4,109 mt in the NFMA and 5,604 mt in the SFMA. This expected landings would leave 4,287 mt to be allocated to the limited access fishery in the fishing year beginning July 1, 1996. This allocation would not be further subdivided by management area, because the number of vessels would be determined by an area non-specific qualification criteria. Vessels in the limited access fishery will, therefore, be able to fish anywhere within U.S. waters for monkfish.

The annual limited access fishery quota would be allocated in unequal portions during four fishing seasons. The allocation of the quota would be weighted to allow more landings during the early winter season when prices, especially liver prices, are higher. The allocation would also be weighted to reduce monkfish landings during the spawning season (April to June), when monkfish are more vulnerable to exploitation. The Council proposes the following seasonal allocations to meet these objectives:

During the second year of management, beginning July 1, 1997, the annual quota would be determined by deducting the expected bycatch from the TALs for that year. The TAL objective for the second year would be 3,000 mt in the NFMA and 6,000 mt in the SFMA. The expected bycatch during the same time period is 3,411 mt and 4,859 mt, respectively (Table 80). This calculation would leave an allocation of 730 mt for the limited access fishery. The annual quota of 730 mt would be allocated by season as shown in Table 81.

Consistent with the biological objectives when monkfish are overfished (Section 3.4), the limited access quota would remain constant at 730 mt each year through year seven (2001). Reductions in bycatch between fishing year 1998 and fishing year 2002 would contribute to reducing fishing mortality toward the overfishing definition threshold (Section 3.4.1.1).

**Table 80.** Total allowable landings (TAL) associated with non-preferred alternative 2.

Year beginning July 1	Total allowable landings		Expected fishing mortality		Expected landings with trip limits and multispecies DAS		Target allocation for monkfish-only fishery
	Northern area	Southern area	Northern area	Southern area	Northern area	Southern area	
1991-1993					6,505	10,488	
1996	5,500	8,500	0.13	0.37	4,109	5,604	4,287
1997	3,000	6,000	0.07	0.26	3,411	4,859	730
1998	2,890	5,686	0.07	0.25	3,300	4,546	730
1999	2,890	5,686	0.07	0.25	3,300	4,546	730
2000	2,779	5,385	0.07	0.24	3,190	4,245	730
2001	2,669	5,085	0.06	0.22	3,080	3,944	730
2002	2,148	4,927	0.05	0.22	3,080	3,944	51

**Table 81.** Seasonal TAL allocations proposed for non-preferred alternative 2.

	July 1 to October 14	October 15 to January 15	January 16 to March 31	April 1 to June 30
Percent of annual quota	25%	50%	25%	0%
Year beginning July 11996	1,072	2,144	1,072	0
“ 1997	183	365	183	0
“ 1998	183	365	183	0
“ 1999	183	365	183	0
“ 2000	183	365	183	0
“ 2001	183	365	183	0
“ 2002	13	26	13	0

Although it is difficult to anticipate all the changes in monkfish bycatch that might occur in other regulated fisheries over the next seven years, the TAL objective to meet the overfishing definition threshold mortality would be 2,148 mt in the NFMA and 4,927 mt in the SFMA. The expected bycatch for the same period is 3,080 mt in the NFMA and 3,944 mt in the SFMA, leaving 55 mt for the limited access fishery.

#### 8.1.4.4.2.2.3 Closed season possession limits for monkfish limited access vessels

The possession limits for limited access vessels when no quota is available would be the same as non-preferred alternative 1 (Section 8.1.4.4.1.1).

#### **8.1.4.4.2.3 Framework adjustments**

The same measures and adjustment process described in non-preferred alternative 1 (Section 8.1.4.4.1.5) would apply.

#### **8.1.4.4.3 Non-preferred alternative 4**

##### **Days-at-sea effort control**

Like non-preferred alternative 1, the days-at-sea effort control alternative would establish regulations for two broadly-defined monkfish fishing sectors (Table 82). Vessels that target other species and have a modest monkfish bycatch would be regulated by other FMPs, but would have limits on the amount and size of monkfish that could be landed. Any vessel permitted in another fishery (e.g. sea scallops, summer flounder, multispecies) or participating in an unregulated fishery would be able to land their monkfish bycatch up to the trip limit considered to be customary in that fishery. Vessels would not have to qualify to land monkfish bycatch based on historic participation by that vessel. Vessels fishing in some fisheries, however, have negligible monkfish bycatch (e.g. surf clam fishery) and would not be able to land monkfish.

**Table 82.** Classification of vessels for non-preferred alternative 4.

<b>Class</b>	<b>Qualification criteria</b>	<b>Trip limit while fishing a monkfish-only day-at-sea</b>	<b>Trip limit when not fishing under a monkfish-only day-at-sea</b>
Limited entry fishery	Based on historic performance	No trip limit	Trip limit ranging from 100 to 1,000 pounds tail weight or 332 to 3,320 pounds whole weight
Bycatch fishery	Must have a permit to fish for another federally regulated species	No allocations of monkfish-only days-at-sea apply. Trip limits while fishing in another fishery based on historic distribution of landings within broadly defined fisheries and/or based on maximum ratios of monkfish to total weight of fish on-board	

The other fishing sector would be vessels that target monkfish on an entire fishing trip or only for portions of a trip. These vessels, fishing on a monkfish-only day-at-sea, could land their entire catch of monkfish, subject to limitations on minimum size and liver to tail landings ratios. Unlike non-preferred alternative 1, however, the limited access vessels could fish their monkfish-only days-at-sea at any time, except for the spawning closure from April 1 to June 30. Each vessel would be allocated the same number of days (i.e. a fleet allocation) to target monkfish.

Unlike preferred alternative 3, the fleet days-at-sea allocations vary based on the target TAL for the monkfish-only fishery and the number and monkfish landings history of qualifying vessels. Days-at-sea allocations would be lower for less restrictive qualification criteria and bycatch trip limits. In the first case, more vessels would generate more monkfish landings per fleet day-at-sea. In the second case, the target TAL for the monkfish-only fishery would be lower because the expected bycatch is higher.

Vessels would be eligible to participate in this fishery to target monkfish if their historic landings of monkfish exceeded the qualification criteria. The Council will choose one of three possible qualification criteria for

the final amendment. One of the possible criteria is non-preferred because it gives unreasonably small days-at-sea limits.

Multispecies limited access vessels that qualify for the monkfish-only fishery could choose to forfeit their monkfish-only days and target monkfish during a multispecies day. These vessels would be required to make an annual declaration at the start of the fishing season. This exception would be advantageous for vessels that fish in a mixed fishery where monkfish are one of the targeted fisheries to fish a multispecies day-at-sea and retain their entire catch of monkfish.

The management measures in common to all three alternatives would apply to these vessels. The minimum size and liver to tail ratios would apply to both fishery sectors. The minimum mesh size would apply only to the limited access fishery. Dealer permits would be required of any primary dealer that accepts the landings of monkfish, whether from targeted fishing activity or from bycatch of monkfish. Vessel and operator permits for monkfish would only be required of vessels that qualify for limited access and the captains that operate them. Logbook data would be required of any vessel that qualifies for limited access or any other vessel that otherwise would be required to submit a logbook for another fishery, eg, sea scallops, multispecies, summer flounder, etc.

#### **8.1.4.4.3.1     *Monkfish possession limits***

In addition to the common management measures that apply to any monkfish landings (minimum size, maximum liver to tail landings ratio, mandatory reporting), a trip or possession limit would apply to vessels that do not qualify for monkfish limited access.

##### **8.1.4.4.3.1.1 Day-at-sea controlled fisheries**

One of the following two options would be chosen by the Council depending on the monkfish limited access qualification criteria selected. The reason for the difference is to allow for a 50 days-at-sea fleet allocation if reasonable adjustments to the proposed trip limit achieved sufficient reductions in bycatch and a corresponding increase in the target TAL allocation for the limited access fishery.

- a)     Vessels fishing a multispecies or sea scallop day-at-sea would be unable to land more than 200 pounds tail weight or 664 pounds whole weight of monkfish per day-at-sea. For example, a vessel landing monkfish after a 4 day trip would be able to land 800 pounds of monkfish tails (plus 200 pounds of livers). Another vessel landing monkfish after a 15 day trip would be able to land 3,000 pounds of monkfish tails (plus 750 pounds of livers). This trip limit would be chosen if the limited access qualification criteria is either one pound, one trip or 50,000 pounds tail weight from February 28, 1991 to February 27, 1995 (Table 68),
- or,       b)     Vessels fishing a multispecies or sea scallop day-at-sea would be unable to land more than 175 pounds tail weight or 581 pounds whole weight of monkfish per day-at-sea. For example, a vessel landing monkfish after a 4 day trip would be able to land 700 pounds of monkfish tails (plus 175 pounds of livers). Another vessel landing monkfish after a 15 day trip would be able to land 2,625 pounds of monkfish tails (plus 656 pounds of livers). This trip limit would be chosen if the limited access qualification criteria is the third option (Table 68).

##### **8.1.4.4.3.1.2 Exempted fisheries**

The Councils will choose a possession limit that is between zero and ten percent of the total weight of fish on board. The limit selected by the Councils will depend on public comment on the proposed bycatch limit and on the distribution of landings per trip that indicate amounts of unavoidable bycatch in each fishery.

At the upper end of the possible range, vessels fishing in an exempted fishery (other than summer flounder) would be able to possess no more than 10 percent of the total weight of fish onboard. This possession limit would

apply to the summer flounder fishery and the squid, mackerel, and butterfish fisheries conducted in the Mid-Atlantic region. For example, a vessel with 900 pounds of summer flounder on board would be able to retain 100 pounds of monkfish tails and livers.

#### **8.1.4.4.3.1.3 Summer flounder vessels**

Vessels with a summer flounder permit that are fishing for summer flounder could retain monkfish as long as they amount to no more than 10 percent of the total weight of fish onboard. In other words, a permitted vessel fishing with regulated mesh and 1,500 pounds of flounder and other fish would be able to retain and land 167 pounds of monkfish tails and livers. If the livers from the monkfish weighed 25 percent of the total tail weight, then the vessel could have 33 pounds of livers and 134 pounds of tails.

#### **8.1.4.4.3.2 *Multispecies fishery measures***

The following management measures would apply to any vessel operating under a multispecies limited access permit, either a days-at-sea or an exempted category.

##### **8.1.4.4.3.2.1 Declared days out of the fishery**

Specified periods to protect groundfish spawning when multispecies vessels are required to declare out of the fishery would also apply to multispecies days-at-sea used to target monkfish. Multispecies days-at-sea vessels that have declared out of the multispecies fishery, for any reason including the fulfillment of its 20 day out periods, would be prohibited from possessing monkfish.

##### **8.1.4.4.3.2.2 Eligibility for monkfish-only days-at-sea**

Vessels with multispecies permits may qualify for monkfish limited access and receive additional monkfish fleet days-at-sea to target and retain only monkfish. In many cases, these qualifying vessels will have qualified based on their monkfish landings in a mixed fishery. This condition often exists in the Gulf of Maine, where vessels target American plaice, winter flounder, and monkfish.

These vessels would be given credit for their monkfish history by qualifying for monkfish limited access. Instead of forcing these vessels with qualifying monkfish history to discard their monkfish catches above the trip limit, they would be able to target monkfish and regulated multispecies without a monkfish trip limit if they forfeit their monkfish-only days-at-sea. Each qualifying vessel with a multispecies permit would make an annual declaration at the start of the fishing season whether to forfeit its monkfish-only days-at-sea and fish its multispecies days without a monkfish trip limit. Trips where monkfish were targeted would count against the vessel's multispecies days, even if monkfish was the only landed species.

##### **8.1.4.4.3.2.3 Multispecies vessels that are exempt from the days-at-sea requirements**

Some multispecies vessels are exempt from the multispecies days-at-sea limits, because of vessel size or type of gear used. These vessels (rod and reel or handline permits, and vessels 30 feet and electing not to fish under days-at-sea) can now retain up to 300 pounds of cod, haddock, and yellowtail flounder on a fishing trip [§648.82(b)(3)].

One of the following two monkfish possession for exempted multispecies vessels would be chosen by the Council before submitting the final amendment to the Department of Commerce:

- a) Possession of monkfish would be included within the existing 300 pound limit. In other words, no more than 300 pounds of cod, haddock, yellowtail flounder, or monkfish could be retained by these vessels on a fishing trip,

- or      b) Possession of monkfish would be limited to 100 pounds tail weight or 332 pounds whole weight. In other words, these exempted multispecies vessels would be able to retain up to 300 pounds of cod, haddock, or yellowtail flounder; plus up to 100 pounds of monkfish tails or 332 pounds of whole monkfish.

#### **8.1.4.4.3.3    *Limited access fishery measures***

The limited access fishery would be managed by limiting the number of vessels that can land monkfish in excess of the trip limits and by restrictions on fishing time. The amount of time fishing for monkfish would be monitored via a call-in, VMS, or another certified method. A qualifying vessel can choose when to fish for monkfish under the days-at-sea program and the days absent from port would be deducted from each vessel's fleet allocation.

Limited access would be based on the vessel's historic participation from February 28, 1991 to February 27, 1995 [the monkfish control date]. They must comply with guidelines in control date notice to be eligible for qualification. Pre-qualification would be based on official weighout/dealer records. Vessels without sufficient landings in the official weighout/dealer data base would be allowed to certify other sources of supporting evidence during a verification period.

##### **8.1.4.4.3.3.1 Qualification criteria**

One of three methods (Table 68) would be chosen by the Councils to qualify vessels to participate in a monkfish-only fishery controlled by days-at-sea. One method [one pound of monkfish (in any form) on one or more trips] is non-preferred because it is expected to qualify too many vessels and allow a reasonable fleet allocation that meets the biological TAL objectives. Two qualification options based on historic participation from February 28, 1991 to February 27, 1995 are preferred for non-preferred alternative 4:

- A. Documented monkfish landings exceeding 50,000 pounds tail weight
- B. Documented landings that meet one of the following criteria:
  - a) for vessels less than 51 gross registered tons, monkfish landings of at least 750 pounds tail weight or 2,490 pounds whole weight on 15 or more trips, or
  - b) for any vessel, monkfish landings of at least 1,000 pounds tail weight or 3,320 pounds whole weight on 50 or more trips, or
  - c) for any vessel, monkfish landings of at least 5,000 pounds tail weight or 16,600 pounds whole weight on 8 or more trips, or
  - d) for any vessel, monkfish landings of at least 10,000 pounds tail weight or 33,200 pounds whole weight on 5 or more trips.

##### **8.1.4.4.3.3.2 Fleet days-at-sea allocations**

Limited access monkfish vessels would be allotted multispecies fleet days-at-sea to target and land only monkfish in fisheries that have been declared exempt from the groundfish regulations because of their low catch of regulated groundfish. These vessels would be required to use appropriate mesh and would not be allowed to retain other regulated species.

The TAL objectives for non-preferred alternative 4 are the same ones adopted by the Council for the other alternatives. The fleet days-at-sea allocations would be set at levels calculated to achieve landings equal to the target allocation of landings for the monkfish-only fishery. This target allocation of landings is determined by deducting the expected annual bycatch from the annual TAL objectives.

The TAL for the fishing year beginning July 1, 1996 is 5,500 mt whole weight in the NFMA and 8,500 mt in the SFMA. Based on historical landings, adjusted for the regulations already in place for multispecies, sea

scallops, and summer flounder and adjusted for the proposed non-preferred alternative 4 trip limits (Section 8.1.4.4.3.1), the Council anticipates the landings of monkfish from fisheries managed via trip limits to be 1,877 mt in the NFMA and 2,805 mt in the SFMA. This expected landings would leave 9,318 mt to be allocated to the limited access fishery in the fishing year beginning July 1, 1996 (Table 83). This allocation would not be further subdivided by management area, because the number of vessels would be determined by an area non-specific qualification criteria. Vessels in the limited access fishery will, therefore, be able to fish anywhere within U.S. waters for monkfish.

During the second year of management, beginning July 1, 1997, the annual target allocation for the limited access fishery would be determined by deducting the expected bycatch from the TALs for that year. The TAL objective for the second year would be 3,000 mt in the NFMA and 6,000 mt in the SFMA. The expected bycatch during the same time period is 1,560 mt and 2,493 mt, respectively (Table 83). This calculation would leave an allocation of 5,001 mt for the limited access fishery.

The limited access target allocation would remain constant at 5,001 mt each year through year seven (2001). Reductions in bycatch between fishing year 1998 and fishing year 2002 would contribute to reducing fishing mortality toward the overfishing definition threshold (Section 3.4.1.1).

Although it is difficult to anticipate all the changes in monkfish bycatch that might occur in other regulated fisheries over the next seven years, the TAL objective to meet the overfishing definition threshold mortality would be 2,148 mt in the NFMA and 4,927 mt in the SFMA. The expected bycatch for the same period is 1,467 mt in the NFMA and 1,984 mt in the SFMA, leaving 3,624 mt for the limited access fishery.

**Table 83.** Expected TAL allocations between the bycatch and directed monkfish fisheries for non-preferred alternative 4, with a 200 pound per day-at-sea bycatch allowance for vessels fishing during a multispecies or scallop day-at-sea. These estimates take into account the affect of the mortality reduction programs that have already taken place, or are scheduled to take place, according to the multispecies, sea scallop, and summer flounder FMPs. All results are expressed in metric tons of whole weight.

Year beginning July 1	Total allowable landings		Expected fishing mortality		Expected landings with trip limits and multispecies DAS		Target allocation, monkfish- only fishery
	Northern area	Southern area	Northern area	Southern area	Northern area	Southern area	
1991-1993					6,505	10,488	
1996	5,500	8,500	0.13	0.37	1,877	2,805	9,318
1997	3,000	6,000	0.07	0.26	1,560	2,439	5,001
1998	2,969	5,849	0.07	0.26	1,529	2,288	5,001
1999	2,969	5,849	0.07	0.26	1,529	2,288	5,001
2000	2,938	5,697	0.07	0.25	1,498	2,136	5,001
2001	2,907	5,545	0.07	0.24	1,467	1,984	5,001
2002	2,148	4,927	0.05	0.22	1,467	1,984	3,624

Similar calculations were performed using a 175-pound tail weight per day-at-sea trip limit to determine the target allocations under this condition. The annual expected landings from bycatch and the remaining target allocations for the limited access fishery are given in Table 84.

The monkfish landings histories of eligible limited access vessels under each qualification criteria option was analyzed to determine how many fleet days-at-sea could be allocated. The days-at-sea allocation depends on the number of qualifying vessels and the target annual allocation of monkfish landings.

**Table 84** Expected TAL allocations between the bycatch and directed monkfish fisheries for non-preferred alternative 4, with a **175 pound per day-at-sea bycatch allowance** for vessels fishing during a multispecies or scallop day-at-sea. These estimates take into account the affect of the mortality reduction programs that have already taken place, or are scheduled to take place, according to the multispecies, sea scallop, and summer flounder FMPs. All results are expressed in metric tons of whole weight.

Year beginning July 1	Total allowable landings		Expected fishing mortality		Expected landings with trip limits and multispecies DAS		Target allocation, monkfish-only fishery
	Northern area	Southern area	Northern area	Southern area	Northern area	Southern area	
1991-1993					6,505	10,488	
1996	5,500	8,500	0.13	0.37	1,647	2,498	9,854
1997	3,000	6,000	0.07	0.26	1,372	2,173	5,455
1998	2,969	5,849	0.07	0.26	1,346	2,038	5,455
1999	2,969	5,849	0.07	0.26	1,346	2,038	5,455
2000	2,938	5,697	0.07	0.25	1,320	1,903	5,455
2001	2,907	5,545	0.07	0.24	1,295	1,768	5,455
2002	2,148	4,927	0.05	0.22	1,295	1,768	4,012

Under qualification option 1 (one pound, one trip), there are 1871 vessels in the NMFS weightout data that meet this criterion. During the 4-year qualification period, these vessels landed an average of 19,110 mt per year. The total days on trips landing monkfish averaged 48 per vessel, but only 5 days per vessel for trips where monkfish contributed to more than 20 percent of the total landed revenue (Table 85). Only 255 out of the 1871 qualifying vessels had at least one trip where more than 20 percent of total landed revenue came from monkfish. Based on the landings history of these qualifying vessels, the Council would allocate 18 days-at-sea in the fishing year beginning May 1, 1996 and 7 days-at-sea in the fishing year beginning May 1, 1997. These days-at-sea limits are estimated to produce landings of 9,318 mt during 1996-1997 and 5,001 mt during 1997-1998 (Table 86).

Three hundred and sixteen (316) vessels would qualify under option 2, according to NMFS weighout data. During the 4-year qualification period, these vessels landed an average of 14,346 mt per year. The total days on trips landing monkfish averaged 132 per vessel, but only 22 days per vessel for trips where monkfish contributed to more than 20 percent of the total landed revenue (Table 85). Only 88 out of the 316 qualifying vessels had at least one trip where more than 20 percent of total landed revenue came from monkfish. Based on the landings history of these qualifying vessels, the Council would allocate 40 days-at-sea in the fishing year beginning May 1, 1996 and 13 days-at-sea in the fishing year beginning May 1, 1997. These days-at-sea limits are estimated to produce landings of 9,318 mt during 1996-1997 and 5,001 mt during 1997-1998 (Table 86).

One hundred and fourteen (114) vessels would qualify under option 3, according to NMFS weighout data. During the 4-year qualification period, these vessels landed an average of 7,418 mt per year. The total days on trips

landing monkfish averaged 131 per vessel, but only 37 days per vessel for trips where monkfish contributed to more than 20 percent of the total landed revenue (Table 85). Only 48 out of the 114 (42%) qualifying vessels had at least one trip where more than 20 percent of total landed revenue came from monkfish.

The target annual allocation of landings for this option is slightly higher than that for options 1 and 2. This occurs because the bycatch trip limits is lower and the landings from this fishing sector are correspondingly reduced. The target allocation of landings to the limited access fishery is therefore increased to 9,854 mt in the first year and 5,455 in the second. These allocations would allow the Council to allocate 200 days-at-sea in the fishing year beginning May 1, 1996 and 50 days-at-sea in the fishing year beginning May 1, 1997. Many of the limited access qualifiers, under this option do not have a history of targeting monkfish for 200 days per year. The average number of days for trips landing monkfish is 131. Even though the estimated monkfish landings by qualifiers do not exceed the target allocation in the first year, the Council would set a precautionary cap at 200 days. This precautionary regulation would prevent vessels from making back-to-back trips to intensively target monkfish.

**Table 85.** Non-preferred alternative 4: Days-at-sea allocations for any vessel that qualifies for a limited access monkfish permit based on historic participation.

	Number of vessels qualifying via NMFS weighout records	Base landings (mt)	Average DAS from 1991 to 1994		DAS allocations for each vessel	
			All vessels	Vessels with 20% or more revenue from monkfish	1996	1997 and beyond
Option 1 - One pound of monkfish on one or more trips	1871	19,110	48	5	18	7
Option 2 - Monkfish landings exceeding 50,000 pounds tail weight	316	14,346	132	22	40	13
Option 3 - 10,000 pounds tail weight on five or more trips, etc.	114	7,418	131	37	200	50

**Table 86.** Non-preferred alternative 4: Target landings and days-at-sea allocations for the monkfish-only fishery. These allocations for options 1 and 2 would require the bycatch trip limit to be 200 pounds tail-weight per day-at-sea. The allocations for option 3 would require a bycatch trip limit of 165 pounds tail-weight per day-at-sea.

	Number of vessels qualifying via NMFS weighout records	Target annual allocation (mt)		Annual allocation per vessel (pounds, tail weight)		DAS allocations for each vessel	
		1996	1997 and beyond	1996	1997 and beyond	1996	1997 and beyond
Option 1 - One pound of monkfish on one or more trips	1871	9,318	5,001	3,307	1,775	18	7
Option 2 - Monkfish landings exceeding 50,000 pounds tail weight	316	9,318	5,001	19,581	10,509	40	13
Option 3 - 10,000 pounds tail weight on five or more trips, etc.	114	9,318	5,001	54,277	29,131	200	50

#### **8.1.4.4.3.3.3 Closed seasons**

Monkfish-only days-at-sea would be allotted to qualifying vessels only during July 1 to March 31, inclusive. No directed monkfish effort would, therefore, be allowed during April to June. This allocation of days is intended to allow more landings during the early winter season when prices, especially liver prices, are higher. The seasonal allocation would also be weighted to reduce monkfish landings during the spawning season (April to June), when monkfish are more vulnerable to exploitation.

#### **8.1.4.4.3.3.4 Closed season possession limits for monkfish limited access vessels.**

Monkfish vessels would be regulated by a reduced trip limit when the monkfish limited access fishery was closed. Monkfish landings by these limited access vessels would continue to be counted against the quota, even though the cumulative monkfish landings to date already exceeded it. The additional monkfish landings by limited access vessels, even though controlled by a restrictive trip limit, would create a quota overage. NMFS would make adjustments in the following two fishing seasons, under the framework notice action procedure, to account for the previous overage.

The Council will choose a trip limit based on public comments for one of the two trip limit options: a) 100 pounds tail weight or 332 pounds whole weight, or b) 1,000 pounds tail weight or 3,320 pounds whole weight.

#### **8.1.4.4.3.3.5 Framework adjustments**

Framework measures that are common to all three non-preferred alternatives (Sections 8.1.4.4.1, 8.1.4.4.2, and 8.1.4.4.3) could be adjusted to meet the monkfish TALs or other objectives. In addition to these frameworks, the following management measures within non-preferred alternative 4 could also be adjusted through framework action.

##### ***8.1.4.4.3.3.5.1 Fleet days-at-sea allocations***

Fleet days-at-sea could be adjusted, up or down, to ensure that the biological objectives are not exceeded. Landings and catches would be compared to the respective TAL and TAC objectives for cod, haddock, yellowtail flounder, and monkfish together when days-at-sea adjustments are considered. The Council's intent, specifically regarding adjustments for monkfish, is to invoke a days-at-sea adjustment only when adjustments to other management measures cannot meet the biological objectives of the amendment.

##### ***8.1.4.4.3.3.5.2 Number of gillnets per vessel***

If days-at-sea limits are ineffective in controlling gillnet effort on monkfish, the Council may place limits on the number of nets a monkfish-only vessel may fish. This limit would be based on the physical vessel characteristics that are defined in the vessel upgrading restrictions (Section 4.2.1.2) rather than on a vessel's history of net use. Basing the limitation on the vessel's physical characteristics will prevent the proliferation of gear and speculative increases in gear deployment in anticipation of future reward, since upgrading vessel characteristics is restricted.

#### 8.1.4.4.4 Other actions considered during scoping

##### 8.1.4.4.4.1 *Following scoping hearings*

Many alternatives, common to fisheries management throughout the world, were considered at the initial round of scoping hearings. Although management often uses these strategies in other fisheries, few scoping comments supported these approaches because of few data available at that time would allow the Councils to recommend a specific limit or because commenters felt the measures would be ineffective. As more information became available, especially the offshore extent of the resource and the total harvestable biomass, gear selectivity, stock/recruitment relationships, and current exploitation rates, some of the following alternatives were ultimately adopted by the Councils for inclusion in the preferred alternative. The measures listed below are included to document the breadth of strategies that the Councils considered during plan development. A brief summary of the various measures is given to indicate what the thoughts about the measures were at the time of the initial scoping hearings.

###### 8.1.4.4.4.1.1 Gear restrictions for directed fisheries

These measures have similar benefits as described for a minimum mesh size measure. Gear restrictions would be important in implementing some of the management measures such as effort control and minimum size limits. The morphology of monkfish complicates the implementation of minimum mesh sizes to achieve a minimum size (age) at first capture.

###### 8.1.4.4.4.1.2 Closed seasons

Monkfish are taken largely as a bycatch in the groundfish and scallop fisheries although directed effort appears to be increasing. It is likely that closed seasons would only be effective in controlling the directed portion of the fishery (the minority at this time). Landing prohibitions could be effective in reducing exploitation during periods of the year when the resource is concentrated (i.e., if spawning aggregations form) but would be less effective in the non-directed portion of the fishery, especially if discard mortality is high.

Although monkfish appear to be concentrated in certain areas during the spring and fall research surveys, insufficient information exists to justify prohibiting fishing for monkfish within certain seasons. Spawning is known to occur in May and June in areas south of Georges Bank and later in the year in the Gulf of Maine. Specific spawning aggregations, when monkfish might be more susceptible to capture, have not been observed and cannot be defined. Closed seasons, therefore, are not likely to be effective in controlling fishing mortality and protecting spawning activity unless they encompassed a very broad area and a long season. Because of the large proportion of monkfish landed as bycatch, such a broad closure would be very costly to fishermen fishing for other species.

###### 8.1.4.4.4.1.3 Closed areas

The pros and cons for closed areas are basically the same as those for closed seasons, but with one important difference. If an area is closed to the use of gears known to take monkfish, reductions in exploitation could result (because fishing is prohibited). Additional benefits would accrue in terms of yield if areas where small monkfish concentrate were closed to fishing.

The public commented during scoping hearings that this alternative would be preferable if areas that have high concentrations of small monkfish could be identified. Fishermen believed that they are able to avoid small fish when they occur. Unfortunately, these areas often change, can be relatively small, and cannot be predicted. Although this alternative is not currently a viable option, it may be effective in reducing mortality on small fish if seasonal aggregations of small, immature fish can be identified.

#### **8.1.4.4.4.1.4 Quotas**

Quotas could take one of several forms. The most common form of quota management is an annual quota (referred to as Total Allowable Catch or TAC under the Magnuson Act), usually set to correspond to some target level of annual exploitation. Annual quotas can be effective in reducing exploitation only if all fishing ceases once the quota has been reached. If fishing is allowed to continue once the quota has been reached and discard mortality rates are high, then additional mortality may occur with no resultant economic return to the fishery. In addition, under open access conditions, annual quotas usually lead to derby type fisheries with their shortened fishing seasons and resultant economic inefficiencies. This can be further compounded if the number of vessels allowed to participate in the fishery is not restricted since the economic rent will be dispersed amongst a greater number of vessels.

Individual Transferable Quotas (ITQ's) are a relatively new management technique where a total quota is divided into small parts and allocated to individual participants. Individual quotas or shares could be bought, sold or leased so that harvesters have flexibility in planning their fishing activities. Potential advantages of ITQ's include increased profits, greater economic stability, improved product quality, improved safety, reduced gear conflicts and losses, elimination of the race for fish, bycatch reduction, an improved investment climate, reduction of market gluts, and reduction in post-harvest waste (Anderson 1992). Potential disadvantages of ITQ's include increased high-grading, under-reporting of catch, enforcement costs and problems, creation of a "rich mans club", changes in the makeup of the fishing fleet, and potential inequities of the initial allocation of quota shares (Anderson 1992).

There was almost no public support for quota management during scoping hearings, especially the total stock biomass cannot be currently estimated. Many felt that the above disadvantages greatly outweighed the potential benefits. In addition, the high proportion of landings occurring as a bycatch and the high discard mortality noted in preliminary studies would greatly diminish the potential management control over total mortality rates.

#### 8.1.4.4.4.1.5 Trip limits

Trip limits have been used as a tool to extend the fishing season in the US West Coast groundfish and the Atlantic large coastal shark fisheries. The primary purpose of these trip quotas is to slow the rate of landings to enable the fishery to operate year round. Significant discard mortality has been identified as a major problem with this management strategy (Pikitch et al. 1988). Trip limits could be effective if the goal of management is to limit directed effort and to maintain a bycatch fishery only.

The maximum amount of removals as a proportion of total harvestable biomass has not been defined because the offshore extent of the stock is unknown. Until this occurs or unless significant declines in biomass on the shelf edge are observed, there is considerable reluctance to limiting the directed fishery for monkfish to maintain a primarily bycatch fishery. Other fisheries in the northeastern US are facing severe management-imposed restrictions and the offshore monkfish resource could offer a viable alternative to these displaced fishermen. The primary objective of the preferred alternative is to improve yield per recruit and prevent overfishing on immature monkfish. Trips limits would do little to achieve these goals.

#### 8.1.4.4.4.1.6 Moratorium on vessels

Over-capitalization and excess harvesting capacity is now recognized as a major problem facing the US fishing industry (USDC 1991). As catch and effort restrictions are implemented through various management plans and their amendments, increased pressure on non-traditional species such as monkfish through a transfer of effort is likely to occur.

Quotas or limits on fishing effort are not currently being proposed within the FMP, and therefore no limits on entrants are needed to protect the effectiveness of those measures or to maintain profitability of existing participants in the monkfish fishery. Many public comments were made in favor of maintaining an open access fishery as an alternative to fishing for other regulated species that face severe management restrictions. The Council desires to maintain this alternative fishery without entry criteria by reducing the catch of small, immature monkfish.

#### 8.1.4.4.4.1.7 Effort restrictions

Another management tool used to control exploitation in other fisheries is to place limits on total effort of the fleet. Control may be accomplished through restrictions placed on the number of days-at-sea for individual vessels such that total effort equals the desired level (i.e., to achieve some prescribed level of fishing mortality). Effort controls have the advantage of reducing exploitation and maintaining a year round fishery without promoting discards. A disadvantage is that without control of entry into the fishery, individual effort would be restricted without controlling total effort exerted by the fleet. Monitoring and enforcement could also be difficult and expensive.

Presently, there are no precise exploitation goals or thresholds for monkfish. Coupled with the cost of implementing an effort monitoring system, unless fishing mortality can be estimated, there is no justification to limit total fishing effort.

#### **8.1.4.4.4.1.8 Special management zones**

This technique has been suggested for management of species associated with reefs or other types of hard bottom. While not applicable to monkfish on a biological basis, special management zones could be incorporated into the management program to help ameliorate gear conflicts.

During 1992 and 1993, the Council coordinated a series of industry meetings to facilitate voluntary agreements among fishermen to reduce gear loss and conflict. As a result of these efforts, gear loss and conflicts have been reduced although some fishermen lost access to otherwise productive fishing grounds. By operating under the guidelines of a gear conflict resolution, these fishermen have avoided gear loss by fishing in certain areas and allowing other fishermen access to other grounds. The Councils are satisfied with the progress made in this framework, but other areas may need this attention. As a result of these efforts, the Councils are content with the progress and feel that management measures are not currently required to address these problems.

#### **8.1.4.4.4.1.9 Effort monitoring system**

There is currently no management reason to monitor effort, either days-at-sea or days fished. Such a system is most often used to limit fishing time or to ensure compliance with closed areas as a way to reduce fishing mortality. These management measures have not been recommended, and therefore effort monitoring is unnecessary.

#### **8.1.4.4.4.1.10 List as a regulated species**

Since monkfish are taken largely as a bycatch in the mixed species groundfish fishery, the species might be regulated through the Multispecies FMP. Initially monkfish could be handled in a manner similar to whiting with management measures deferred until more information is available concerning size/age composition of the landings, fishing mortality rates, etc.

The Council considered this alternative instead of developing a stand-alone FMP. Although many of the fishing vessels are regulated through their participation in the groundfish fishery, many landings occur as a bycatch to scalloping and from directed fishing effort with anchored gillnets. Some additional directed fishing effort for monkfish with otter trawls may be occurring by vessels who were excluded from groundfishing by Amendment #5 to the Multispecies FMP. Monkfish also range much further southward than many of the regulated groundfish species, raising the potential for vessels to be targeting monkfish who are not qualified under the Multispecies FMP moratorium.

These other fishing activities and the question of what management measures for groundfish would apply to directed fishing for monkfish made this alternative complicated and unworkable. Would the much larger groundfish fleet be allowed to direct additional fishing effort for monkfish? Would vessels that qualify for a permit via their historic catches of monkfish be then allowed to fish for groundfish? What management measures for groundfish would apply to monkfish? Should monkfish effort be reduced through restrictions on days-at-sea? The Councils' found these questions vexing and determined that monkfish management would be simplified and better administered under a separate FMP.

#### **8.1.4.4.4.2      *Management Options Considered During Development of this Amendment***

After the Groundfish PDT concluded that the initial draft Monkfish FMP would not prevent overfishing, the Councils undertook a comprehensive evaluation of all possible fishery management measures that could conceivably be used to manage monkfish. Initially, the Councils considered single management measures and assigned pros and cons to them based on the potential conservation benefits, effectiveness, and limitations of each

measure as they relate to the monkfish fishery. The following table summarizes the attributes of the management measures that were considered during this phase:

**Table 87.** Pros and cons of individual management measures for the monkfish fishery.

Management measure	Conservation benefit or effectiveness	Limitations
Mesh limits	Improve yield per recruit. Allow spawning. Directly control age at entry.	Poor selectivity. Applicable only to directed fishery. High enforcement costs and potentially low compliance.
Area closures	Protection for small fish if areas can be identified. Protection for other species as well.	Shifts in effort occur. Monkfish are widely distributed. It would prevent fishing for other species not in need of protection. Areas would be difficult to identify and quantify. High enforcement costs.
Quotas / Total Allowable Catch	Directly controls fishing mortality. Easy to implement. Restricts displaced effort into monkfish fishery. Allows fishermen in other restricted fisheries to fish for monkfish.	Encourages more fishing. Inefficient harvesting and market policy. Negatively affects truly 'directed' fishermen. Causes increased discarding. High enforcement and monitoring costs. Potential for low compliance. May cause effort shifts into other fisheries.
Individual Quotas	Directly controls fishing mortality. Efficient harvesting and market strategy. Could match allowable catch with vessel capabilities.	Making initial allocations, defining criteria. May under-harvest full potential of the fishery. Costly to monitor and enforce. Increases discarding through high-grading.
Individual Transferable Quotas	Directly controls fishing mortality. Promotes efficiency. Allows fishermen to harvest the full potential of the fishery.	Making initial allocations, defining criteria. Costly to monitor and enforce. More costly to administer. Privatizes a public resource. Potential for market control and monopolization.
Size Limits and liver landing limits	Other existing restrictions provide some	No control over exploitation.

<b>Management measure</b>	<b>Conservation benefit or effectiveness</b>	<b>Limitations</b>
(previous preferred alternative)	control.	Possible large effort shifts into monkfish fishery. Causes increased discarding. Implementation problems.
Days-at-sea limits to fish for monkfish.	Directly controls fishing mortality.  Allows flexibility to fish for other species.  Doesn't disrupt supply.  Minimizes discarding.  Could be applied by area.	Needs controls on fishing power.  Need to limit new entrants to be effective.  Defining qualifying criteria (everyone may qualify).  May not achieve objectives.  High monitoring and enforcement costs.
Trip Limits	Promotes a year-round fishery.  Discourages increased directed effort.  Allows by-catch fishery to continue.	Benefits small vessels while harming large vessels.  Causes increased discarding via high-grading.  Requires other management controls.  High enforcement costs, potential for low compliance.  Setting a trip limit to achieve target.

It was quickly apparent, when the Councils began developing a more comprehensive management strategy, that no one management measure would suffice. The fisheries that depend on monkfish have fishermen using different gears to land monkfish as a bycatch or as a targeted species. These fisheries also differed in broadly defined areas, due to existing fisheries and geographical associations with other species.

Any one measure, therefore, had negative consequences and compliance problems for one or more fisheries. During this initial evaluation, several combinations of measures were suggested that would effectively regulate one or more components of the monkfish fisheries. The Council also assigned pros and cons to the combined measures based on the potential conservation benefits, effectiveness, and limitations of each measure as they relate to the monkfish fishery. The following table summarizes the attributes of the combined management measures. Some of these combined measures, or variants of them, were included within the proposed management alternatives.

**Table 88.** Pros and cons of strategies or combinations of management measures for the monkfish fishery.

Management measure	Conservation benefit or effectiveness	Limitations
Directed fishery quota with limited access to a directed fishery, and a trip limit that takes effect after the directed fishery quota is filled.	Easy to implement. Allows flexibility to fish for other species. Restricts displaced effort.	Inefficient harvesting and market policy. Encourages fishing. Negatively impacts truly 'directed' fishermen
Individual Quotas with limited entry to directed fishery.	Same as individual quotas, but allows harvesting of full fishery potential.	Same as individual quotas, except lessens the potential under-harvesting of the resource.
Individual Quotas for directed fishery only, trip limits or other controls on by-catch	Cost effective. Efficient harvest strategy. Less costly to monitor, ie fewer vessels to track quotas.	Costly to monitor. Causes increased discarding from trip limit. Making initial allocations, defining criteria.
Two area management, ie.  a) Gulf of Maine and northern Georges Bank b) Southern Georges Bank, Southern New England, and the Mid-Atlantic	Would not cause discarding of groundfish where it would be impossible to catch predominately monkfish.	Need to define and prevent overfishing in two areas which are not entirely distinct.
Existing days-at-sea or quota limits for by-catch/mixed fisheries combined with days-at-sea limits for directed/unregulated fishing for monkfish.	Better minimizes discarding. Applies to mixed fisheries. Reduces administrative and enforcement costs.  More effort reduction for monkfish than possible with separate regulations.  Other benefits as described below.	Allocating days-at-sea for vessels with a history of directed fishing for monkfish.  Benefits small vessels.  Other limitations as described below.
Existing days-at-sea or quota limits for by-catch/mixed fisheries combined with quotas for directed/unregulated fishing for monkfish.	Reduces discarding. Reduces enforcement costs. Increases compliance. Less displaced effort from other regulated fisheries.  Can meet objectives by relying on existing measures.  Uses complimentary fishery management policies.  Other benefits as described above.	May impact unrelated fisheries.  May provide imprecise control over monkfish mortality.  Other management controls may run counter to management goals for monkfish.  Other limitations as described above.

<b>Management measure</b>	<b>Conservation benefit or effectiveness</b>	<b>Limitations</b>
Existing days-at-sea or quota limits for by-catch/mixed fisheries combined with quotas for directed/unregulated fishing for monkfish, trip limits for incidental monkfish catch, and limited entry for a directed fishery.	May provide more precise control for monkfish.	Causes increased discarding arising from a trip limit. Prevents directed fishing effort. Defining qualifying criteria. Would cause complicated regulations.

#### 8.1.4.5 Alternatives outside the Councils' authority

Two types of economic incentives have the potential to reduce mortality or to induce changes in exploitation patterns through technological innovation. Both approaches require authority or funding that the Councils do not have.

##### 8.1.4.5.1 Vessel capacity reduction

Vessels that have a significant contribution to total monkfish mortality would be identified and eligible for a one-time grant or purchase if they relinquished all permits and rights to permits to fish in federal waters. If the program followed a similar procedure as the one used for the groundfish fishery, vessel owners would also transfer the deed to the vessel, allowing the government to scrap the vessel to prevent effort shifts into other unregulated fisheries.

The Councils rejected this approach for initial monkfish management action, because it requires a moratorium on new permits and controls on fishing. It would furthermore require authorization that the Council does not have. Once these controls are in place, it might be economically attractive to remove excess fishing capacity using this program to keep the FMP's management measures from getting too restrictive and causing the remaining vessels in the fleet from becoming uneconomic. A vessel capacity reduction program also provides economic relieve to fishermen that cannot economically continue in the fishery.

##### 8.1.4.5.2 Market based strategies

This alternative includes market based measures which would induce the landing of larger fish. These measures generally involve the allocation of federal funds or modifying the tax code to extract "resource rent". In this case, a "resource rent" might be structured to levy a tax on landings of small monkfish, commensurate with management objectives. The marginal profitability of catching small monkfish in excess of the management objective would be a disincentive to continue fishing on these fish.

Other combinations of financial incentives are possible, but any such proposal is outside the Councils' authority under the Act and would involve federal appropriations and establishing or changing excise taxes.

## **8.1.5 Anticipated Impacts of the Proposed Management Measures – Environmental Consequences**

### **8.1.5.1 Biological Impact Analysis**

The following sections describe the expected biological impacts for each management measure described in Section 4.0. Most of the analysis is focused on the primary management measures that will have the greatest effect on mortality reduction: qualification criteria (Section 4.1.2), days-at-sea allocations and trip limits (Sections 4.3 and 4.6.1), and minimum size limits (Section 4.5.1). The synergistic effects of the individual management measures are described in the Rationale for Adoption of the Preferred Alternative (Section 8.1.2.2.1). Options for management measures included in the preferred alternative are discussed within Section 8.1.5. The biological impacts of management measures included only in the non-preferred alternatives are discussed in Section 8.1.5.1.2.

The impacts of non-preferred alternative management measures are based on analyses conducted for the DSEIS, using 1994 and 1995 data. It was impossible to update the analyses of the non-preferred alternatives using 1995 and 1996 data (the same as the preferred alternative impact analysis) in the short time-frame available to develop the Final FMP and supporting documentation. It is not believed that changes in the fishery during 1996 would have significantly altered the conclusions reached in the DSEIS. Portions of those analyses are given in Section 8.1.4.4, but more detail can be found in the DSEIS.

The primary biological impact of the proposed measure is to reduce fishing mortality for monkfish. It is unclear whether the overall impact on ecosystem productivity is enhanced by rebuilding stock biomass, since monkfish are tertiary predators and feed on many commercially-important species. There are insufficient data to parameterize the trophic relationships between monkfish and other species, enabling an optimization of stock abundance that considers the abundance of other species. Optimum yield, therefore, is independently defined for monkfish. The overfishing definition that complies with the Magnuson-Stevens requirements and meets the new National Standard guidelines requires that fishing mortality not exceed  $F_{threshold}$ , a proxy reference point for FMSY. Biomass will therefore be above  $B_{MSY}$  for the majority of time and conditions, once rebuilding has occurred.

Secondary biological impacts include reduced habitat alteration and reduced bycatch from the proposed restrictions on fishing activity. The FMP proposes to greatly reduce fishing mortality on monkfish through effort reduction by limited access vessels. Other synergistic management actions on fisheries (multispecies, sea scallops, summer flounder) that have a monkfish bycatch will also reduce habitat alteration. These secondary impacts are described on Section 8.1.5.2.6.

#### **8.1.5.1.1 Preferred alternative**

##### **8.1.5.1.1.1 Total allowable catch targets**

The total allowable catch (TAC) targets will allow more rapid management response to inaccurate projections of impacts and to changing conditions. Setting target TACs will allow the Councils to take management action, without conducting a time-consuming full assessment, when the fishery catches significantly exceed (or fall below) the anticipated amount. This provision will have an unquantifiable impact on mortality, monkfish stock biomass, and catches of other species. The benefits of using a target TAC should be positive since more rapid management action should aide in achieving optimum yield from the fishery.

#### *8.1.5.1.1.2 Limited entry qualification criteria*

Limited entry is necessary to insure that other input restrictions have the intended effect on fishing mortality. Without limiting the number of vessels, total days-at-sea allocations would be too high and the directed fishery trip limits would not hold landings at desired levels. The target TACs would be exceeded and the plan would not stop overfishing.

It is not clear if limiting the number of vessels in the monkfish fishery will have a positive or negative effect on habitat alteration or bycatch of monkfish and other species. It is possible that vessels that do not qualify (e.g. vessels that began targeting monkfish after the control date) will target other species. The Fishery Impact Statement (Section 7.0) suggests that many of these vessels will target multispecies or sea scallops if they have a limited access permit for one of those fisheries. If they do not have a limited access day-at-sea multispecies or sea scallop permit, the analysis in the Fisheries Impact Statement indicates that vessels that use trawls are likely to target summer flounder, squid, whiting, and dogfish to the extent that current and future regulations allow. Vessels that do not qualify for a limited access monkfish permit and use gillnets are likely to target dogfish, skates, and coastal migratory species of finfish (e.g. bluefish, croaker, spot, and weakfish).

The following information discusses the number of vessels that qualify, their characteristics, and their landings history during the four-year qualification period, February 28, 1991 to February 27, 1995. The number and size of vessels that qualify with different criteria options are discussed. For the preferred alternative, the analysis compares the landings and economic dependence of vessels that qualify and do not qualify for limited access. Section 8.1.7 provides more details about the distribution and social impacts of the proposed qualification criteria.

On one hand, more qualifying vessels would exceed the biological objectives and mortality goals. On the other hand not qualifying enough vessels would cause increased discarding, due to catches where monkfish was an unavoidable component of total landings. The preferred alternative strikes a balance between these two competing factors.

#### **Preferred option**

The preferred qualification option will allow a significant majority of vessels with high monkfish landings to qualify. The preferred alternative qualification criteria are described in Section 4.1.2. Some of these vessels qualify due to large volumes of landings that occur while the vessel is targeting other species, consistent with the proposed management measures that require existing days-at-sea vessels to use a multispecies or scallop day-at-sea to land monkfish that exceed the bycatch allowances. It is anticipated that many will use their monkfish days to accommodate higher incidental catch of monkfish when it occurs. The proposed criteria will therefore reduce discards while limiting the amount of time that a vessel may target monkfish, within or outside its current allocation of days-at-sea.

Although the preferred alternative qualification criteria are less conservative than non-preferred alternative 3a and 3b, the preferred alternative is still considerably more conservative than the non-preferred alternative 3, taken to public hearings in January 1997 as the preferred alternative. Since all vessels with multispecies day-at-sea permits would have automatically qualified for monkfish limited access, non-preferred alternative 3 would have automatically qualified 1,172 vessels for monkfish limited access<sup>25</sup>.

The preferred qualification criteria will automatically qualify 600 vessels for monkfish limited access, 298 eligible for the higher trip limit while using mobile gear (Table 89). Based on NMFS weight data from the four-year qualification period, there would be 32 (3+4+25) category A permits, 33 (2+10+21) category B permits, 266 (136+102+28) category C permits, and 269 (250+2+17) category D permits. Sixty-five (65) vessels would therefore

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<sup>25</sup> The number of qualifying vessels for non-preferred alternative 3 is slightly different from the estimates taken to public hearings in January 1997 and included in the PDT analysis (PDT Document 1). Since that time, qualification data have been updated to include the exact four-year qualification period, instead of the 1991-1994 calendar years. The number and identity of the vessels in the buyout program have also changed.

be classified as monkfish-only and would receive up to 40 days-at-sea each year to target monkfish. Six of the 65 vessels have summer flounder permits and probably qualify for monkfish limited access due to their incidental landings of monkfish. Five-hundred and thirty-five (535) days-at-sea vessels would qualify for monkfish limited access and could target monkfish during up to 40 of the vessel's multispecies or scallop days-at-sea.

This qualification option qualifies more vessels than either non-preferred alternative 3a or 3b, presented below. Compared to non-preferred alternative 3a, the preferred alternative will qualify more scallop vessels with day-at-sea permits and more monkfish-only (category A and B) vessels. This option will therefore reduce discarding caused by the bycatch trip limits that would apply to scallop vessels that do not qualify for monkfish limited access. Fewer vessels that rely on monkfish landings would be displaced from the monkfish fishery.

**Table 89. Preferred alternative qualification criteria.** Number of vessels that qualify for monkfish limited access by permits currently held by the vessels. Data are from 1,815 vessels that landed at least one pound of monkfish during the qualification period and have not been removed from the fleet by the multispecies buyout program.

Permits currently held by vessel	Will not automatically qualify	Qualifies for low trip limit	Qualifies for high trip limit	Total vessels permitted in 1997
Multispecies DAS	537	250	136	923
Scallop DAS	112	2	102	216
Combination	10	17	28	55
Summer Flounder	58	2	3	63
Other	140	10	4	154
No NERO permit	358	21	25	404
All vessels	1215	302	298	1815

When classified by size of vessel, the vessels that qualify for monkfish limited access appear to have a similar distribution to all vessels that landed monkfish during the four-year qualification period (Table 90). The qualifying vessels tend to be underrepresented in the smaller vessel categories (e.g. less than 30 GRT, possibly because these vessels do not land as much monkfish per year as do the larger vessels. The smaller vessels rely on monkfish landings as much as the larger vessels, when the percent of revenue derived from monkfish landings is summarized by vessel size. These vessels could however continue targeting monkfish under the daily bycatch allowance for day-at-sea vessels. Three-hundred and forty-four (344) of the 617 vessels less than 30 GRT have multispecies permits.

The majority of non-qualifying vessels is under 50 GRT and they fail to qualify with the more liberal criterion, 7,500 pounds tail-weight. Only 10% of the non-qualifiers are between 51 and 99 GRT, potentially missing the 7,500 pounds tail-weight criterion because of vessel size alone. Only 45 of the 172 vessels in this size range have between 7,500 and 50,000 pounds tail-weight during the four-year qualification period. Other choices of a vessel size qualification threshold will have greater proportions of vessels that fall into this situation.

Since monkfish landings during the qualification period is a function of vessel size (Table 91), the vessels that qualify with 50,000 pounds tail-weight (category A and C) tend to be larger vessels, over 100 GRT. This result is compatible with the Councils' management philosophy, giving higher directed fishery trip limits to larger offshore vessels using trawls to target monkfish.

**Table 90. Preferred alternative qualification criteria.** Vessel size by gross registered tonnage (GRT) recorded on the 1997 vessel permit. Only non-buyout vessels that do not have a 1997 vessel permit or that had no monkfish landings during the qualification period are excluded. There were 1,871 vessels that had at least one pound of monkfish landings during the qualification period, but 56 have been removed from the fleet due to the multispecies buyout program. The qualification criteria are given in Section 4.1.2.

GRT on 1997 vessel permit	Will not automatically qualify	Qualifies for low trip limit	Qualifies for high trip limit	Total vessels permitted in 1997
0	41			41
10	187	16	3	206
20	243	43	8	294
30	146	41	6	193
40	68	31	7	106
50	68	26	3	97
60	29	18	6	53
70	40	8	9	57
80	34	11	5	50
90	24	8	9	41
100	78	12	15	105
110	14	9	8	31
120	42	16	24	82
130	34	19	18	71
140	28	12	23	63
150	45	10	19	74
160	18	2	27	47
170	22	9	25	56
180	10	6	19	35
190	15	2	23	40
200	17	2	38	57
220	9			9
240	1		1	2
250			1	1
260		1		1
300			1	1
310	1			1
370	1			1
<b>Grand Total</b>	<b>1215</b>	<b>302</b>	<b>298</b>	<b>1815</b>

The preferred alternative criteria would qualify for monkfish limited access vessels that landed nearly 90 percent of the monkfish during the four-year qualification period (Table 91). A large proportion of those landings came from vessels that would automatically qualify for category A and C limited access permits. There do not

appear to be any vessel categories that landed a large fraction of monkfish landings, but fail to qualify for monkfish limited access.

**Table 91. Preferred alternative qualification criteria.** Monkfish landings (pounds, live weight) during the four-year qualification period by vessel size by gross registered tonnage (GRT) recorded on the 1997 vessel permit. Only non-buyout vessels that do not have a 1997 vessel permit or that had no monkfish landings during the qualification period are excluded. There were 1,871 vessels that had at least one pound of monkfish landings during the qualification period, but 56 have been removed from the fleet due to the multispecies buyout program. The qualification criteria are given in Section 4.1.2.

GRT on 1997 vessel permit	Will not automatically qualify	Qualifies for low trip limit	Qualifies for high trip limit	Total vessels permitted in 1997
0	106,615			106,615
10	564,217	808,183	912,186	2,284,586
20	1,079,315	2,816,079	2,252,888	6,148,282
30	805,790	2,813,884	2,193,641	5,813,315
40	470,119	1,839,964	2,816,194	5,126,278
50	503,455	2,145,388	1,220,975	3,869,818
60	327,834	1,538,735	1,795,054	3,661,623
70	372,445	659,490	3,808,538	4,840,473
80	369,017	745,625	1,055,825	2,170,466
90	372,476	635,522	2,556,389	3,564,388
100	991,234	938,167	6,298,450	8,227,850
110	757,412	645,104	3,477,187	4,879,704
120	1,874,089	1,168,912	8,224,318	11,267,319
130	1,844,746	1,620,176	5,428,564	8,893,485
140	1,445,353	902,153	6,792,279	9,139,785
150	1,258,254	1,045,426	8,574,958	10,878,638
160	615,088	166,387	11,994,965	12,776,440
170	884,605	912,035	12,712,567	14,509,208
180	632,656	636,325	10,145,623	11,414,604
190	584,064	256,473	11,137,940	11,978,477
200	764,012	291,110	16,178,355	17,233,477
220	79,092			79,092
240	110,543		244,950	355,492
250			1,007,240	1,007,240
260		64,488		64,488
300			1,046,232	1,046,232
310	16,909			16,909
370	7,204			7,204
<b>Grand Total</b>	<b>16,836,544</b>	<b>22,649,624</b>	<b>121,875,319</b>	<b>161,361,488</b>

On the other hand, a higher proportion of days absent and trips tend to be taken by vessels that do not qualify for monkfish limited access, indicating that the proposed qualification criteria are truly selecting vessels that are targeting monkfish instead of just the more actively fished vessels. During the four-year qualification period, vessels were at sea for over 300,000 days absent when they landed one or more pounds of monkfish during a fishing trip (Table 92). Nearly vessels that will not qualify for monkfish limited access generated nearly one-third of the fishing effort during trips landing at least one pound of monkfish. About the same fraction of trips were taken by non-qualifying vessels (Table 93).

Trip length was longer for vessels that will be eligible for the higher directed fishery trip limit. Vessels that will qualify for category A or C permits had trips that averaged 6.1 days absent. Trip length was only 2.4 days absent per trip for vessels that will qualify for category B or D permits. Trip length also appears to be highly correlated with vessel size. Trip length for 50 GRT vessels was 2.6 days absent during the qualification period and increases for larger vessels: 3.5 days absent for 100 GRT vessels, 6.0 days absent for 150 GRT vessels, and 8.4 days absent for 200 GRT vessels.

**Table 92. Preferred alternative qualification criteria.** Total number of days absent for trips with at least one pound of landings during the qualification period, excluding the 56 vessels that have been removed from the fleet by the multispecies buyout program.

GRT on 1997 vessel permit	Will not automatically qualify	Qualifies for low trip limit	Qualifies for high trip limit	Total vessels permitted in 1997
0	357			357
10	6,273	2,084	569	8,926
20	13,110	8,131	2,070	23,311
30	9,629	8,712	1,285	19,626
40	6,175	6,079	1,859	14,113
50	5,780	6,773	1,358	13,911
60	2,023	3,413	2,422	7,858
70	2,910	2,013	4,624	9,547
80	2,454	2,455	2,110	7,019
90	1,774	1,615	3,579	6,968
100	5,531	2,451	6,435	14,417
110	2,904	1,765	3,973	8,642
120	7,538	2,414	10,194	20,146
130	7,859	2,993	6,588	17,440
140	5,687	1,791	10,442	17,920
150	6,024	1,938	8,681	16,643
160	2,156	682	15,070	17,908
170	3,340	1,808	15,415	20,563
180	2,274	545	9,929	12,748
190	2,003	491	14,714	17,208
200	2,741	842	22,905	26,488
220	687			687
240	413		581	994
250			235	235
260		197		197
300			421	421
310	119			119
370	80			80
<b>Grand Total</b>	<b>99,841</b>	<b>59,192</b>	<b>145,459</b>	<b>304,492</b>

**Table 93. Preferred alternative qualification criteria.** Total number of trips with at least one pound of landings during the qualification period, excluding the 56 vessels that have been removed from the fleet by the multispecies buyout program.

GRT on 1997 vessel permit	Will not automatically qualify	Qualifies for low trip limit	Qualifies for high trip limit	Total vessels permitted in 1997
0	698			698
10	4,703	1,125	324	6,152
20	5,109	4,869	863	10,841
30	4,146	4,333	485	8,964
40	2,950	2,555	602	6,107
50	2,593	2,487	302	5,382
60	866	1,377	629	2,872
70	1,150	922	858	2,930
80	767	1,447	466	2,680
90	612	452	618	1,682
100	1,401	930	1,777	4,108
110	439	571	809	1,819
120	1,101	642	1,973	3,716
130	842	923	1,185	2,950
140	689	871	1,426	2,986
150	723	425	1,609	2,757
160	381	92	2,368	2,841
170	475	307	1,843	2,625
180	209	171	1,272	1,652
190	203	127	1,818	2,148
200	325	225	2,610	3,160
220	70			70
240	39		52	91
250			39	39
260		18		18
300			52	52
310	15			15
370	19			19
<b>Grand Total</b>	<b>30,525</b>	<b>24,869</b>	<b>23,980</b>	<b>79,374</b>

## Non-preferred options

Fewer vessels would qualify for monkfish limited access, because the qualification criteria options (Sections 8.1.4.2.2 and 8.1.4.2.3) are more conservative. These options became less attractive as the Councils considered more restrictive bycatch allowances for non-qualifying vessels. In response, the Councils relaxed the qualification criteria after the second round of public hearings in January 1998 to avoid causing excessive discarding by vessels that landed monkfish as a component of their targeted catch, but failed to qualify for monkfish limited access.

For the non-preferred alternative 3a, 506 vessels would qualify for monkfish limited access (Table 94). The same multispecies days-at-sea vessels would qualify, but there would be fewer scallop vessels and monkfish-only vessels that would qualify for monkfish limited access. With this qualification option, there would be 48 monkfish-only permits and 458 monkfish limited access permits held by multispecies and scallop vessels.

**Table 94. Non-preferred alternative 3a.** Number of vessels that qualify for monkfish limited access by permits currently held by the vessels. Data are from 1,815 vessels that landed at least one pound of monkfish during the qualification period and have not been removed from the fleet by the multispecies buyout program.

Permits currently held by vessel	Will not automatically qualify	Automatically qualifies	Total vessels permitted in 1997
Multispecies DAS	537	386	923
Scallop DAS	189	27	216
Combination	10	45	55
Summer Flounder	60	3	63
Other	142	12	154
No NERO permit	371	33	404
All vessels	1309	506	1815

Classified by vessel size, fewer large vessels would qualify for monkfish limited access (Table 95), since vessels with scallop day-at-sea permits tend to be larger than vessels with other types of permits. The same vessels that qualify with the preferred alternative would qualify with option 3a, since both use a 7,500 pounds tail-weight threshold for these vessels.

Table 95. **Non-preferred alternative 3a.** Vessel size by gross registered tonnage (GRT) recorded on the 1997 vessel permit. Only non-buyout vessels that do not have a 1997 vessel permit or that had no monkfish landings during the qualification period are excluded. There were 1,871 vessels that had at least one pound of monkfish landings during the qualification period, but 56 have been removed from the fleet due to the multispecies buyout program. The qualification criteria are given in Section 8.1.4.2.2.

GRT on 1997 vessel permit	Will not automatically qualify	Automatically qualifies	Total vessels permitted in 1997
0	41		41
10	187	19	206
20	243	51	294
30	146	47	193
40	68	38	106
50	68	29	97
60	29	24	53
70	40	17	57
80	37	13	50
90	26	15	41
100	80	25	105
110	17	14	31
120	51	31	82
130	37	34	71
140	37	26	63
150	52	22	74
160	29	18	47
170	31	25	56
180	16	19	35
190	25	15	40
200	36	21	57
220	9		9
240	2		2
250		1	1
260		1	1
300		1	1
310	1		1
370	1		1
<b>Grand Total</b>	<b>1309</b>	<b>506</b>	<b>1815</b>

For the non-preferred alternative 3b, only 455 vessels would qualify for monkfish limited access (Table 96) even though it would qualify more monkfish only vessels than qualification option 3a. With this qualification option, there would be 65 monkfish-only permits and 390 monkfish limited access permits held by multispecies and scallop vessels.

**Table 96. Non-preferred alternative 3b.** Number of vessels that qualify for monkfish limited access by permits currently held by the vessels. Data are from 1,815 vessels that landed at least one pound of monkfish during the qualification period and have not been removed from the fleet by the multispecies buyout program.

Permits currently held by vessel	Will not automatically qualify	Automatically qualifies	Total vessels permitted in 1997
Multispecies DAS	666	257	923
Scallop DAS	112	104	216
Combination	26	29	55
Summer Flounder	58	5	63
Other	140	14	154
No NERO permit	358	46	404
All vessels	1360	455	1815

Classified by vessel size, fewer intermediate-size (60-110 GRT) vessels would qualify for monkfish limited access (Table 97). The under-representation of intermediate-size vessels occurs because the monkfish-only (tending to be smaller) and the scallop day-at-sea (tending to be larger) vessels have lower thresholds compared to their historic landings than do the intermediate-size multispecies vessels. For this qualification option, the vessels less than 50 GRT that qualify with the preferred alternative would also qualify with option 3b, since both use a 7,500 pounds tail-weight threshold for these vessels.

**Table 97. Non-preferred alternative 3b.** Vessel size by gross registered tonnage (GRT) recorded on the 1997 vessel permit. Only non-buyout vessels that do not have a 1997 vessel permit or that had no monkfish landings during the qualification period are excluded. There were 1,871 vessels that had at least one pound of monkfish landings during the qualification period, but 56 have been removed from the fleet due to the multispecies buyout program. The qualification criteria are given in Section 8.1.4.2.3.

GRT on 1997 vessel permit	Will not automatically qualify	Automatic qualify	Total vessels permitted in 1997
0	41		41
10	187	19	206
20	243	51	294
30	146	47	193
40	68	38	106
50	68	29	97
60	47	6	53
70	48	9	57
80	45	5	50
90	32	9	41
100	90	15	105
110	23	8	31
120	58	24	82
130	53	18	71
140	40	23	63
150	55	19	74
160	20	27	47
170	31	25	56
180	16	19	35
190	17	23	40
200	19	38	57
220	9		9
240	1	1	2
250		1	1
260	1		1
300		1	1
310	1		1
370	1		1
<b>Grand Total</b>	<b>1360</b>	<b>455</b>	<b>1815</b>

### **Vessels in the monkfish fishery that fail to qualify for limited access**

Many vessels in North Carolina began targeting monkfish after the control date. Nearly all of these vessels will fail to qualify for monkfish limited access because before the control date they accumulated insufficient history to qualify for limited access. According to NC records, many vessels began targeting monkfish during March 1995 and landings per trip increased to over 1,000 pounds, immediately after the publication of the control date. Some monkfish landings occurred during the spring of 1994, but came from New England vessels that were displaced southward by the Multispecies FMP Amendment 4 regulations. Some NC vessels that entered the monkfish fishery early also participated during 1994, but it is not clear if any of these vessels had sufficient landings history prior to the control date to qualify for monkfish limited access. Landings in 1995 and 1996 by vessels using gillnets increased, with about 20 to 30 vessels landing 2,500 pounds of monkfish per trip.

Some vessels may revert back to fishing for other species that they targeted before 1995, e.g. weakfish, bluefish, king whiting, and croaker. Others may try their hand at the newly developed bluefin tuna fishery, provided that permits are available for new entrants or they already have a permit. Some others may buy another vessel that qualifies for monkfish limited access and transfer the permits to the current NC vessel, provided that the transfer does not violate the upgrade restrictions of the FMP.

The former choices (i.e. targeting other species) will promote mortality reduction for monkfish, but may increase mortality on other species. Most of the non-qualifying vessels that are in the monkfish fishery use gillnets to target monkfish, so changes in habitat alteration and bycatch of other fish species is expected to be negligible. The use of sink gillnets is thought to cause very little habitat alteration and fish bycatch in gillnets is low. Bycatch of marine mammals and endangered species is higher in gillnets than in other gears, so any effort reduction away from the use of gillnets could have a positive impact.

#### *8.1.5.1.1.3 Day-at-sea allocations and trip limits*

Restrictions on total fishing effort when limited access vessels may target monkfish and trip limits, controlling bycatch and directed fishing effort, will be two of the primary management measures controlling fishing mortality. The preferred alternative and non-preferred alternative 3a and 3b have similar expected mortality reductions. The amount of anticipated discards is significantly lower, however, for the preferred alternative.

The expected mortality reductions are a little less than the FMP's mortality reduction objectives. For the preferred alternative, the anticipated mortality reductions are 50 percent in the Northern Fishery Management Area and 65 percent in the Southern Fishery Management Area. This result compares to the 68 percent and the 78 percent mortality reduction objectives, respectively. These results, however, only include three components (limited entry, days-at-sea restrictions, and trip limits). On these factors alone, the plan is expected to achieve 74 and 83 percent of the mortality reductions needed in the Northern and Southern Fishery Management Areas, respectively. The anticipated impacts of size limits and gear restrictions are described in Sections 8.1.5.1.1.6 and 8.1.5.1.1.7.

### **Sources of uncertainty**

Although the PDT made some assumptions about when discards would occur, there was no attempt to forecast changes in fishing behavior that are anticipated from monkfish management. No assumptions were made that vessels in other fisheries would all land the applicable bycatch trip limits or that the limited access vessels would use all of the days-at-sea allotted to them. Had the PDT made these assumptions, the expected landings would considerably exceed those associated with the mortality

objectives, possibly exceeding observed landings during 1995 and 1996. Observed landings and days absent on trips targeting monkfish are less than the expected landings if all vessels fish at the proposed limits. This outcome supports the Councils' assertion that not all monkfish limited access vessels will take advantage of the opportunity to use monkfish days to target monkfish, while discarding excess bycatch during the vessel's remaining fishing time in other fisheries.

One of the large uncertainties is how and when multispecies and scallop vessels will use monkfish days to target monkfish. The PDT's made no assumptions about shifts in fishing effort, other than the status quo use of days would continue. If a qualifying vessel used fewer than 40 days to target monkfish (without landing large-mesh groundfish or scallops), the analysis assumes that the vessel would use the monkfish days to target monkfish if the vessel also had sufficient unused multispecies or scallop days to utilize for this purpose. Alternatively, if unused multispecies or scallop days during 1996 (after applying the day-at-sea reductions for the 1998 and 1999 fishing years) were insufficient to absorb the monkfish effort or the vessel targeted solely monkfish during more than 40 days absent, the PDT analysis assumed that the vessel would no longer be able to make those directed monkfish trips. The vessel would be more likely forgo targeting monkfish instead of shifting fishing effort from groundfish or scallops. Some examples are given in Table 93 to clarify these assumptions.

If multispecies vessels use the monkfish days primarily to enable the vessel to land monkfish as a component of their normal groundfish catch, then the realized mortality reduction might be greater than analyzed here. This is one of the main reasons that the year 2 measures only take effect as 'defaults' if the year 1 management program exceeds the TACs and there is insufficient mortality reduction to meet the year 1-3 objectives. On the other hand, if the multispecies vessels reserve their monkfish days to target only monkfish, discarding unavoidable monkfish bycatch while targeting groundfish during a multispecies day-at-sea, then monkfish mortality could remain high. If this effort shift occurs, however, mortality on regulated groundfish would decline, because the multispecies vessels with fleet day-at-sea allocations would only have 48 days remaining to target groundfish. Because of the cost associated with loosing a multispecies day-at-sea to target solely monkfish, the Councils believe that this type of effort shift is unlikely.

Similarly, the Councils anticipates that only a small fraction of scallop vessels will convert gear and vessel equipment to use trawls or sink gillnets to target monkfish during a scallop day-at-sea. If more scallopers than anticipated shift fishing effort toward monkfish, then monkfish mortality could remain above the mortality objectives, but scallop mortality would correspondingly decline if the scallop vessel gave up an active scallop day-at-sea. If this effort shift occurs, monkfish mortality could exceed the objectives, but habitat damage due to heavy scallop dredges would be reduced. Scallopers also have the option of using a gillnet to target monkfish. The Council believes it will be highly unlikely for a scallop dredge vessel to convert to using sink gillnets to capture monkfish. Few scallopers have experience using gillnet gear and it is probably uneconomic to use a large scallop vessel to use gillnets, given the restrictions on the number of nets a gillnet vessel may use.

Although the least costly alternative for these vessels to target monkfish may be to use large-mesh beam trawls, there is a high cost of relinquishing a valuable scallop day, especially since additional scallop day-at-sea reductions are planned. Since scallop vessels have a history of targeting monkfish with dredges during a scallop day-at-sea, the analysis also made the assumption that a scalloper would only switch to another gear to target monkfish if the monkfish revenue was more than 50 percent of the total revenue for the trip.

Another source of uncertainty is fishing behavioral changes when vessels would be forced to discard monkfish if they did not relocate and avoid monkfish. The PDT needed to make some

assumptions about the likelihood that a vessel would continue fishing and discard or move to other areas. These assumptions are explained below and in PDT Document 2 (Appendix II). If discards are higher than anticipated, the realized mortality rate will exceed the mortality objectives, unless other factors compensate. On the other hand, a greater effort by fishermen or management to reduce discards will have a beneficial effect on monkfish mortality. It is unclear how this fishing behavior will effect other species, because it is unknown how much the monkfish rules will change fishing behavior or where the vessels would relocate to target other species.

**Table 93.** Assumptions about the use of monkfish day-at-sea with various levels of unused multispecies or scallop day-at-sea allocations.

Vessel type	Situation	Days absent on trips targeting only monkfish	Days-at-sea when monkfish revenue exceeds multispecies or scallop revenue	Unused multispecies or scallop days-at-sea	Expected monkfish days-at-sea to be used to target only monkfish
Multispecies Fleet or individual Or Scallop Full-time, part-time, or occasional	Monkfish days absent exceed unused multispecies or scallop days	25	0	10	10
Multispecies Fleet or individual Or Scallop Full-time, part-time, or occasional	Unused days exceed monkfish days absent	25	0	60	25
Multispecies Fleet or individual Or Scallop Full-time, part-time, or occasional	Monkfish days absent exceed the proposed allocation of monkfish days	60	0	70	40
Multispecies Fleet or individual	Monkfish days will be used for a mixed-species trip	25	40	15	0
Scallop Full-time, part-time, or occasional	Effort shift from scallops to monkfish is cost effective.	25	40	10	40
Monkfish-only	Must use a monkfish day to target monkfish	25	0	0	25
Monkfish-only	Monkfish days absent exceed proposed allocation of monkfish days	60	0	0	40

## Methods

The analysis of impacts was conducted in two parts and the combined result was evaluated by comparing the predicted landings and discards if the rules were in place during 1995 and 1996 vs. the observed landings by selected trips. Some landings were not considered in this analysis, primarily because they were from combined trips from multiple vessels. Despite this censuring of the data, about 200,000 trips were used to analyze the expected fishing mortality reduction. These trips accounted for

24,000 mt of the 26,000 mt of known monkfish landings. The change in predicted landings under the proposed rules vs. the observed landings during 1995-1996 is equivalent to the anticipated fishing mortality reduction. This assumption is true as long as the management measures have the same impact on the unanalyzed portion of the fishery and exploitable stock biomass remains at 1995-1996 levels.

The anticipated fishing mortality reductions are compared below to the mortality reduction objectives to evaluate the preferred and non-preferred alternatives 3a and 3b. The expected mortality reductions associated with non-preferred alternatives taken to public hearings in January 1997 are described in Sections 8.1.4.4.1 and 8.1.4.4.2.

The Council anticipated the effects of the preferred and non-preferred alternatives by applying the proposed rules to trips during 1995 and 1996. The PDT developed two separate models to analyze the effects of day-at-sea and trip limit restrictions on vessels that would qualify for monkfish limited access and vessels that would not qualify, respectively. The qualifying vessels would have up to 40 monkfish days (with or without directed fishery trip limits) to exceed the bycatch allowances, either on trips where monkfish was a component of a mixed catch or on trips targeting only monkfish. The latter group would have no monkfish days and could only land monkfish up to the applicable bycatch allowance. Some examples are given in Table 93 to clarify this procedure.

To develop a realistic model, the PDT made certain assumptions about fishing effort shifts (described above) and discarding. Discarding mortality was calculated when monkfish landings exceeded the proposed trip limits and when the proportion of the trip's revenue from monkfish landings was less than 50 percent. Otherwise the analysis assumed that the revenue loss would be sufficient inducement for the fishermen to change behavior and avoid monkfish, focusing on areas or gears that captured another target species better and also captured less monkfish. The analysis also assumed the same discard mortality rates that the Council adopted to evaluate the effects of a minimum size limit (Table 99 and Table 100). More details about the PDT's analytical methods are given in PDT Document 2 (Appendix II).

## Results

In the **Northern Fishery Management Area**, day-at-sea restrictions and trip limits are expected to produce a 25 percent reduction in mortality during the first year of FMP implementation (Table 94) and a 33 percent reduction in year 2. Total landings decrease from 10,687 mt under the status quo, to 7,718 and 6,891 mt in years 1 and 2, respectively. The reduction in year 1 would be caused by the limits on available days (vessels would no longer be able to target monkfish outside of multispecies days) and due to the effect of the bycatch trip limit. The analysis suggests, however, that discards would only be about five to eight percent of the catch. Discards by days-at-sea vessels are low because many vessels that target monkfish qualify for limited access and would not have a trip limit on any of their multispecies days. Most of the reduction between years 1 and 2 reflect decreases in available scallop day-at-sea. Some vessels in the 1995-1996 weighout data fished for scallops and monkfish on the northern and western sides of Georges Bank, open to fishing during a scallop day-at-sea.

In the fourth fishing year when only retention monkfish bycatch would be allowed and all vessels on a multispecies day-at-sea would have a 300 pounds tail-weight per day-at-sea, or 25 percent of the total weight of fish onboard limit, the calculated mortality reduction is 50 percent. Landings would decline from 10,687 mt under the status quo to only 3,374 mt with the preferred alternative. Discards, however, are expected to increase to over 2,000 mt, or about 40% of the total catch. The Council believes that this discard level is overstated, especially if the new closed areas are effective for reducing monkfish

mortality, groundfish recovery makes fishing for monkfish less attractive, or vessels change fishing behavior more than predicted by the model.

The expected mortality reductions in the **Southern Fishery Management Area** are greater than in the northern area. The day-at-sea restrictions and the more restrictive bycatch limits, coupled with planned reductions in scallop day-at-sea through the 1999 fishing year, are calculated to reduce mortality by 32 percent in year 1 (Table 95). The preferred alternative, without directed fishery trip limits, is estimated to fall significantly short of the mortality goals for 1999 to 2002 (years 1-3). Additional mortality reductions in year 2 are anticipated, when the scallop day-at-sea are slated to be 120 days and the directed fishery trip limits become effective. In year 2, the day-at-sea restrictions and trip limits are estimated to produce a 59 percent reduction in fishing mortality. Landings for the analyzed trips are calculated to decline from 13,414 mt under the status quo to 8,672 mt in year 1 and 6,444 mt in years 2 and 3. Increased discards caused by the regulations are anticipated to be about 420 mt, or five to six percent of the total catch.

In the fourth fishing year when limited access vessels would receive no monkfish days-at-sea allocations and only bycatch levels could be landed, the estimated mortality reduction is 65 percent. Landings are expected to decline to 3,578 mt, while discards increase to 1,184 mt, or about 25 percent of the total catch.

### **Comparisons with non-preferred alternatives 3a and 3b**

The alternatives are expected to give roughly equivalent results, with regard to monkfish mortality reduction when the Council proposes to end overfishing by May 1, 2002. In the Northern Fishery Management Area (Table 94), the estimated mortality reductions range from 50 to 51 percent for the three alternatives. In the Southern Fishery Management Area (Table 95), the estimated mortality reductions are 64 to 65 percent for all three alternatives. These estimated effects compare with the mortality reduction objectives of 68 and 78 percent, respectively. While all the alternatives appear to fall somewhat short of the overfishing definition thresholds, there are many behavioral responses that the PDT could not analyze would effect the mortality rates actually realized by the management program. Some of these responses (for example fishermen using fewer days-at-sea to target monkfish or moving away from concentrations of small monkfish) would have beneficial effects. Other responses may increase fishing mortality, or could cause shifts in fishing activity between the two management areas. Estimated discard mortality is also roughly the same for all alternatives, except for non-preferred alternative 3b in the Northern Fishery Management Area, where discard mortality is somewhat less and landings would be somewhat higher.

The preferred and two non-preferred alternatives have different effects in the first two years, however. In year 1, non-preferred alternative 3b is estimated to achieve greater reductions in fishing mortality [35% in the northern area (Table 94) and 39% in the southern area (Table 95)], than the other two alternatives. More vessels qualify with non-preferred alternative 3a than with non-preferred alternative 3b. The preferred alternative has the most vessels that qualify for monkfish limited access, but the directed fishery trip limits do not become effective until halfway through year 2.

In the northern area during years 2 and 3 (implementation after 18 months in the final alternative), the preferred alternative and the non-preferred alternative 3b are estimated to have

about the same effect on mortality reduction, 33 percent vs. 37 percent, respectively (Table 94). Both fall about 20 percent short of the 55 percent mortality reduction objective. Non-preferred alternative 3a is expected to produce the least mortality reduction, only a 30 percent reduction relative to the status quo. In the southern area during years 2 and 3 (Table 95), the preferred alternative is the most conservative of the three options and is expected to achieve a 49 percent reduction in fishing mortality, compared to a 59 percent objective.

More details for each of the alternatives, by permit type, gear, and qualification status, are given PDT Document 2 (Appendix II). Examination of the estimated effects on landings and discard mortality could reveal how the proposed rules could effect individual sectors of the monkfish fishery. Further description would, however, require much more discussion than provided in this summary of results.



**Table 94.** Northern Fishery Management Area: Summary of estimated landings and discards after applying the proposed qualification criteria, days-at-sea limits, and trip limits. These results are compared with the total 1995-196 landings for vessels in each category to estimate monkfish mortality reduction.

	Vessel classification	Mortality reduction objective	Preferred Alternative			Non-Preferred Alternative 3a			Non-Preferred Alternative 3b		
			Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)
Year 1	DAS Qualifiers		6,492	53	7,991	6,035	34	7,341	5,337	50	6,532
	DAS Non-qualifiers		706	49	1,599	1,437	139	2,913	1,571	388	4,742
	Monkfish-only		416	115	708	282	44	425	416	115	708
	Bycatch fisheries		104	33	389	169	172	950	104	33	389
	Total		7,718	250	10,687	7,923	389	11,629	7,428	586	12,371
	Percent reduction	<b>55%</b>	<b>25%</b>			<b>29%</b>			<b>35%</b>		
Year 2	DAS Qualifiers		5,781	49	7,991	5,930	32	7,341	5,173	45	6,532
	DAS Non-qualifiers		697	49	1,599	1,372	133	2,913	1,516	416	4,742
	Monkfish-only		309	115	708	282	44	425	416	115	708
	Bycatch fisheries		104	33	389	169	168	950	104	33	389
	Total		6,891	246	10,687	7,753	377	11,629	7,209	609	12,371
	Percent reduction	<b>55%</b>	<b>33%</b>			<b>30%</b>			<b>37%</b>		
Year 4	DAS Qualifiers		2,546	1,663	7,991	2,177	1,609	7,341	2,882	868	6,496
	DAS Non-qualifiers		656	68	1,599	1,212	195	2,913	1,481	425	4,742
	Monkfish-only		68	243	708	32	111	425	68	243	708
	Bycatch fisheries		104	33	389	168	165	950	104	33	389
	Total		3,374	2,007	10,687	3,589	2,080	11,629	4,535	1,569	12,335
	Percent reduction	<b>68%</b>	<b>50%</b>			<b>51%</b>			<b>51%</b>		

**Table 95.** Southern Fishery Management Area: Summary of estimated landings and discards after applying the proposed qualification criteria, days-at-sea limits, and trip limits. These results are compared with the total 1995-196 landings for vessels in each category to estimate monkfish mortality reduction.

	Vessel classification	Mortality reduction objective	Preferred Alternative			Non-Preferred Alternative 3a			Non-Preferred Alternative 3b		
			Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)
Year 1	DAS Qualifiers		6,391	48	7,853	5,393	21	6,569	5,368	30	6,588
	DAS Non-qualifiers		1,104	212	3,200	2,720	259	5,753	1,400	643	5,505
	Monkfish-only		1,091	105	1,426	902	73	1,152	1,023	105	1,352
	Bycatch fisheries		86	60	935	98	172	1,341	86	60	935
	Total		8,672	425	13,414	9,113	525	14,815	7,877	838	14,380
	Percent reduction	<b>59%</b>	<b>32%</b>			<b>35%</b>			<b>39%</b>		
Year 2	DAS Qualifiers		4,903	44	7,853	5,258	19	6,569	5,117	27	6,588
	DAS Non-qualifiers		1,046	210	3,200	2,540	254	5,753	1,400	641	5,505
	Monkfish-only		409	105	1,426	902	73	1,152	1,023	105	1,352
	Bycatch fisheries		86	60	935	97	163	1,341	86	60	935
	Total		6,444	419	13,414	8,797	509	14,815	7,626	833	14,380
	Percent reduction	<b>59%</b>	<b>49%</b>			<b>37%</b>			<b>41%</b>		
Year 4	DAS Qualifiers		2,432	712	7,853	1,642	645	6,569	2,558	343	6,588
	DAS Non-qualifiers		955	233	3,200	2,226	343	5,753	1,235	666	5,505
	Monkfish-only		104	180	1,426	69	128	1,152	103	179	1,352
	Bycatch fisheries		85	59	935	97	154	1,341	85	59	935
	Total		3,576	1,184	13,414	4,034	1,270	14,815	3,981	1,247	14,380
	Percent reduction	<b>78%</b>	<b>65%</b>			<b>64%</b>			<b>64%</b>		

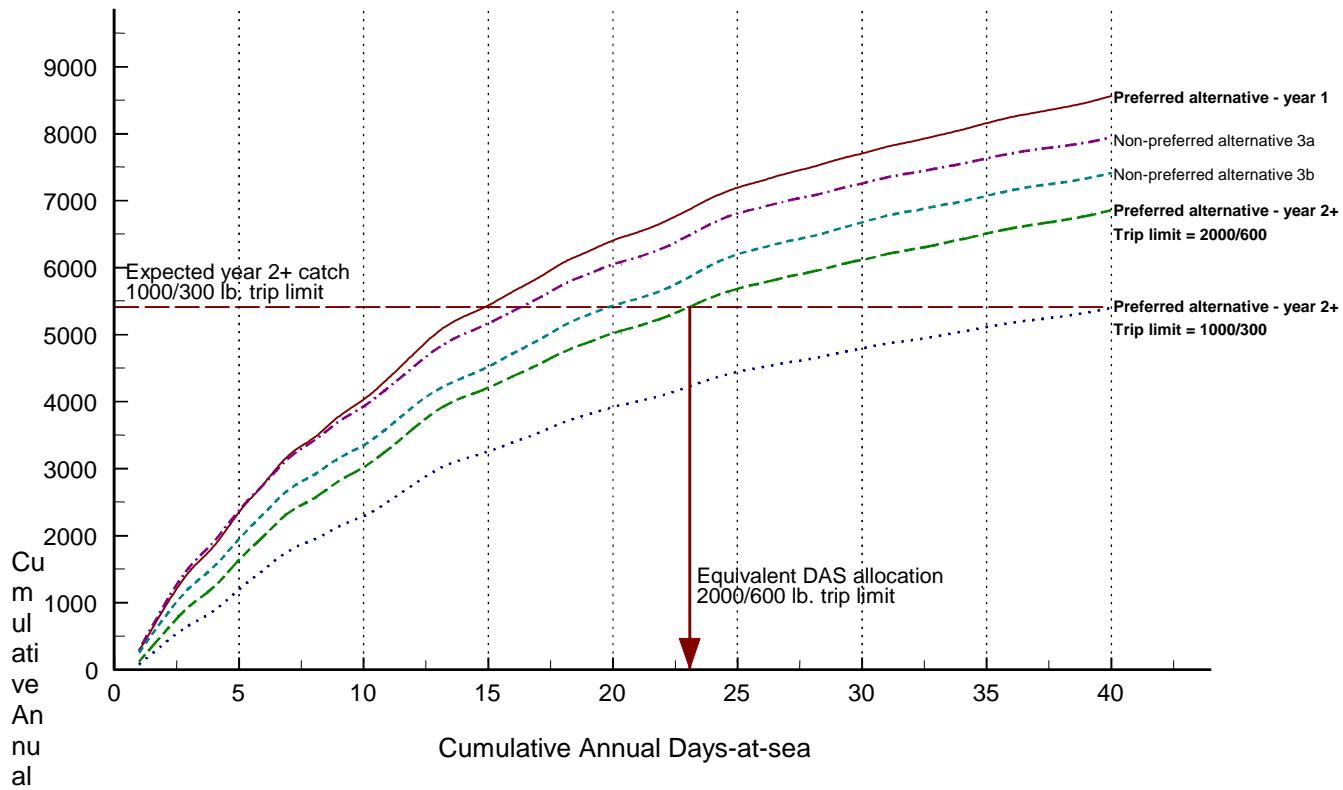
#### **8.1.5.1.1.4      *Day-at-sea options***

Days-at-sea allocations will restrict the amount of time that monkfish limited access can target monkfish and therefore reduce fishing mortality. Various allocations of days-at-sea were examined to determine their impact on expected landings by the directed fishery for monkfish. No discards were assumed, because the Council expects that limited access vessels will not be able to target monkfish with the proposed bycatch limits.

Lower days-at-sea allocations, rather than using directed fishery trip limits to achieve the same mortality reduction, could reduce cost and habitat alteration by reducing fishing time. The Council believes, however, that day-at-sea allocations that are less than 40 days per year would not be economically viable for many vessels. A short season would not cover fixed operating costs to participate in even a seasonal fishery, if the gear and equipment could not be used in another fishery.

With a 40 day-at-sea annual allocation of days, the preferred alternative is anticipated to produce 8,564 mt of monkfish landings in year 1 from the directed fishery and 5,403 mt in year 2. Another 5,826 mt of monkfish would be landed in year 1 by qualifying vessels while they were targeting other fish and not on a monkfish day-at-sea. Since no monkfish days-at-sea are anticipated for year 4, the landings from the directed fishery are anticipated to be zero.

Below 40 days, expected landings decline at a faster rate as the days-at-sea allocation approaches zero (Figure 25). This result occurs because a greater number of vessels become affected by the lower allocation of days. Total landings from the directed fishery (including multispecies and scallop vessels on a monkfish day-at-sea) would be 50 percent of projected landings for the preferred alternative, by reducing the allocation to 11 days. To achieve an equivalent mortality reduction as that expected from a (year 2) trip limit of 300 pounds for vessels using fixed gear and 1,000 pounds tail-weight for vessels using mobile gear, the annual day-at-sea allocation would have to be 15 days (Figure 25).



**Figure 25.** Cumulative estimated landings vs. monkfish days-at-sea allocation options with preferred and non-preferred alternative qualification criteria and trip limits. The data include trips for all vessels that qualify for monkfish limited access and the vessel would have to use a monkfish day-at-sea, had the rules applied during the 1995-1996 fishing year.

#### 8.1.5.1.1.5 *Trip limit options*

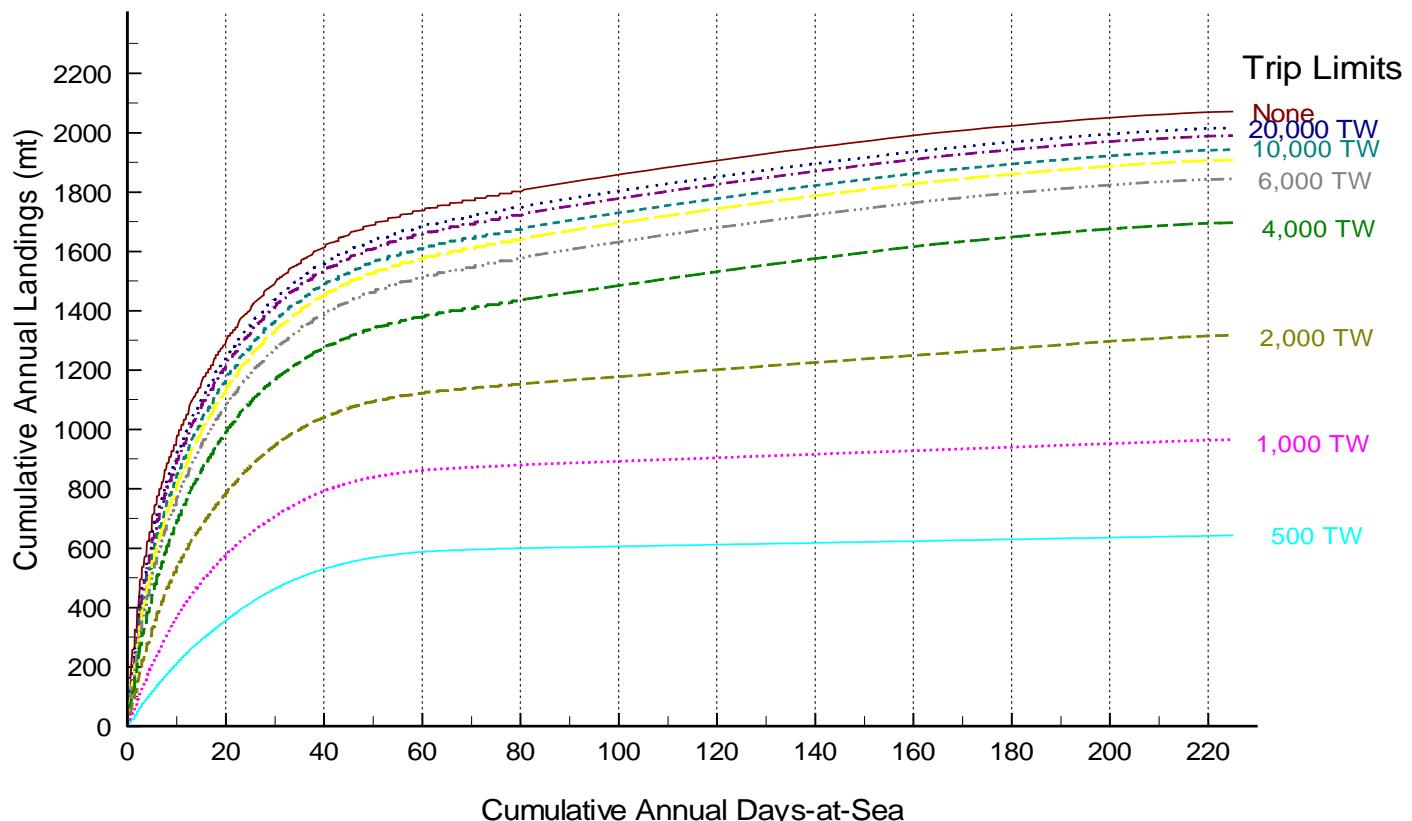
##### 8.1.5.1.1.5.1 Directed fishery limits

The Councils also evaluated other combinations of days-at-sea allocations and trip limits, besides the ones chosen for years 2 and 3. These trip limit/day-at-sea options ranged from no trip limit to 500 pounds tail-weight per trip and from zero to 220 days (Figure 26). In general, reductions in landings and mortality were non-significant with trip limits over 6,000 pounds tail-weight per trip and over 40 days, because few monkfish limited access vessels have fishing activity that exceed these amounts<sup>26</sup>.

<sup>26</sup> The amount of days absent during 1995-1996 by monkfish-only vessels may be underestimated because these vessels were not required to report landings to NMFS. Some vessels landed monkfish at dealers that did not report landings. It is also unclear how days absent for gillnet vessels (many vessels that target monkfish use gillnets) were calculated. Fishing time will be counted differently under the day-at-sea program and may deviate from the anticipated effectiveness of the days-at-sea program to limit fishing mortality.

The Councils later revised the directed fishery trip limits, so they would be applied on a daily basis, rather than per trip. This change allows vessels greater flexibility to fish different lengths of time, but cannot be directly evaluated against the results in Figure 26. The Councils considered two daily trip limit options. In one option, vessels on a monkfish day-at-sea would be able to land 300 pounds tail-weight per day-at-sea while using fixed gear or 1,000 pounds tail-weight per trip while using mobile gear, both limits in the Southern Fishery Management Area. In the Northern Fishery Management Area, there are not directed fishery trip limits planned. In the other analyzed option, vessels in the Southern Fishery Management Area would be able to land 600 pounds tail-weight per day-at-sea while using fixed gear or 2,000 pounds tail-weight per day-at-sea while using mobile gear.

The higher of the two trip limit options would produce 6,860 mt of monkfish landings, 50 percent higher than the more conservative trip limit option. To achieve the same fishing mortality reduction with the more liberal trip limit option, only 23 days could be allocated to the monkfish limited access vessels. The preferred alternative allows some monkfish limited access vessels to fish with a 1,500 pounds tail-weight per day-at-sea limit while using mobile gear. According to the NMFS data, 298 of the 600 monkfish limited access vessels would qualify to fish at the higher limit (Table 89). How many will fish with the higher trip limit is unknown, but 136 of the 298 permit category A or C vessels have multispecies permits and usually fish with mobile gear. The expected landings of the preferred alternative is therefore between the options in Figure 26 labeled “Preferred alternative, Trip limit = 1000/300” and the one labeled “Preferred alternative, Trip limit = 2000/600), probably closer to the more conservative option.



**Figure 26.** Expected landings for monkfish limited access vessels without multispecies or scallop day-at-sea permits for various day-at-sea and trip limit options. Rules were applied to the trips taken during 1995-1996 by vessels that would qualify for monkfish limited access under the preferred alternative.

#### 8.1.5.1.1.5.2 Bycatch limits – Preferred alternative

The purpose of the monkfish trip limits is to discourage increases in fishing effort by vessels that currently have an incidental catch of monkfish. Without trip limits, there is no way to distinguish limited access vessels from those that do not qualify, but usually catch monkfish while targeting other species. For many fisheries, the usual bycatch of an incidental species is low and possession is prohibited or the trip limit is set at very low levels. A local example of this sea scallops, where fishing vessels without limited access permits can only retain up to 40 pounds of shucked scallops.

Fishermen using many types of gears over a wide area, on the other hand, catch monkfish as a bycatch. The proposed trip limits are compromise between unacceptably low limits that would cause fishermen to discard monkfish and excessively high limits that could allow many vessels to target monkfish.

The proposed limits have been chosen such that a very small proportion of trips targeting other species would have to discard monkfish or relocate to land the monkfish that are caught. The basis for choosing these limits was the PDT recommendation to adopt trip limits that were at the 95 percentile of trips by non-qualifying vessels in other fisheries (PDT Document 1, Appendix I). These limits and the distribution of landings per trip when vessels target other species is examined in more detail below.

Although a reduction in bycatch is anticipated, most of it will be realized through planned changes in multispecies and scallop days-at-sea. Between the 1995-1996 base period and the 1999 fishing year, multispecies fleet days will have dropped from 139 to 88. Similarly, scallop days will have fallen from 164 days in the 1995-1996 base period to 142 days in 1999 and 120 days in 2000. These two fisheries have significant volumes of monkfish bycatch and the planned decreases in allowable fishing effort will have a large, beneficial impact on monkfish mortality reduction.

Under the preferred alternative, the Council expects landings from monkfish bycatch to decline, with minor increases in discard mortality. Although the PDT analysis did not count discards when applying the proposed rules to trips by non-qualifying vessels when monkfish revenue was more than 50 percent of the trip revenue, only the top 5 percent of the trips (sorted by total monkfish landings) would be forced to discard monkfish. It is very likely that these large-volume trips, with trip limits appropriate for fisheries targeting other species, would try to avoid these large volumes of monkfish, if they cannot be landed.

The expected landings for the preferred alternative is calculated to decline from 1,988 under the status quo to 810 mt in year 1,801 mt in year 2, and 760 mt in year 4 in the Northern Fishery Management Area (Table 94). The Council expects minor increases in monkfish discards<sup>27</sup> compared to the status quo. When vessels target other species, discards due to the preferred alternative rules would rise by 82 mt, 82 mt, and 101 mt, respectively. In the Southern Fishery Management Area (Table 95), landings are expected to decline from 4,135 mt under the status quo to 1,190 mt in year 1, 1,132 mt in year 2, and 1,040 mt in year 4. Minor increases in discards are anticipated, rising by 272 mt, 270 mt, 292 mt compared to the status quo, respectively.

The change in landings for non-preferred alternatives 3a and 3b are about the same as for the preferred alternative, but discards are higher. Bycatch trip limits are slightly different for non-preferred alternatives 3a and 3b, because the Council modified the preferred alternative trip limits after the second round of public hearings. Also qualification criteria are different with the non-preferred alternatives, so the number and fishing characteristics for vessels that do not qualify for monkfish limited access is different. Year 1 landings for non-preferred alternatives 3a

<sup>27</sup> Discards are already a significant fraction of the catch, due to unmarketability or state regulation. See Section ? for more details.

and 3b in the Northern Fishery Management Area are expected to be 1,606 and 1,675 mt, respectively. Year 1 landings for non-preferred alternatives 3a and 3b in the Southern Fishery Management Area are expected to be 2,818 and 1,486 mt, respectively. These expected landings are considerably higher than the non-preferred alternative for all analyzed years, because fewer vessels would qualify for monkfish limited access.

Discards for the non-preferred alternatives in year 1 are expected to increase by 311 and 421, respectively in the Northern Fishery Management Area and 431 and 703 mt, respectively in the Southern Fishery Management Area. The anticipated discards are therefore 155 to 380 percent higher than the preferred alternative in the Northern Fishery Management Area and 160 to 260 percent higher than the preferred alternative in the Southern Fishery Management Area. Table 94 and Table 95 show similar results for years 2 and 4. Very little of the anticipated discards are mitigated by declines in discards by (fewer) vessels that qualify for monkfish limited access in the non-preferred alternatives.

The basis for the bycatch trip limit options was the 95th percentile of observed trips by non-qualifying vessels during 1994 and 1995. The PDT analyzed and presented these data to the Councils in PDT Document 1 (Appendix I). While developing the preferred and non-preferred alternatives, the Councils aggregated and modified the proposed trip limits, based on public comments, industry advice, and their knowledge of the fisheries.

In the Northern Fishery Management Area (Table 97), the preferred alternative daily trip limit for vessels using groundfish trawls is nearly double the 99th percentile for the landings of tails, while the preferred alternative trip limit for vessels using groundfish gillnets is 1.5 times the 99th percentile of observed 1994-1995 trips. The preferred alternative trip limit for scallop vessels using dredges is consistent with the 99th percentile of observed trips. Few vessels fish for summer flounder in the Northern Fishery Management Area. The proposed limit for vessels using small mesh is about  $\frac{1}{2}$  of the 95th percentile of observed trips.

In the Southern Fishery Management Area (Table 97), the preferred alternative daily trip limit for vessels using groundfish trawls is less than the 95th percentile for observed trips and  $\frac{1}{2}$  of the 95th percentile for vessels using gillnets. The proposed trip limit for vessels using scallop dredges, on the other hand, are 1.5 times the 99th percentile of observed trips. The proposed trip limit is consistent with the 99th percentile of observed trips for vessels using scallop trawls, although the estimate of trip length is less certain. For non-qualifying vessels using trawls to target summer flounder, the proposed 5 percent limit is consistent with the 95th percentile of observed trips. For vessels using small mesh in the Southern Fishery Management Area, the proposed limit is only  $\frac{1}{3}$ rd of the 95th percentile of observed trips.

In general, the preferred alternative trip limits for monkfish bycatch tend to be less conservative than the 95th percentiles. This is consistent with the Councils' agenda to limit the ability of non-qualifying vessels to target monkfish, while minimizing discard mortality. For vessels using small mesh, on the other hand, the proposed limit tends to be more conservative than the 95th percentile. The Councils want to be more conservative for vessels using small mesh, because they are more likely to catch very small (also unmarketable and fast-growing) monkfish. Even if the vessels had a market for these small fish, landings of monkfish less than 11-inches tail-length would be prohibited. More details are given in Section 8.1.5.1.1.5.3 about the distribution of landings per trip and per day-at-sea during 1991-1993 (reporting of days absent was transferred to a separate reporting system that is difficult to match with landings).

**Table 96.** Distribution of monkfish landings as bycatch in fisheries that target other species in the Multispecies Regulated Mesh Area, 1994-1995. Only trips by vessels that would not qualify for monkfish limited access for non-preferred alternative 3 were included in the PDT analysis. Source: PDT Document 1 – September 26, 1997. Source: PDT Document 1 (Appendix I), average trip lengths from 1995 vessel trip reports.

Gear	Preferred alternative trip limit <sup>28</sup> for non-qualifying vessels in the NFMA	Average trip duration	Landings of whole fish per trip (lbs.)		Percent of total weight of fish onboard		Landings of monkfish tails per trip (lbs.)		Percent of total weight of fish onboard		Average landings of monkfish tails per day absent (lbs.)	
			Days	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	
Groundfish trawl	300 pounds/DAS	7	1,992	3,984	20%	30%	600	1,200	6%	9%	150	300
Groundfish gillnet	300 pounds/DAS	1	332	664	10%	20%	100	200	3%	6%	100	200
Scallop dredge	300 pounds/DAS	15	9,960	13,280	13%	17%	3,000	4,000	4%	5%	215	285
Scallop trawl	300 pounds/DAS	No data	3,320	4,648	13%	13%	1,000	1,400	4%	4%	90	125
Summer flounder trawl	5% of total weight of fish onboard	Not analyzed	650	2,026	19%	41%	196	610	6%	13%	-	-
Other gear	50 pounds/trip	Not analyzed	398	830	7%	13%	120	250	2%	4%	-	-

<sup>28</sup> Pounds tail-weight. To calculate the whole-weight equivalent, multiply the trip limit for tails by 3.32. When expressed as the percent of total weight of fish onboard, the 5 percent limit would apply to the possession or landings of whole fish or tails.

**Table 97.** Distribution of monkfish landings as bycatch in fisheries that target other species in the Mid-Atlantic Regulated Mesh Area, 1994-1995. Only trips by vessels that would not qualify for monkfish limited access for non-preferred alternative 3 were included in the PDT analysis. Source: PDT Document 1 – September 26, 1997. Source: PDT Document 1 (Appendix I), average trip lengths from 1995 vessel trip reports.

Gear	Preferred alternative trip limit <sup>29</sup> for non-qualifying vessels in the SFMA	Average trip duration	Landings of whole fish per trip (lbs.)		Percent of total weight of fish onboard		Landings of monkfish tails per trip (lbs.)		Percent of total weight of fish onboard		Average landings of monkfish tails per day absent (lbs.)	
			Days	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	95 <sup>th</sup> percentile	99 <sup>th</sup> percentile	
Groundfish trawl	50 pounds/DAS	9	1,992	2,988	20%	27%	600	900	6%	8%	150	225
Groundfish gillnet	50 pounds/DAS	1	332	332	3%	7%	100	100	1%	2%	100	100
Scallop dredge	300 pounds/DAS	11	5,312	7,304	13%	20%	1,600	2,200	4%	6%	115	155
Scallop trawl	300 pounds/DAS	6	2,324	5,976	10%	17%	700	1,800	3%	5%	65	165
Summer flounder trawl	5% of total weight of fish onboard	Not analyzed	680	1,295	18%	21%	205	390	5%	6%	-	-
Other gear	50 pounds/trip	Not analyzed	498	1,328	7%	10%	150	400	2%	3%	-	-

<sup>29</sup> Pounds tail-weight. To calculate the whole-weight equivalent, multiply the trip limit for tails by 3.32. When expressed as the percent of total weight of fish onboard, the 5 percent limit would apply to the possession or landings of whole fish or tails.

#### 8.1.5.1.1.5.3 Bycatch limits – Non-preferred alternatives 1, 2, and 4

Potential problems with unacceptably high discarding are precisely why the Councils considered, but rejected non-preferred alternative 2. This alternative was an initial attempt to counter the argument that the proposed trip limits for non-preferred alternative 1 were too low and would cause unacceptable discarding of monkfish. Ninety-five percent of all trips, regardless of the degree of targeting monkfish, would be able to land the entire catch without discarding. On the other hand, the high trip limits for non-preferred alternative 2 (including a 3,500 pound tail-weight possession limit for multispecies trawl vessels) were proposed at levels that would allow many vessels to target monkfish under a trip limit. The Councils believed that vessels targeting a species should not be restrained by a trip limit that would force them to return to port or continue fishing and high-grade their catch to retain more valuable sized fish or their livers.

The initial proposed trip limits, for each gear that commonly captures monkfish in the northern and southern areas were based on trips that had a small portion of the total revenue coming from monkfish landings. Rounded off to the nearest 100 pounds, ninety-nine percent of trips where monkfish landings comprised less than 16 percent of total revenue would be able to land its entire catch of monkfish without discarding. A much larger proportion of total monkfish landings occurred on trips where monkfish landings exceeded the proposed trip limits, but these trips were ones where fishermen targeted monkfish. Presumably, many of these vessels would qualify for monkfish limited access and these trips would occur during monkfish days-at-sea or while the directed monkfish fishery is open under the quotas. If a vessel that made these trips does not qualify, it is very unlikely that it would make the trip anyway and discard, since most of the trip's revenue originally came from monkfish landings. It is impossible to accurately predict how many of these trips with high monkfish landings would continue and begin discarding monkfish. Estimating changes in fishing behavior requires detailed knowledge of the fixed and variable costs of each vessel, as well as the motives of the fishermen. There is simply not enough data to make this estimate possible for the wide variety of vessels and fisheries that land monkfish.

The three management alternatives (including non-preferred alternative 3) have similar trip limits for fisheries with monkfish bycatch, but have slight differences that reflect the management strategy of each alternative. In certain cases, the Councils also combined trip limits across areas or types of gear to make the proposed management program more uniform and thus improve compliance and enforceability. In all cases, the proposal is based on weight data for individual trips and reflects the normal landings of monkfish that are peculiar to a given area, gear type, and fishery. Scallop dredges, for example, take longer trips and fish in areas prone to monkfish bycatch than do vessels in other fisheries. Their trip limits are therefore considerably higher than those proposed by the Councils for other vessels. The proposed limits for each alternative and the proportion of trips and landings that would be impacted are explained in more detail below.

##### 8.1.5.1.1.5.3.1 *Groundfish trawl limits*

###### **Northern area**

In the northern area, the 1,000 pound trip limit for Alternative 1 would affect 94 percent of trips that derive more than 25 percent of their total revenue from groundfish while using trawl gear (Figure 27, upper panels). About 92 percent of groundfish trips would be affected in the southern area (Figure 28, upper panels). Landings on the trips that had monkfish landings exceeding the 1,000 pound limit accounted for 50 percent of the total landings of monkfish in the northern area and 38 percent in the southern area. Most trips with landings that exceed the proposed limits target monkfish, although

groundfish still contributed more than 25 percent of total revenue. Some of the vessels making the trips with high landings of monkfish would qualify for limited access and could target monkfish. Others may move to areas with less monkfish and more of their target species if they cannot otherwise land these high volumes of monkfish.

Monkfish limits per day-at-sea are possible for this fishery, because the time away from port is monitored via a mandatory call-in system. Vessels that do not call-in cannot retain any of the 10 regulated large-mesh species and are not reflected in the weightout files with trips having at least 25 percent of the total revenue from monkfish.

The proposed 200 pounds per day-at-sea limit for alternatives 1 and 4 would have similar impacts to trip limits on the number of affected trips and on monkfish landings. In the northern area, about 93 percent of all trips in this category would be able to land their customary bycatch of monkfish (Figure 27, lower panels). Because of the few number of trips with large volumes of monkfish, monkfish landings in this fishery would be reduced by 42 percent, assuming that vessels with landings less than the trip limit do not increase fishing for monkfish.

### **Southern area**

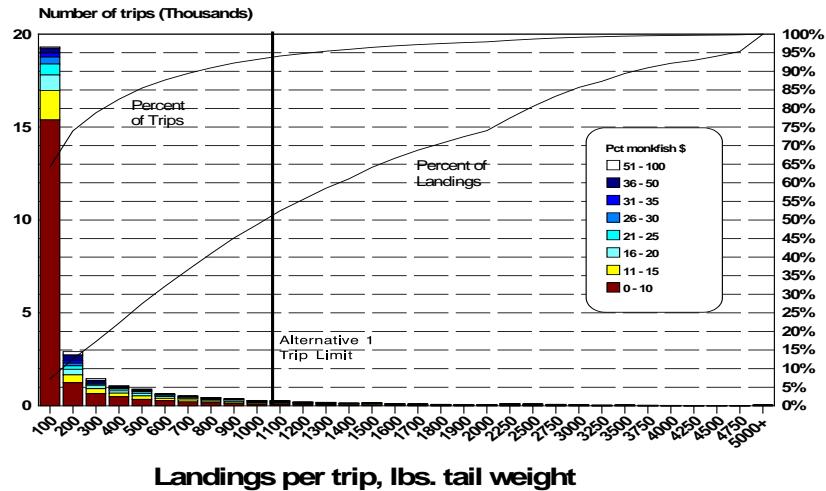
In the southern area (Figure 28, lower panel), the 200 pound/DAS trip limit would not affect 94 percent of all trips in this category, but could reduce monkfish landings by as much as 47 percent. Due to the high percent of revenue derived from monkfish when their landings exceed the proposed trip limit, it does not mean that these landings would be discarded. Some trips will occur within the limited access program while on other trips, the trip limit would force changes in fishing behavior because fishermen could not land the majority of their monkfish catches. Some trips may not occur at all because of the bycatch trip limit.

The trip limits also affect mainly large vessels. Nearly all vessels that are smaller than ton class 31 (less than 150 GRT) land less than 200 pounds per trip (Figure 27 and Figure 28, right panels). They would be unaffected by a 1,000 pound trip limit. This distribution of monkfish landings by vessel size occurs because the smaller vessels tend to take shorter trips, often day-trips. They also tend to have smaller fish holds.

Limits per day-at-sea also has similar impacts on vessels of various sizes. Nearly all vessels smaller than ton class 31 have monkfish landings that do not exceed the 200 pound/DAS proposed limit. In the northern area, there are some trips by ton class 24 and 25 vessels that would be impacted by the daily limit.

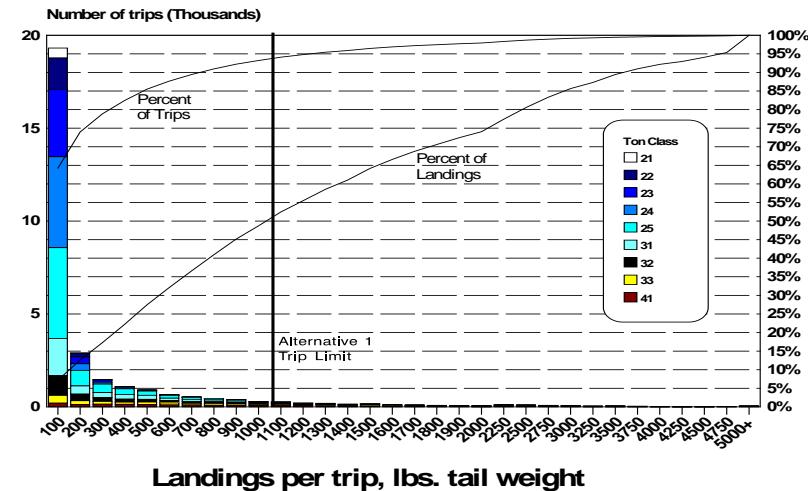
Non-preferred alternative 3 proposes no trip limits for this fishery category, because all vessels that can target groundfish would automatically qualify for monkfish limited access.

## Landings by Percent Monkfish Revenue

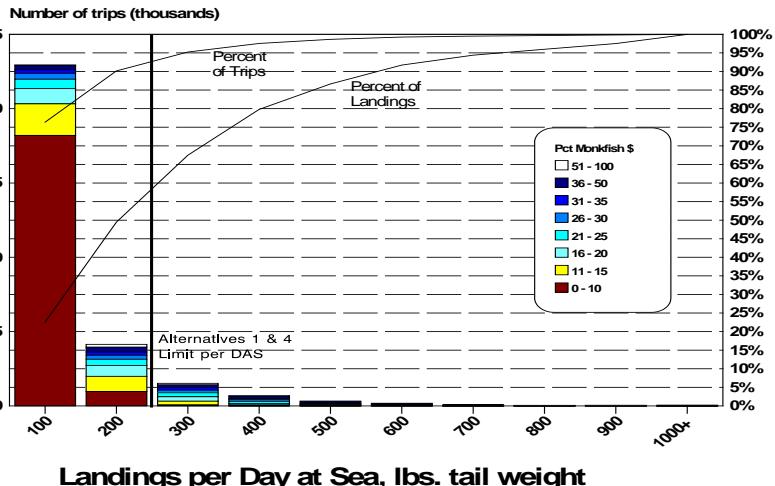


Landings per trip, lbs. tail weight

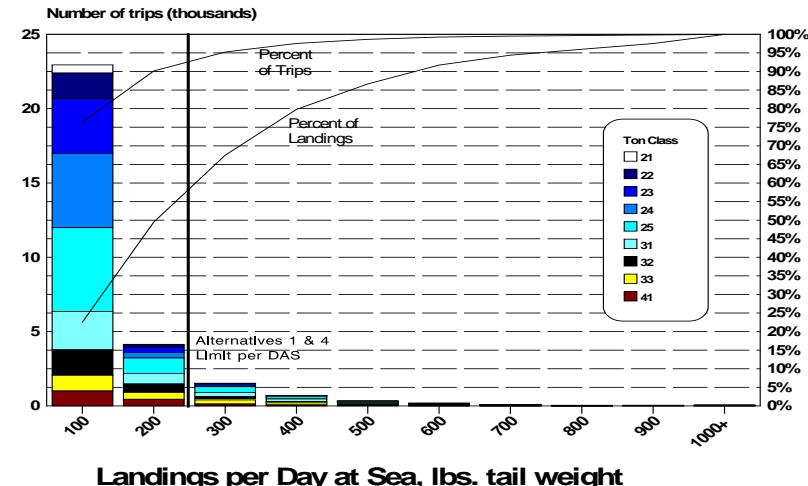
## Landings by Vessel Ton Class



Landings per trip, lbs. tail weight



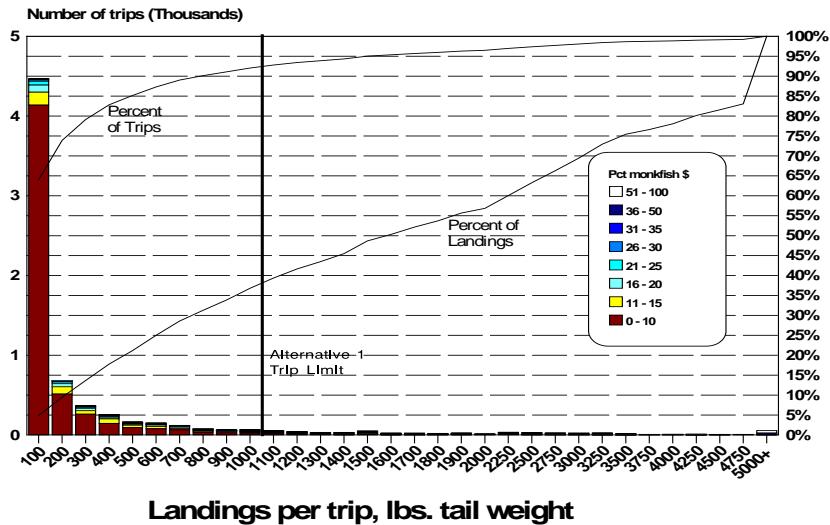
Landings per Day at Sea, lbs. tail weight



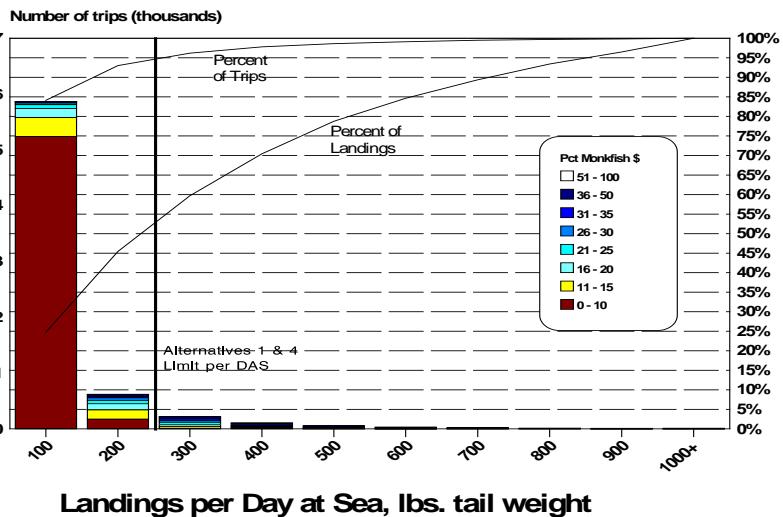
Landings per Day at Sea, lbs. tail weight

**Figure 27.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) for trawl vessels targeting large-mesh groundfish in the Northern Fishery Management Area, 1991-1993. The plots on the left show the distribution of trips by the percent of a trip's value from monkfish landings. The plots on the right show the distribution of trips by vessel size.

## Landings by Percent Monkfish Revenue

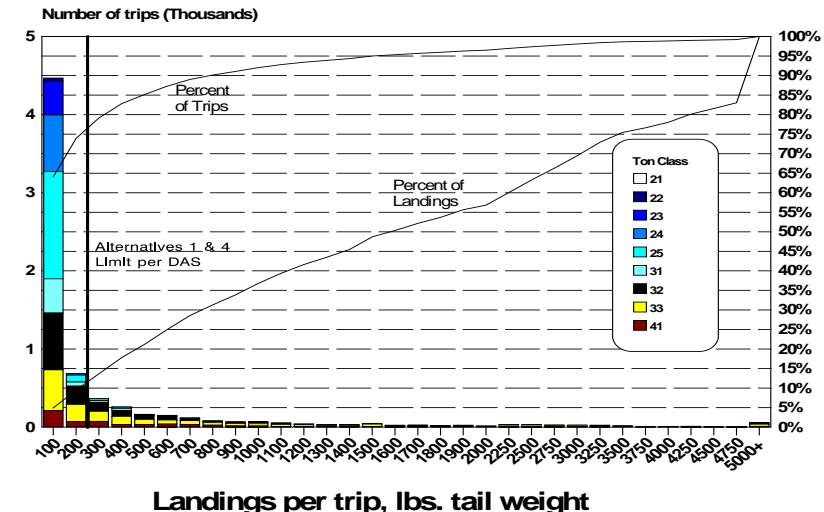


Landings per trip, lbs. tail weight

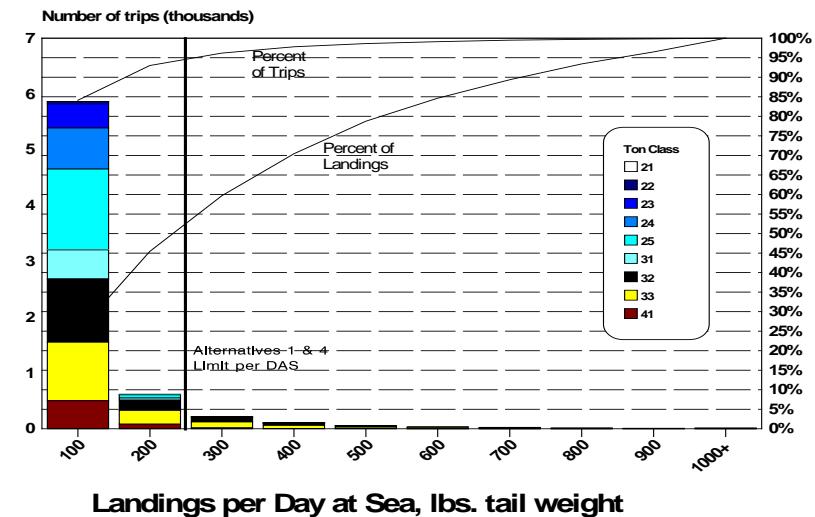


Landings per Day at Sea, lbs. tail weight

## Landings by Vessel Ton Class



Landings per trip, lbs. tail weight



Landings per Day at Sea, lbs. tail weight

**Figure 28.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) **for trawl vessels targeting large-mesh groundfish in the Southern Fishery Management Area**, 1991-1993. The plots on the left show the distribution of trips by the percent of a trip's value from monkfish landings. The plots on the right show the distribution of trips by vessel size

### *8.1.5.1.1.5.3.2 Groundfish gillnets*

#### **Northern and southern area**

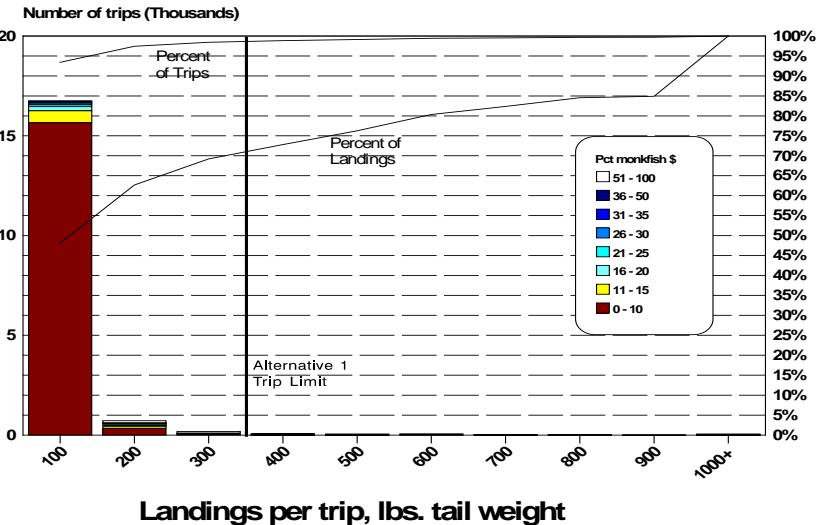
Very few trips by fishermen using gillnets to target groundfish would be impacted by the proposed trip limits. In the northern area (Figure 29, upper panel), only two percent of all trips in this category would be affected by the proposed 300 pounds tail-weight trip limit. Nearly all trips with low proportions of monkfish revenue have monkfish landings that are less than 200 pounds per trip. The remaining trips with monkfish landings above the trip limit would have to discard the excess monkfish, but the fishing effort on these trips is likely to occur under the limited access program or it will probably change so that monkfish bycatch is reduced.

Also, the trips by small vessels (< 150 GRT) in this category have monkfish landings that less than the proposed trip limit. On the other hand, there are a few trips (< two percent) that have higher amounts of monkfish landings, many that partially target monkfish. As a result, the 300-pound trip limit for the northern area would reduce monkfish landings by groundfish gillnet vessels by 29 percent.

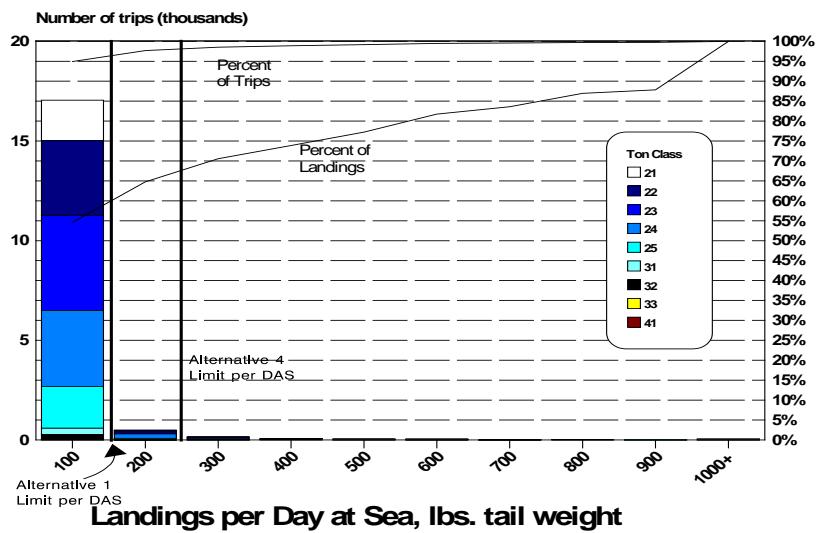
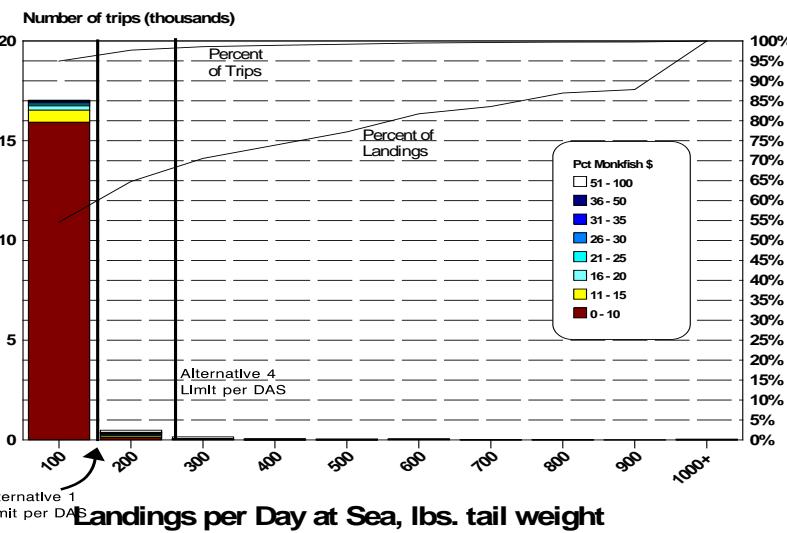
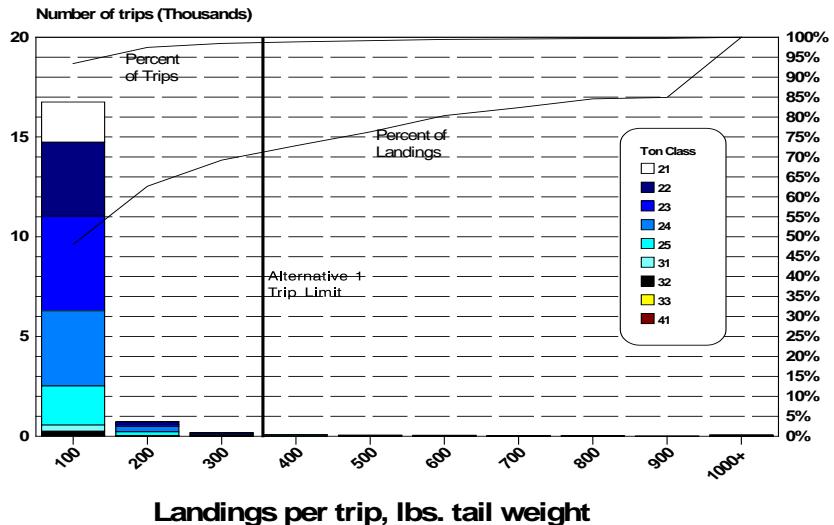
The landings per day-at-sea limit for the northern area would also affect few trips (Figure 29, lower panel). Non-preferred alternative 1 proposes a 100 pound/DAS limit, which would affect only four percent of all trips in this category, but could reduce monkfish landings by as much as 40 percent. Few if any trips that have monkfish revenue below 10 percent of total trip revenue would be affected. Most trips with monkfish landings higher than larger vessels make the non-preferred alternative 1 trip limit. Which limit applies, per trip or per day-at-sea, depends on whichever limit is more. These estimates of each factor, therefore, overestimate the proportion of trips that would be affected.

The monkfish landings per day-at-sea limit for non-preferred alternative 4 would affect fewer vessels than non-preferred alternative 1, because the 200 pound/DAS limit is higher. Only two percent of all trips would be affected, but landings could be reduced as much as 32 percent. Alternative 3 proposes no trip limits for this fishery category, because all vessels that can target groundfish would automatically qualify for monkfish limited access.

## Landings by Percent Monkfish Revenue

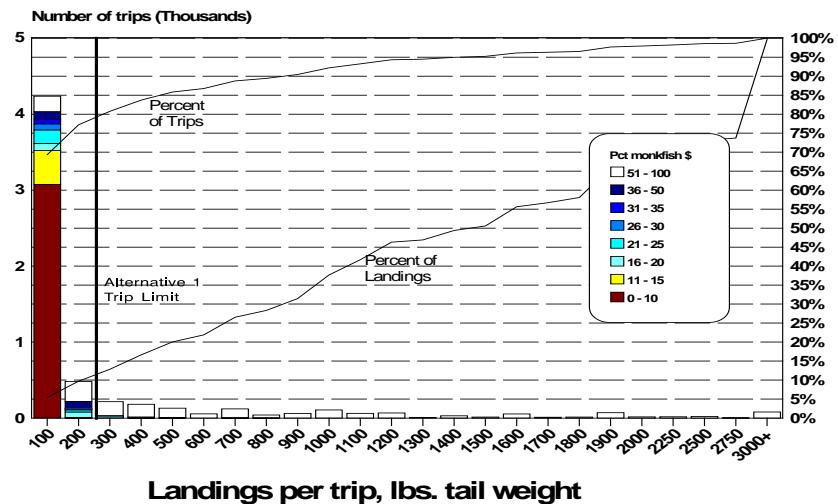


## Landings by Vessel Ton Class

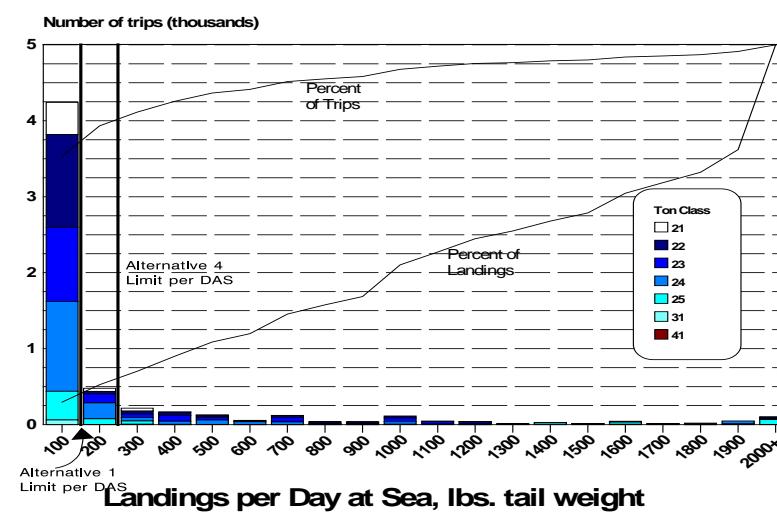
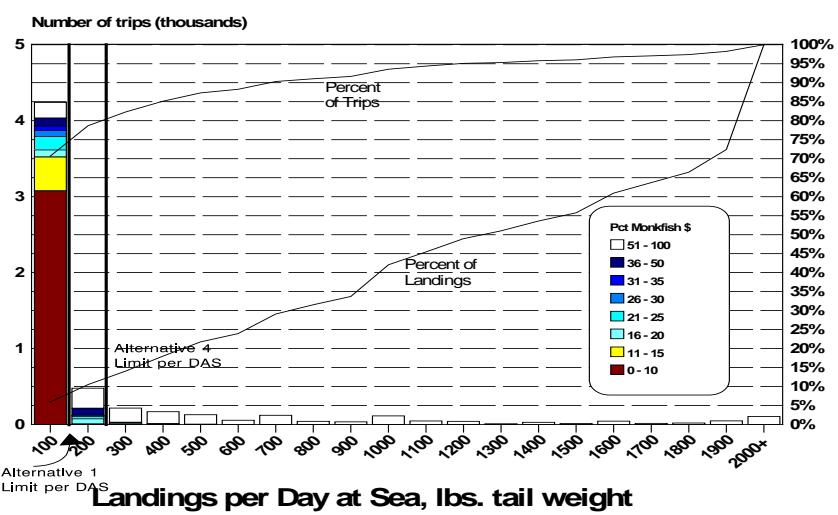
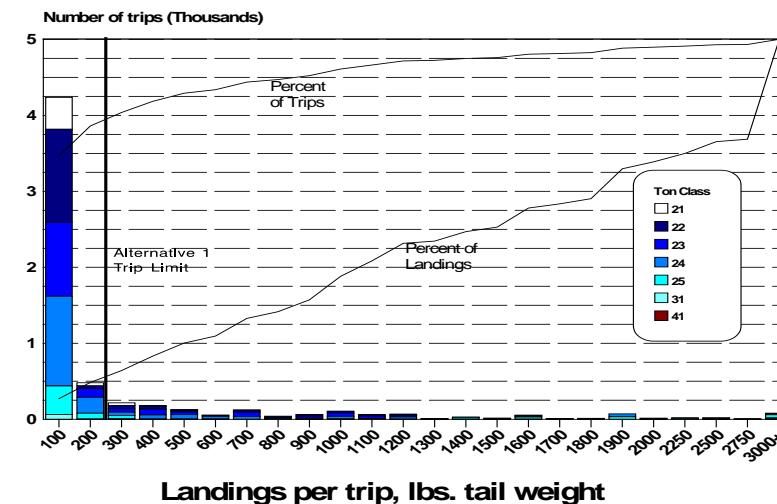


**Figure 29.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) **for gillnet vessels targeting large-mesh groundfish in the Northern Fishery Management Area**, 1991-1993. The plots on the left show the distribution of trips by the percent of a trip's value from monkfish landings. The plots on the right show the distribution of trips by vessel size

## Landings by Percent Monkfish Revenue



## Landings by Vessel Ton Class



**Figure 30.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) for gillnet vessels targeting large-mesh groundfish in the Southern Fishery Management Area, 1991-1993. The plots on the left show the distribution of trips by the percent of a trip's value from monkfish landings. The plots on the right show the distribution of trips by vessel size

#### *8.1.5.1.1.5.3.3 Summer flounder trawl*

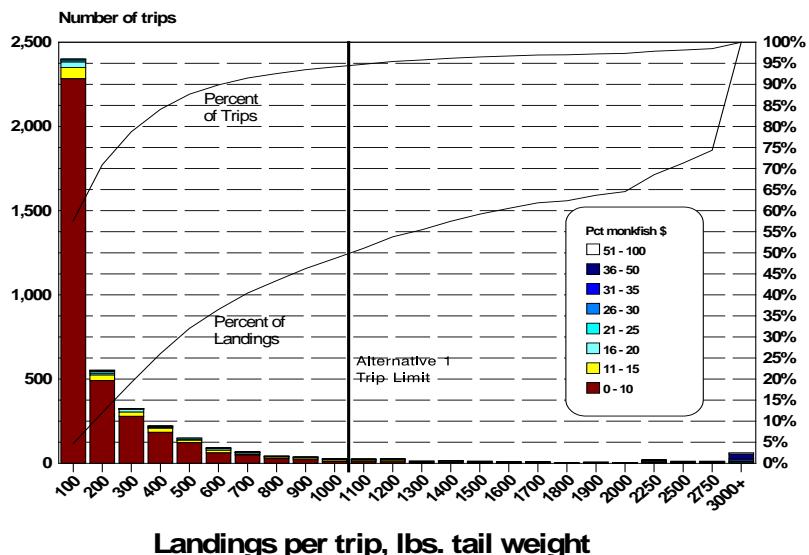
Few trips, but a substantial fraction of monkfish landings, would be affected by the proposed 1,000 pounds tail-weight and 10 percent of the total weight of fish on board limits. The summer flounder trawl fishery occurs almost exclusively in the southern area. Landings of monkfish as a bycatch on trips that derive more than 25 percent of the total revenue from summer flounder are sometimes very high when they exceed these limits. Most of the trips with landings that exceed the proposed limits derive less than 30 percent of the total revenue from monkfish. How frequently the proposed limits will induce changes in fishing behavior depends on the amount of overlap in the distribution of monkfish and summer flounder when these vessels target the latter.

Recent changes to management will significantly reduce the quotas to meet the biological targets under the Summer Flounder FMP. If the fisheries close earlier due to the reduced quotas, the monkfish bycatch associated with this fishery will similarly decline.

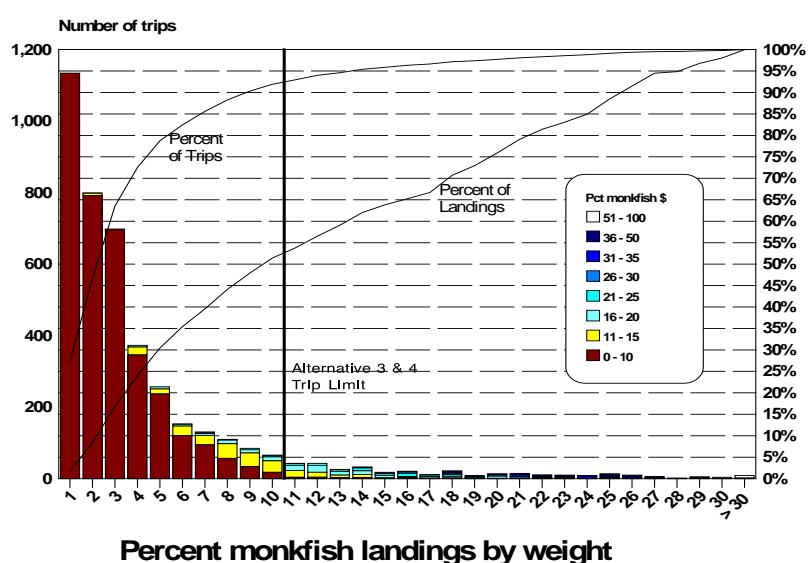
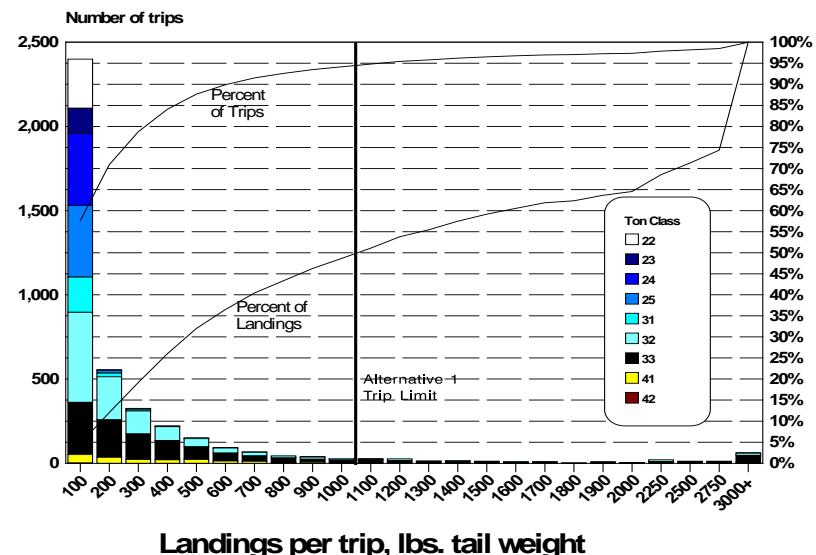
A trip limit of 1,000-pounds tail-weight or 50 percent of the total weight of fish onboard is proposed for non-preferred alternative 1. The 50 percent possession limit will have no affect on trips in this category (Figure 31, lower panel). It will almost never be less than the 1,000-pound trip limit. The 1,000-pound trip limit will affect the landings of monkfish on about six percent of trips in this category (Figure 31, upper panel). Because of the high volume of monkfish landings when the amount of a trip is more than the proposed limit, total landings of monkfish bycatch could be reduced as much as 50 percent. It is difficult to estimate how frequently the trip limit would alter fishing behavior to avoid catching monkfish. Some trips, especially when the monkfish bycatch exceeds 3,000 pounds tail-weight, derive more than 30 percent of the trip's revenue from monkfish. Some of the vessels with these high-volume trips could qualify for monkfish limited access. If they do not qualify, however, they would probably seek other areas to fish to target more on summer flounder and less on monkfish.

Like Alternative 1 trip limits, a 10 percent possession limit would affect few trips, but a substantial fraction of monkfish landings in this fishery category. Alternatives 3 and 4 propose a proportional possession limit of 10 percent of the total weight of fish onboard. This limit would affect only about seven percent of the total trips targeting summer flounder (Figure 31, lower panel), but could decrease monkfish bycatch by as much as 47 percent. By definition, the amount of a trip's revenue from monkfish increases as a proportion of the total when monkfish landings exceed 10 percent. Some partial targeting of monkfish may be occurring when monkfish landings exceed 10 percent and the limit may affect fishing behavior in some cases. How frequently the 10 percent possession limit will alter fishing behavior and decrease monkfish catch is difficult to predict.

# Landings by Percent Monkfish Revenue



# Landings by Vessel Ton Class



**Figure 31.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) **for gillnet vessels targeting summer flounder in the Southern Fishery Management Area**, 1991-1993. The plots on the left show the distribution of trips by the percent of a trip's value from monkfish landings. The plots on the right show the distribution of trips by vessel size

#### **8.1.5.1.1.5.3.4 Small mesh trawl fisheries**

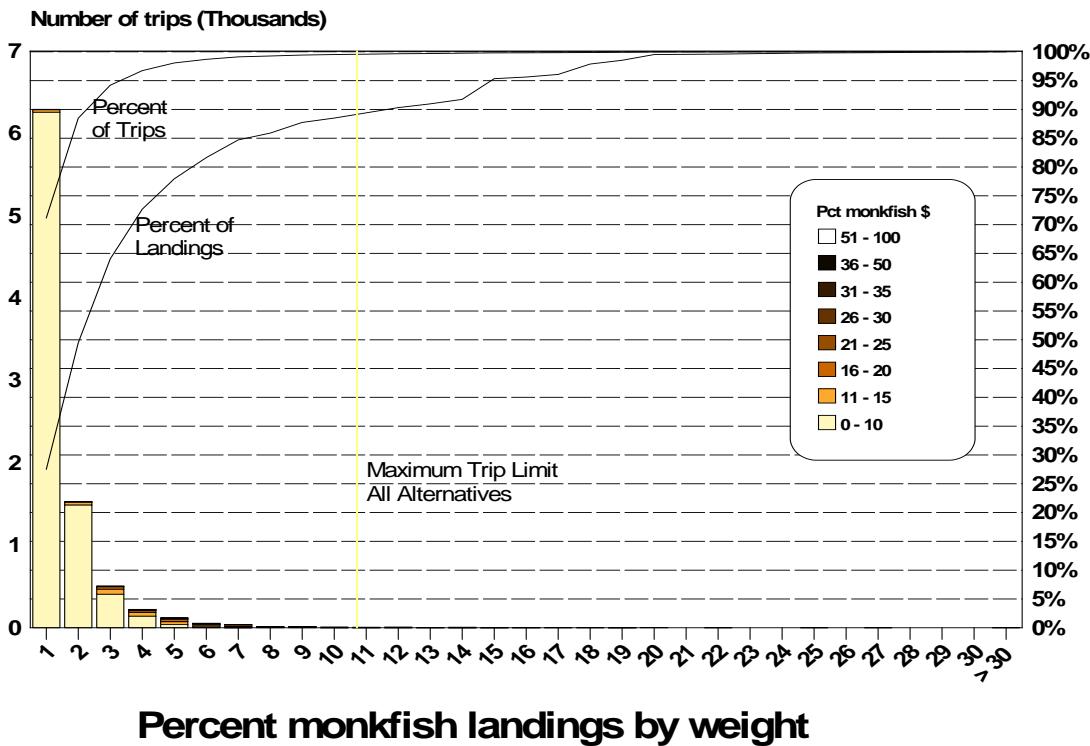
At the most liberal limit (10 percent of the total weight of fish onboard), the monkfish possession limits for fisheries that target other species with small mesh (less than 6 inches in the New England regulated mesh area and 5 1/2 inches in the Mid-Atlantic regulated mesh area) would affect very few trips. The bycatch of monkfish on these trips would not decrease and could increase, especially if landing livers as a bycatch became even more lucrative.

##### **Northern area**

In the northern area (Figure 32), a 10 percent limit would have affected an extremely small fraction of the 5,000 trips during 1991-1993 that were evaluated. Vessels in the small mesh fishery in the northern area target shrimp, whiting, and dogfish. Monkfish landings would decrease only about two percent and could increase. If the criteria for selecting trip limits in other fisheries are applied to small mesh fisheries, the possession limit could be as low as four percent. Unlike other fisheries, however, the percent of revenue from monkfish is very low. A low possession limit is unlikely to affect fishing behavior and reduce catches of monkfish.

##### **Southern area**

A similar pattern of landing monkfish as a bycatch in small mesh fisheries occurs in the southern area (Figure 32). A very small fraction of total trips would be affected by a 10 percent possession limit, but when the fraction of monkfish landings is higher than 10 percent there are significant amounts of monkfish landed. Unlike the northern area, a 10 percent possession limit in the southern area could reduce monkfish landings by about 12 percent. These landings, however, make up a small fraction of the total revenue and the possession limit is unlikely to change fishing behavior and reduce monkfish catch. If the criteria for selecting trip limits in other fisheries are applied to small mesh fisheries, the possession limit could be as low as six percent.



**Figure 32.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) for gillnet vessels targeting squid, whiting, and scup in the Southern Fishery Management Area, 1991-1993.

#### 11.6.5.5 Scallop dredge

The majority of monkfish bycatch from scalloping occurs in the southern area, so the following discussion focuses on that area. The monkfish bycatch that comes from the northern area mainly arises from scalloping on the northern edge of Georges Bank, in statistical areas 522 and 561. Both these statistical areas fall within the northern fishery management area (Figure ), but the southern area trips limits for non-preferred alternative 1 would apply to scallop dredges fishing there. For non-preferred alternatives 3 and 4, the scallop trip limits is the same in the northern and southern areas. The following discussion of the impacts of the proposed trip limits, therefore, focuses on the catches in the southern area only.

##### Southern area

The proposed trip or possession limits for scallop dredge vessels are generally much higher than those for other fisheries. Scallop vessels often land large amounts of monkfish per trip, due to the usual practice of making long trips (average DAS about 15 days) and their frequent bycatch of monkfish in scallop areas. These vessels, furthermore, have low reliance on monkfish revenue owing to the higher unit value of scallop meats.

The 4,000 pound trip limit for non-preferred alternative 1 would affect about eight percent of all trips during 1991-1993 that targeted scallops<sup>30</sup> (Figure 33, upper plots). Monkfish landings, on the other hand, could be reduced as much as 35 percent of current levels because the trips that land larger amounts of monkfish contribute to a disproportionate share of total landings. The majority of monkfish landings by scallopers that exceed the proposed limit are made on trips where monkfish contributes to a large fraction of the trip's value, even though the percent of the trip's revenue from scallop landings is at least 25 percent. For trips where monkfish contribute to less than 15 percent of the trip's value, only about one percent of them had landings that were higher than the non-preferred alternative 1 trip limit. Most vessels in the scallop fleet are large, falling into ton classes 33 and 41 (greater than 105 GRT).

Only five percent of all trips by scallop dredge vessels would be affected by the 5,000 pound non-preferred alternative 3 trip limit. Monkfish landings by scallop dredge vessels could decline as much as 25 percent of current landings in this category. The TAL allocation for the limited access fishery would be accordingly lower than under non-preferred alternative 1, increasing the potential for additional days-at-sea reductions if the target landings are exceeded. Fishermen could land more monkfish on their scallop trips, however, making it less likely they would have to change their fishing practices or discard the excess monkfish.

The non-preferred alternatives 1 and 3 possession limit of 400 pounds (tail weight) per day-at-sea is also not expected to affect a large number of dredge trips that target scallops. Only five percent of all trips in the southern area during 1991-1993 had monkfish landings that exceeded the proposed limit. Simply on the basis of this possession limit, the landings of monkfish bycatch is expected to decrease by 25 percent (Figure 33, lower plots). Very few trips where monkfish contributed to more than 15 percent of a trip's value had landings above the 400 pound per day-at-sea limit.

The possession limits for non-preferred alternative 1 are somewhat more liberal than those for non-preferred alternative 3, although individually the limits for non-preferred alternative 3 are the more liberal of the two options. Discards of monkfish could be higher under the limits for non-preferred alternative 3, especially on long trips that are common in the scallop fishery. Because of the way the limits would be applied, the proportion of affected trips would be less than 5 percent for non-preferred alternative 1 (4,000 pounds per trip or 400 pounds per day-at-sea, whichever is more) and about five percent of all trips for non-preferred alternative 3 (5,000 pounds per trip or 400 pounds per day-at-sea). Non-preferred alternatives 1 and 3 differ in the way they treat the possession limit per trip versus the possession limit per day-at-sea. The possession limit for non-preferred alternative 1 would be whichever is more. This means that a scallop dredge vessel on a 6-day trip could retain up to 4,000 pounds of tails, while a scalloper on a fifteen-day trip could retain up to 6,000 pounds of tails. Under non-preferred alternative 3, these same scallopers could only retain 2,400 and 5,000 pounds of tails, respectively.

The proposed possession limit for non-preferred alternative 4 is much more conservative. Although it only has a limit per day-at-sea, it is half of the one proposed by non-preferred alternatives 1 and 4 and may cause unacceptable discarding. About 16 percent of trips targeting sea scallops during 1991-1993 had monkfish landings that exceeded the 200 pound per day-at-sea limit (Figure 33, lower plots). Landings from monkfish bycatch could be reduced as much as 48 percent, but catches are unlikely to be reduced as much. About 20 percent of trips where monkfish accounted for 15 percent or less of total revenue had monkfish landings that exceeded the proposed non-preferred alternative 4 limit. It is very unlikely that scallopers on these trips would change their fishing behavior because they were not able to land their monkfish bycatch. The trips with low monkfish revenue that would exceed the non-preferred alternative 4 possession limit account for slightly more than 15 percent of total monkfish bycatch by scallopers, or eight percent of total landings in the southern area.

Discarding is not expected to be excessively high because the proposed trip limit is higher than customary bycatch levels and scallopers that rely on the high levels of monkfish landings will change their fishing practices. Some of the scallopers with a history of landing large amounts of monkfish will furthermore qualify for monkfish limited access. When monkfish revenue is a high fraction of the total

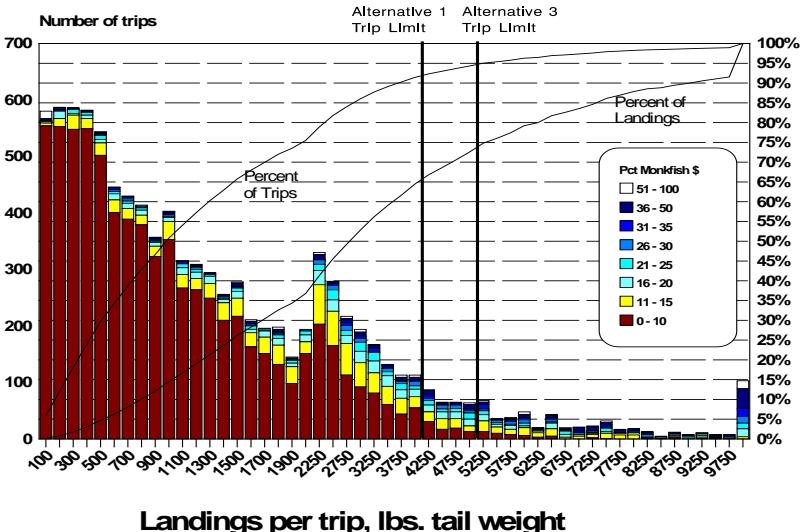
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<sup>30</sup>

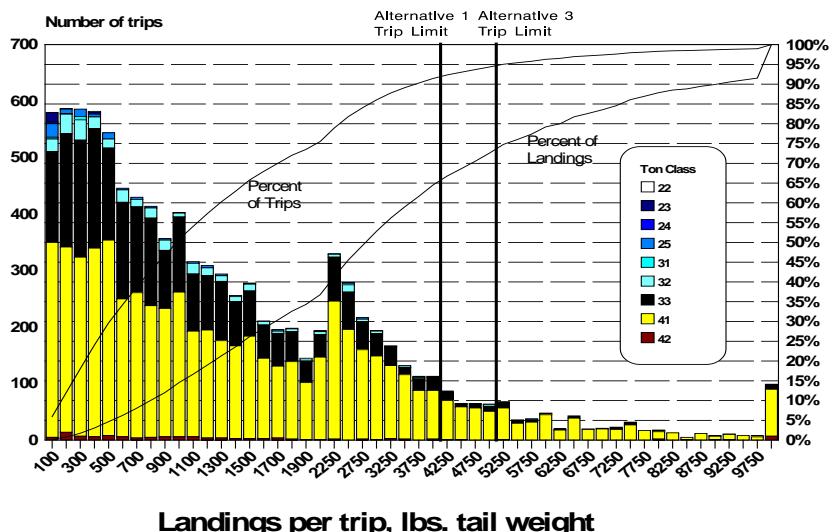
when scallop revenue exceeded 25 percent of the total value of a fishing trip.

trip value, the scallopers are probably targeting monkfish during some portion or their entire trip. If these vessels cannot land these large amounts of monkfish, it is likely that they will change their fishing practices. There are several options for scallopers that find large amounts of monkfish: a) move to other areas where scallops are abundant, but monkfish are not as prevalent, b) make shorter trips, or c) discard the excess monkfish. It is difficult to quantify how frequently the scallopers will discard monkfish, because it will depend on a variety of unpredictable factors. The Council believes that discarding will not be a frequent problem in the scallop fishery, because fishermen that rely on incidental catch for a significant fraction of revenue are likely to fish elsewhere when they cannot land a valuable component of their catch.

## Landings by Percent Monkfish Revenue



## Landings by Vessel Ton Class



**Figure 33.** Distribution of trips grouped by monkfish landings per trip (upper) and per day-at-sea (lower) **for dredge vessels targeting scallops in the Southern Fishery Management Area**, 1991-1993. The plots on the left show the distribution of trips by the percent of a trip's value from monkfish landings. The plots on the right show the distribution of trips by vessel size

### Limits defined by other geographical divisions

The Councils discussed a broad range of monkfish trip or possession limits for vessels using scallop dredges. Trip or possession limits that differ over smaller geographical regions was ultimately discarded by the Councils as a viable alternative because the differences were not great enough to justify the possible lower compliance and the higher enforcement costs. The proposed limits vary somewhat among the alternatives because the normal monkfish by-catch by scallopers varies with season and latitude. In some areas, the 200 pound per day-at-sea limit for non-preferred alternative 4 is not too conservative (i.e. it affects a small proportion of scallop trips) and in other areas the 5,000 pound per trip limit for non-preferred alternative 3 is not too liberal (i.e. some trips where monkfish account for a small proportion of a trip's value have monkfish landings that approach the proposed trip limit).

After taking comment at scoping meetings, the scallop dredge landings of monkfish were analyzed at a finer level of detail to recommend suitable monkfish possession limits for smaller geographical regions. The Council initially recommended the following monkfish limits for scallop dredge vessels, based on the same criteria that was used to develop the original recommendations for two management areas:

**Table 98.** Non-preferred trip limit options for scallop day-at-sea vessels.

Gear	Target species	Proposed trip limit
<i>Scallop dredges and trawls (with limited access permit and fishing under days-at-sea)</i>	Gulf of Maine	1,600 pounds (tail weight) per trip or 200 pounds (tail weight) per day-at-sea, whichever is more
	Georges Bank	5,000 pounds (tail weight) per trip or 400 pounds (tail weight) per day-at-sea, whichever is more
	Southern New England and the New York bight	3,000 pounds (tail weight) per trip or 300 pounds (tail weight) per day-at-sea, whichever is more
	Mid-Atlantic	3,000 pounds (tail weight) per trip or 200 pounds (tail weight) per day-at-sea, whichever is more

Managing monkfish bycatch in a greater number of areas in a fishery with vessels that frequently fish over a broad geographical range poses many problems. One problem is that the different trip limits may increase fishing effort in areas with higher trip limits. The added travel time may be more than offset by the increased value of the monkfish bycatch. Although the practice of optimizing the value of the catch relative to the variable costs of fishing is common, a trip limit may increase the normal shifts in fishing effort. Obviously, more restrictive trip limits would increase this effect if the area-specific limits differ. And since the vessels may primarily be targeting scallops, localized increases in fishing effort to also target monkfish would have a detrimental impact on scallops as well.

A second problem from having different trip limits for a large number of areas is the possibility of decreased compliance and more difficult enforcement. Vessels would need to be held to the lowest trip limit in any of the areas that they fished to make the trip limits effective. Thus continuous monitoring of fishing activity is necessary. Fortunately vessel-monitoring systems (VMS) would greatly improve compliance and reduce enforcement costs. Without a VMS system in place, different trip limits by area would be unenforceable.

Transiting areas that have lower monkfish bycatch trip limits still presents a problem, however. Under the days-at-sea monitoring program, the system may not be able to distinguish whether a vessel is in fact fishing or transiting an area. Perhaps rules could be established that no more than a given number of hourly reports within an

area would be a presumption that a vessel was fishing. It would be difficult and complicated however to make allowances for vessels that were broken-down or anchored to let bad weather pass under such a monitoring system.

#### *8.1.5.1.1.6 Minimum size limits*

The primary reason to implement a minimum size limit for monkfish is to achieve FMP objective 3, preventing increased fishing on immature fish. The monkfish size selection by nets with different mesh size is unknown, but may have a beneficial effect on size selection. The body shape of monkfish, however, prevents even large changes in minimum mesh size from substantially improving monkfish selectivity. Unless there is a significant shift in fishing behavior to avoid immature fish, there is therefore little rationale for implementing a size limit that is larger than current cull practices. The Council believes that this potential shift in fishing behavior is more likely in the Southern Fishery Management Area than in the Northern Fishery Management Area. A minimum size that is consistent with current cull practices will prevent increased fishing pressure on immature monkfish, while minimizing regulatory discards.

##### **8.1.5.1.1.6.1 Preferred alternative**

Some mortality reduction will be realized through survival of discarded monkfish. Although the direct gains in yield from survivors are unlikely to outweigh the yield loss from discard mortality (Section 8.1.5.1.1.6.3), some mortality reduction is expected from surviving discards, nonetheless. With an 11-inch minimum size in both areas during year 1, the expected mortality reduction is four percent. If the 14-inch minimum size becomes effective May 1, 2000, the expected mortality reduction is seven percent. These estimates do not take into account any changes in fishing behavior induced by a minimum size regulation.

In the Northern Fishery Management Area, the fraction of discarded catch surviving with an 11-inch minimum tail length (17-inch total length) is four percent (Table 99). The proportion of total landings under the proposed minimum size is 16 percent for trawls, 14 percent for dredges, and 2 percent for gillnets. The fraction of discarded catch surviving is calculated by multiplying the percent of landings (estimated by number from 1995-1996 sea sampling data) by the discard survival rate, or  $0.16 \times 0.3 = 0.048$  in this case. The total fraction of catch surviving in each area was calculated as the landings-weighted average of the fractions surviving for each gear type. Although the highest discard survival is for gillnets (60%), a higher proportion (16%) of the trawl catch is less than the minimum size. In the Northern Fishery Management Area, the greatest mortality reduction that can be expected from the minimum size is in the trawl fishery.

In the Southern Fishery Management Area (Table 99), the largest fraction of the catch below the proposed minimum size is for scallop dredges. Dredge vessels only land 15 percent of the total in the southern area, however. The aggregate reduction in mortality in the Southern Fishery Management Area is only three percent when weighed by landings by gear. Only 1 percent of the number of monkfish caught by gillnets are under the proposed 11-inch minimum size.

Greater mortality reduction is expected when the 14-inch minimum size becomes effective in the Southern Fishery Management Area (Table 100). The fraction of the catch surviving discards from trawls increases from 4 percent with an 11-inch minimum size (Table 99) to 18 percent with a 14-inch minimum size (Table 100). The greater mortality reduction occurs mainly because the fraction of the trawl catch under the minimum size is 61 percent. Most of the trawl-caught monkfish in the southern area, however, comes from the directed fishery. It is much more likely that these vessels will adapt to the higher size limit by avoiding small fish or by using more size-selective gear.

The fraction of discarded catch surviving from dredges also increases from 6 to 13 percent, but it is less likely that scallop vessels will be able to avoid small monkfish. New technology for using finfish excluder devices in scallop dredges could effectively reduce unwanted discards of small monkfish.

The fraction of discarded catch surviving from gillnets increases from one percent with an 11-inch minimum size to nine percent with a 14-inch minimum size. Not only does the fraction of catch under the larger size limit higher, but also the discard mortality rate is lower, allowing more discarded monkfish to survive. This issue is discussed in more detail below.

The percent of landed number below the size limit is analogous to a mesh selection pattern, but includes fishery culling practices. If every vessel culled monkfish with exactly the same size, the Councils could set a minimum size that would produce no discards. Knife-edge size selection is unfortunately the exception and a size limit that produces an acceptably low level of discards is unavoidable while preventing vessels from targeting small monkfish.

A higher size limit that was near the median of landings would force fishermen to discard half of the monkfish they caught. This option is unattractive unless discard survival is high or the size limit would induce significant changes in fishing behavior. Changes in fishing behavior, discussed in more detail below, include moving to avoid small fish when they are encountered or using gear that is more size selective for monkfish while maintaining efficiency for catching target species.

Although increased compliance costs for a larger size limit in the Southern Fishery Management Area are expected, the Council is proposing administration that reduces administrative and enforcement costs. The 30-day declaration only applies to vessels fishing in the Northern Fishery Management Area with the smaller size limit. Vessels can declare that they will fish exclusively in the northern area for 30 to 365 days, but this declaration is optional. Vessels could continue fishing in the northern area without declaring their intention if they land only monkfish tails that are larger than 11 inches.

**Table 99. Preferred alternative size limit prior to May 1, 2000.** Estimated mortality reduction from the survivors of discarded monkfish due to an 11-inch minimum tail length in all areas.

Gear	Total Landings (mt)		Percent of Total		Percent of landed number below size limit		Discard mortality rate		Fraction of catch surviving	
	North	South	North	South	North - 11"	South - 11"	North	South	North	South
Fish Trawl	10,672	4,290	63%	48%	16%	12%	70%	70%	5%	4%
Scallop Dredge	3,768	1,356	22%	15%	14%	29%	80%	80%	3%	6%
Gillnet	2,537	3,138	15%	35%	2%	1%	40%	40%	1%	1%
Other	48	144	0%	2%	0%	0%	70%	70%	0%	0%
Total	17,026	8,928					<b>Mortality reduction:</b>		<b>4%</b>	<b>3%</b>
							All areas:			<b>4%</b>

**Table 100. Preferred alternative size limit for after May 1, 2000.** Estimated mortality reduction from the survivors of discarded monkfish due to an 11-inch minimum tail length in the Northern Fishery Management Area and a 14-inch minimum tail length in the Southern Fishery Management Area.

Gear	Total Landings (mt)		Percent of Total		Percent of landed number below size limit		Discard mortality rate		Fraction of catch surviving	
	North	South	North	South	North - 11"	South - 14"	North	South	North	South
Fish Trawl	10,672	4,290	63%	48%	16%	61%	70%	70%	5%	18%
Scallop Dredge	3,768	1,356	22%	15%	14%	65%	80%	80%	3%	13%
Gillnet	2,537	3,138	15%	35%	2%	15%	40%	40%	1%	9%
Other	48	144	0%	2%	0%	0%	70%	70%	0%	0%
Total	17,026	8,928					<b>Mortality reduction:</b>		<b>4%</b>	<b>14%</b>
							All areas:			<b>7%</b>

#### 8.1.5.1.1.6.2 Non-preferred options

The Councils considered applying minimum size limits by gear or gear and area. Lower mortality reduction than the year 2 preferred alternative is expected when the 14-inch minimum size applies only to vessels that use fixed gear. The primary fixed gear that has significant monkfish catches is sink gillnet. Mortality reduction is expected to increase from 4 percent for the preferred alternative to 6 percent in the Northern Fishery Management Area with this option (Table 101). Mortality reduction is only six percent in the Southern Fishery Management Area, however, due to the lower fraction of the catch under the non-preferred 11-inch size limit option for mobile gear. On one hand, the lower fraction of the catch reduces discards of unavoidable catches of small monkfish. On the other, it reduces the incentive for trawl vessels to avoid catching small monkfish. The aggregate mortality reduction for both areas is six percent for non-preferred option 1 (Table 101).

Another option that the Councils considered was to implement a 14-inch minimum size for all vessels except those using mobile gear in the Northern Fishery Management Area (Table 102). The rationale for a smaller size limit for mobile gear in the north is because of the inability for groundfish trawl vessels to avoid small monkfish in the northern area. Also the Council believes, but has no supporting data, to suspect that small monkfish in trawls fare better in the Southern Fishery Management Area than in the northern area. The Southern Fishery Management Area has less mud and rocks that are detrimental to monkfish survival when captured by trawl nets. The mortality reduction in the northern area is that same as expected for non-preferred option 1 above. In the southern area, the expected mortality reduction is the same as expected for the year 2 preferred alternative measures. Combined, the aggregate mortality reduction is expected to be the highest at nine percent.

The reason the Councils rejected these non-preferred options was due to increased enforcement costs. With a size limit that differs by gear, enforcement would have to observe the boat using its fishing gear to make a case for violating the 14-inch minimum size. Vessels could also take advantage of a potential loophole by using a trawl for part of the fishing trip that otherwise caught monkfish with gillnets. If the size limit differs by gear and area, the enforcement problem is doubled and compliance costs would be higher. Enforcement would have to prove vessels did not fish in the northern area or use mobile gear to prosecute a violation of the 14-inch size limit in the southern area. To relieve the enforcement burden, vessels would have to declare into a fishing area, increasing compliance costs.

**Table 101. Non-preferred option 1.** Estimated mortality reduction from the survivors of discarded monkfish due to an 11-inch minimum tail length in for vessels using mobile gear and a 14-inch minimum tail length for vessels using fixed gear.

Gear	Total Landings (mt)		Percent of Total		Percent of landed number below size limit				Discard mortality rate		Fraction of catch surviving	
	North	South	North	South	North - 11"	North - 14"	South - 11"	South - 14"	North	South	North	South
Fish Trawl	10,672	4,290	63%	48%	16%		12%		70%	70%	5%	4%
Scallop Dredge	3,768	1,356	22%	15%	14%		29%		80%	80%	3%	6%
Gillnet	2,537	3,138	15%	35%		26%		15%	40%	40%	16%	9%
Other	48	144	0%	2%		0%		0%	70%	70%	0%	0%
Total	17,026	8,928							<b>Mortality reduction:</b>	<b>6%</b>	<b>6%</b>	
									All areas:			<b>6%</b>

**Table 102. Non-preferred option 2.** Estimated mortality reduction from the survivors of discarded monkfish due to an 11-inch minimum tail length in for vessels using mobile gear in the Northern Fishery Management Area and a 14-inch minimum tail length for all other vessels.

Gear	Total Landings (mt)		Percent of Total		Percent of landed number below size limit				Discard mortality rate		Fraction of catch surviving	
	North	South	North	South	North - 11"	North - 14"	South - 11"	South - 14"	North	South	North	South
Fish Trawl	10,672	4,290	63%	48%	16%			61%	70%	70%	5%	18%
Scallop Dredge	3,768	1,356	22%	15%	14%			65%	80%	80%	3%	13%
Gillnet	2,537	3,138	15%	35%		26%		15%	40%	40%	16%	9%
Other	48	144	0%	2%		0%		0%	70%	70%	0%	0%
Total	17,026	8,928							<b>Mortality reduction:</b>	<b>6%</b>	<b>14%</b>	
									All areas:			<b>9%</b>

### **8.1.5.1.1.6.3 Biological effects**

There are three reasons to manage fisheries with minimum size limits:

1. They cause changes in fishing behavior to reduce fishing mortality on small fish, e.g. by causing fishermen to fish in other areas where small fish are less abundant or by reducing the incentive to circumvent mesh regulations.
2. They inhibit the development of markets for small fish, especially when there is a difference in price by size.
3. They cause increases in yield and spawning activity through growth of fish that survive discarding.

#### **Changes in fishing behavior**

The most likely fishing sector to avoid small fish and discarding are fishermen that target monkfish.

Following implementation of the Monkfish FMP, this group will include any limited access vessel using 10-inch square or 12-inch diamond mesh with trawls, beam trawls, or gillnets. Since up to 70 percent of monkfish landings will come from limited access vessels in the Southern Fishery Management Area (Table 95), a minimum size limit could help to reduce mortality on a large proportion of small monkfish.

During scoping hearings, fishermen that targeted monkfish warned about landings and markets for small fish. They urged the management include a size limit to reduce mortality on small monkfish. Fishermen could not identify specific areas where small monkfish concentrated, but they believed that they could avoid small fish on the fishing grounds by responding to fishing conditions.

A minimum size would also be effective in preventing the development of a day-fishery that targets monkfish and lands them in amounts below the trip limit. A short trip-length fishery may become feasible by small boats in inshore areas. A size limit could make this change less likely if the inshore vessels cannot make enough money on large monkfish.

Fishermen that target other species and land their monkfish bycatch are unlikely to change their fishing behavior unless monkfish revenue is a significant fraction of the trip's value. Fisheries in this category include those targeting roundfish (cod and haddock), flatfish (American plaice, winter flounder, and yellowtail flounder), sea scallops, and summer flounder. Monkfish that are caught by sea scallop dredges are unlikely to survive because of the heavy gear as well as the rocks and shell frequently captured by the gear. Monkfish are also unlikely to survive fisheries that tow for long periods, such as the flatfish fishery in the Gulf of Maine.

#### **Markets for small fish**

Prohibiting the landings and possession of small monkfish would prevent price increases for small fish in response to reduced landings of large fish. Monkfish prices vary by size. Increasing prices for small monkfish would reduce the incentive to target larger fish and also would be an incentive for fishermen to circumvent other management measures that could reduce the mortality on small fish. If quotas control catches (non-preferred alternative 1), landings of small rather than large fish would substantially increase overall fishing mortality, because many more small fish are needed to fill a quota.

## **Discard survival and growth**

During development of the proposed management measures, the industry advisors felt that the PDT had used an excessively high discard mortality rate, especially for monkfish catches in the southern management area. The advisors recommended using a 70 percent rate in the northern area and 40 percent rate in the southern area. The advisors pointed out that the only study on monkfish discard mortality was limited and it was conducted only on muddy bottom.

If the industry advice is accurate, the mortality reduction from implementation of a size limit would produce greater mortality benefits. In year 1, the preferred alternative would produce a five percent reduction in mortality (Table 104), rather than four percent that the Councils estimate (Table 99). There are no differences in the north, but the mortality reduction would double in the Southern Fishery Management Area. Similarly, the year 2 mortality reduction would also increase to 12 percent (Table 105), rather than the seven percent Council estimate. In the Southern Fishery Management Area, the mortality reduction could be as much as 27 percent, if the industry advice is a better estimate of discard mortality.

The PDT contacted three scientific experts, familiar with monkfish caught in mobile gear, to get their advice about discard mortality. The PDT contacted Dr. William DuPaul of the Virginia Institute of Marine Science, Dr. Joseph DeAlteris of the University of Rhode Island, and Mr. Arnie Carr of the Massachusetts Division of Marine Fisheries. All three advised that the 40% mortality rate, recommended by the advisors for the Southern Fishery Management Area, was too low. They also saw no reason to suspect that discard mortality would be any different on sandy bottom, characteristic of the southern area, than on muddy bottom, characteristic of the northern area. At a minimum, they felt that the 70 percent rate for mobile gear was appropriate, and that discard mortality could be higher, depending on the type of gear used, the length of tow, and the season. Dr. DuPaul had furthermore submitted a letter to the Councils about his extensive observations aboard boats using scallop dredges and trawls.

The PDT recommended that a 70-80 percent discard mortality rate for mobile gear is the most appropriate level to use for estimating impacts, but also included the expert advice of the industry advisors in the PDT evaluation of size limits. Both industry and scientific advisors agreed that a 70 percent discard mortality rate for trawls is appropriate in the northern area.

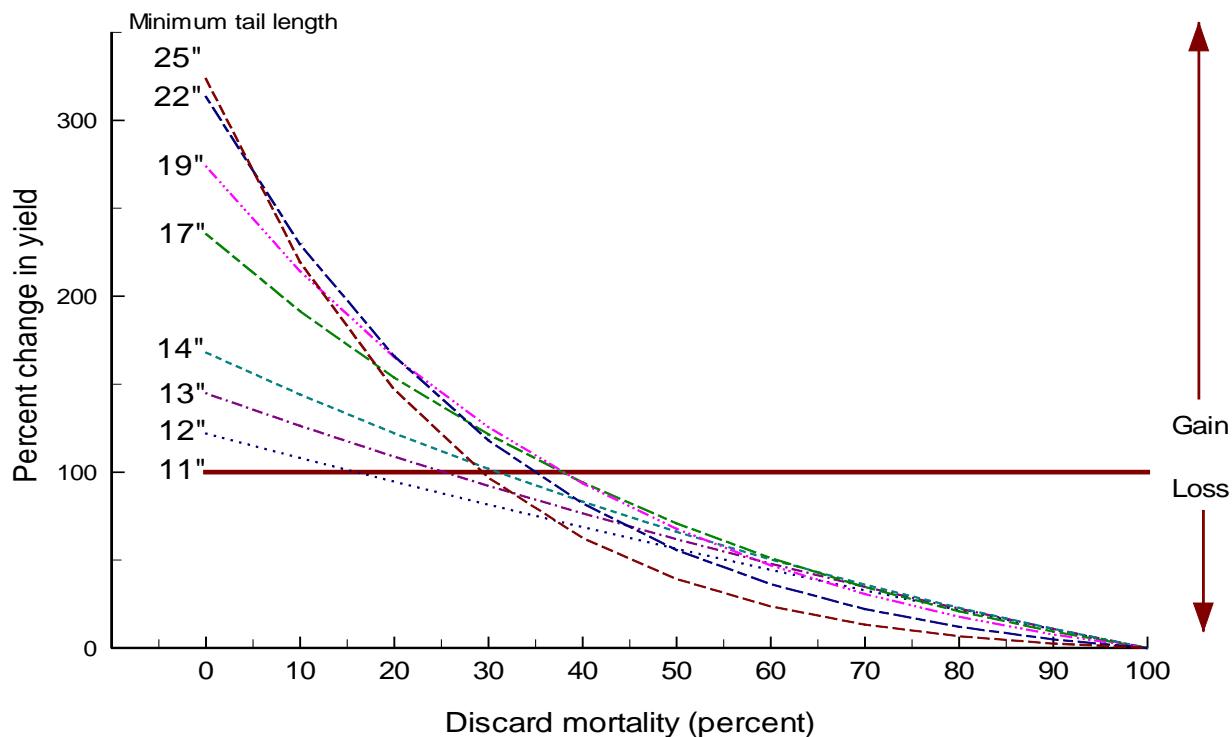
The preferred alternative includes a 14-inch minimum tail length in the Southern Fishery Management Area because the majority of monkfish will be able to spawn at least once prior to capture. About 75 percent of monkfish are mature at 18.5 to 21.4 inches total length (Table 103). Monkfish at this size yield a tail that is 12.3 to 14.3 inches long. Higher minimum sizes to allow more spawning would not have the same amount of benefits as the proposed increase from 11 to 14 inches. A greater size increase would be necessary to allow for 100 percent of monkfish to mature before becoming vulnerable to fishing.

**Table 103.** Monkfish maturity ogive, derived from NEFSC (1992).

	Proportion of Females Mature								
	50 percent			75 percent			99 percent		
	Total	Tail	Age	Total	Tail	Age	Total	Tail	Age
Northern area	18.0	12.0	3-3½	21.4	14.3	4	28.8	19.4	6
Southern area	16.0	10.6	3½-4	18.5	12.3	4½-5	24.5	16.4	6½-7

Monkfish grow from the current minimum size (11-inch tail length) to the proposed size limit (14-inch tail length) in about 13 months (Table 106). Monkfish at this size grow rapidly and would be vulnerable to discarding. Monkfish FEIS

over a short period. While these fish gain about 90 percent in tail weight, about 20 percent would be lost through natural mortality and some will die from discarding. Even if fishermen discarded all the undersized fish that they currently catch (i.e. the size limit and other management measures cause no changes in fishing behavior), the net gain in yield per recruit would be positive whenever discard mortality rate was below 30 percent (Figure 35).



**Figure 34.** Gain or loss in yield-per-recruit (tail-weight) caused by growth and discard mortality at minimum size options, expressed as tail-length. The increase in landings is highest when discard mortality is low. Losses in yield occur in all cases when discard mortality is more than 40 percent. The lowest size limit that produces gains at the highest mortality rate is a 17-inch minimum tail-length

A higher minimum size would produce different marginal gains in yield (Figure 35) or spawning because monkfish would undergo more natural mortality and discarding while growing larger. A 19-inch minimum tail length would be required to ensure maturity of 100 percent of monkfish prior to becoming vulnerable to fishing. Another 25 percent of immature monkfish would be able to spawn if they were allowed to grow to this larger size. Because growth slows with age, monkfish in this size range would take another two years to reach the higher, alternative limit. Monkfish would grow from the current minimum size to 28 inches total length (19-inch tail) in about 38 months (Table 106). During this time, monkfish would gain about 380 percent in tail weight but 50 percent would die from natural causes and others would die from discarding. Discard mortality would have to be less than 38 percent to realize a net gain in yield per recruit. Coincidentally, the delayed harvest of existing small monkfish would delay the economic benefits, reducing the net present value of those future gains.

**Table 104.** Estimated mortality reduction from the survivors of discarded monkfish due to an 11-inch minimum size limit in all areas. The Industry Advisory Committee recommended the discard mortality rates in December 1997.

Gear	Total Landings (mt)		Percent of Total		Percent of landed number below size limit		Discard mortality rate		Fraction of catch surviving	
	North	South	North	South	North - 11"	South - 11"	North	South	North	South
Fish Trawl	10,672	4,290	63%	48%	16%	12%	70%	40%	5%	7%
Scallop Dredge	3,768	1,356	22%	15%	14%	29%	70%	40%	4%	17%
Gillnet	2,537	3,138	15%	35%	2%	1%	70%	40%	1%	1%
Other	48	144	0%	2%	0%	0%	70%	40%	0%	0%
Total	17,026	8,928					<b>Mortality reduction:</b>		<b>4%</b>	<b>6%</b>
							All areas:			<b>5%</b>

**Table 105.** Estimated mortality reduction from the survivors of discarded monkfish due to an 11-inch minimum tail length in the Northern Fishery Management Area and a 14-inch minimum tail length in the Southern Fishery Management Area. The Industry Advisory Committee recommended the discard mortality rates in December 1997

Gear	Total Landings (mt)		Percent of Total		Percent of landed number below size limit		Discard mortality rate		Fraction of catch surviving	
	North	South	North	South	North - 11"	South - 14"	North	South	North	South
Fish Trawl	10,672	4,290	63%	48%	16%	61%	70%	40%	5%	36%
Scallop Dredge	3,768	1,356	22%	15%	14%	65%	70%	40%	4%	39%
Gillnet	2,537	3,138	15%	35%	2%	15%	70%	40%	1%	9%
Other	48	144	0%	2%	0%	0%	70%	40%	0%	0%
Total	17,026	8,928					<b>Mortality reduction:</b>		<b>4%</b>	<b>27%</b>
							All areas:			<b>12%</b>

#### 8.1.5.1.1.6.4 Data source

The size distribution of current monkfish catches was estimated from sea sampling data collected during 1992 and 1993. A second estimate of the monkfish catch size-frequency was made using 1995-1996 data to reflect the potential effects of recent management. The 1992-1993 time period was before states began enforcing an 11-inch tail-length size limit. Discarding small monkfish during this time period was, therefore, the result of poor markets for small fish or other fishing conditions. During 1995-1996, 11-inch minimum size landings limits were in effect in NH, MA, RI, CT, NY, and NJ. Changes due to implementation of Multispecies Amendment 5 and Scallop Amendment 4 are also reflected in the more recent data.

For the 1992-1993 period, it was possible to stratify the sea sampling data by gear, area, and monkfish targeting to expand observations and estimate total monkfish landings and discards. The stratification included two areas, northern and southern. Trips that targeted monkfish included those where monkfish landings were more than 50 percent of the total from all species. Sea sampling from other years was not used because sampling intensity was low or data were unavailable. The sea sampling observer program began in 1988, but few trips with monkfish catches were observed until 1992, especially for directed trips. Sea sampling data for 1995-1996 were stratified only by monkfish management area and gear, because sea sampling intensity declined.

#### 8.1.5.1.1.6.5 Distributional impacts

The present catch and discard patterns differ by gear, area, and targeting. Fishermen using certain gears tend to catch larger fish. Part of this size difference by gear type may be explained by segregated fishing by area and bottom type. On the other hand, there is anecdotal evidence that certain gears catch larger monkfish (or at least do not catch smaller monkfish) than others working in the same area. The current monkfish size-frequency distribution for catch and landings are summarized below by gear type (Section 8.1.5.1.1.6.6). As a result of these differences, there will be different impacts on fisheries using each gear. In some cases, fishermen that target monkfish may use different gear, avoiding discards and improving their efficiency to catch larger fish. A more in-depth explanation of these possible effects is given above in Section 8.1.5.1.1.6.1.

Fish size differences in the catch may also be caused by differential size distribution by area. During recent years, there has been a notable increase of small fish captured by research surveys in the northern area. This observation point to above average recruitment and the sea sampling observations would be affected by this condition. These differences by area are not very meaningful in terms of management impact, because conditions may change. Recruitment may worsen in the northern area and improve in the southern area, making an assessment of geographic impacts of the size limit meaningless. On the other hand, the estimator was stratified by area so that the proper expansion coefficients were used to estimate the size-frequency distributions of total landings.

**Table 106. Time in months to grow from a tail-length equivalent to another larger size.** Monkfish at the present minimum size (11-inches in most states) will require 13 months to grow to the proposed 14-inch minimum size. The table show the number of months that would be required for monkfish to grow between various minimum size alternatives. To determine the length of time required for a monkfish having a tail measuring nine inches (34.8 cm total length) to grow to a tail length of twelve inches (45.9 cm total length), choose the cell at the seventh column (9 inches tail, current landed size) and the eleventh row (12 inches tail, target minimum size).

Target Minimum Size		Current Landed Size																			
Total Length (cm)		20.0	23.7	27.4	31.1	34.8	38.5	42.2	45.9	49.6	53.4	57.1	60.8	64.5	68.2	71.9	75.6	79.3	83.0	86.7	90.4
Total Length (cm)	Tail Length (in)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
20.0	5	0																			
23.7	6	3	0																		
27.4	7	7	4	0																	
31.1	8	11	7	4	0																
34.8	9	14	11	7	4	0															
38.5	10	18	15	11	8	4	0														
42.2	11	22	19	15	12	8	4	0													
45.9	12	26	23	19	16	12	8	4	0												
49.6	13	31	27	24	20	16	12	8	4	0											
53.4	14	35	32	28	24	21	17	13	9	4	0										
57.1	15	40	36	33	29	25	21	17	13	9	5	0									
60.8	16	44	41	37	34	30	26	22	18	14	9	5	0								
64.5	17	49	46	42	39	35	31	27	23	19	14	10	5	0							
68.2	18	54	51	47	44	40	36	32	28	24	19	15	10	5	0						
71.9	19	60	56	53	49	45	42	38	33	29	25	20	15	10	5	0					
75.6	20	65	62	58	55	51	47	43	39	35	30	26	21	16	11	6	0				
79.3	21	71	68	64	61	57	53	49	45	41	36	32	27	22	17	11	6	0			
83.0	22	77	74	70	67	63	59	55	51	47	42	38	33	28	23	18	12	6	0		
86.7	23	84	80	77	73	69	66	62	57	53	49	44	39	34	29	24	18	13	6	0	
90.4	24	91	87	84	80	76	72	68	64	60	56	51	46	41	36	31	25	19	13	7	0
94.1	25	98	94	91	87	83	80	76	71	67	63	58	53	48	43	38	32	27	20	14	7



Fishermen that target monkfish may also be able to avoid areas with small monkfish. Some fishermen that commented about the possible management of monkfish indicated that small fish could be avoided, but specific areas with concentrations of small fish could not be defined in advance (possibly making area closures effective). To some extent, the evidence from sea sampling data bears this out. The current monkfish size-frequency distribution for catch and landings are summarized below (Section 8.1.5.1.1.6.7) for trips with monkfish bycatch and for trips targeting monkfish.

Fisheries that catch monkfish as a bycatch will be less likely to try to avoid small fish. On the other hand, fishermen targeting monkfish will not be able to land small fish and will, if conditions are right, seek areas where larger fish are more abundant and smaller fish are less abundant. SAW 14 (NEFSC 1992) attempted to address this issue through a thorough examination of the research survey data. With the exception of areas too deep for the survey gear, the research survey randomly samples locations throughout the range of monkfish. The SAW noted some differences in seasonal distribution of fish. With regard to immature and mature fish, the research survey showed few areas where the distribution of these size groups was different. On a finer resolution and during unsampled seasons, however, fishermen may be able to identify pockets of larger fish and avoid discarding smaller ones.

#### **8.1.5.1.1.6.6 Size frequency distribution by gear**

##### **Gillnets**

Gillnets generally catch larger monkfish and would have the lowest impact from a 14-inch minimum size. The mean length of monkfish caught on sea sampled trips in 1992-1993 was 67 cm total length, or nearly an 18-inch tail (Figure 35). Twenty-seven percent of gillnet-caught monkfish are less than the proposed minimum size, and ten percent of these sub-legal fish are currently discarded. The sublegal component of gillnet catch would total about 10 percent, by weight.

The size-frequency distribution of gillnet-caught monkfish did not appear to change in 1995-1996. Only two percent of the landed fish are less than the proposed 11-inch size limit in the Northern Fishery Management Area (Figure 38, lower panel). In the Southern Fishery Management Area (Figure 39, lower panel), only one percent of landed monkfish is below the 11-inch size limit, but about 15 percent is below the proposed 14-inch size limit for year 2. Very little change in the lengths of discarded and landed catches appear to have occurred between 1992 and 1995.

It is unknown how well that fishermen that target monkfish with gillnets in the Southern Fishery Management Area will be able to avoid catching the smaller fish. Some gillnet fishermen have advised that gillnet mesh is effective in selecting larger monkfish, but the mechanism of how this would occur is unclear. Monkfish gillnets are tied-down and capture the fish by wrapping them in the net, rather than by gilling. Most gillnet fishermen in the southern area already use 12-inch mesh, rather than 10-inch mesh that will be allowed under the FMP.

The survival rate for small monkfish in gillnets is unknown. It may vary by season and frequency of net hauling. The larger fish size in gillnets can be partially attributed to when and where fishermen use gillnets. Gillnet fishermen often target monkfish when they are making short, seasonal migrations, often to spawn. Larger fish are more likely to be spawning and they may as a result be moving further than their smaller counterparts. There are no migration studies to validate or refute this hypothesis.

On the other hand, fishermen have reported that gillnets catch larger monkfish than trawls or scallop dredges operating in the same areas. This apparent difference in selectivity may be due more to the ability of large fish to respond and escape from mobile gear than do smaller fish. No estimates of monkfish selectivity by gillnets are available.

## Trawls

The majority of trawl sea sampling data during 1992-1993 come from vessels using regulated mesh, then 5 inches square or diamond. Most of trawl catches would be smaller than the proposed 14-inch size limit, but 59 percent of those fish are currently discarded (Figure 35, upper panel). The size limit, therefore, would cause fishermen to discard 46 percent of monkfish that are currently landed or 40 percent by weight.

During 1995-1996, most vessels catching monkfish with trawls were either targeting other species with 6-inch mesh trawls, or targeting monkfish with trawl mesh that was at least 8 inches. During late 1996, a framework to the Multispecies FMP required vessels that target monkfish along the continental shelf edge of Southern New England to use 8-inch mesh to reduce groundfish bycatch.

The size-frequency estimates for trawl-caught monkfish in both areas show signs of good recruitment. In the Northern Fishery Management Area (Figure 38, upper panel), the bulk of the catch occurs at 25 to 40 cm total length, reflecting the high recruitment that has been observed for several recent years in the research survey data (NEFSC 1997). In the Southern Fishery Management Area (Figure 39, upper panel), there appears to be a strong year-class that was about 24 to 28 cm total length. In both cases, nearly all of the newly recruited fish were discarded. The 1992-1993 period was sparsely sampled for trawl-caught monkfish, so it is difficult to say if the size-frequency of landings or discards has recently changed.

In the Northern Fishery Management Area (Figure 38, upper panel), nearly all the discarded fish are less than the proposed size limit and only 16 percent of the landings (by number of fish) would be discarded under the size limit. It was possible to land undersized fish caught in the northern area, because ME has no monkfish size limit. The proposed 11-inch size limit, therefore, is very consistent with the current culling practice caused by market conditions and liver yield.

On the Southern Fishery Management Area (Figure 39, upper panel), nearly all of the catch below the proposed 11-inch minimum size is discarded by vessels using trawls. Only 12 percent (by number of fish) of the landings would be discarded with the 11-inch minimum size. Either due to the 11-inch size limit that is effective in most bordering states or due to market conditions and liver yield, the 11-inch minimum size limit approximates the status quo. After May 1, 2000, the proposed 14-inch minimum size will cause trawl vessels to discard considerably more monkfish. In fact 61 percent of current landings (by number of fish) would be discarded. A significant fraction of monkfish caught by trawls in the southern area are targeted, so the vessels may be able to avoid catching small monkfish or it might be uneconomic to target monkfish until they re-recruit to the new minimum size.

About 20 percent of the trawl landings occur from a fishery that targets exclusively monkfish, so the above fractions overestimate the amount of discards that would occur in the trawl sector. Another large fraction of the trawl-caught monkfish landings occurs from fisheries that target monkfish and a mix of other species. The entire former group and some of the latter group are expected to seek other fishing areas where large monkfish are more prevalent. The remaining proportion of trawl-caught landings occurs from fisheries where monkfish is a bycatch. Some of these fish are currently discarded because the fishermen are targeting other species. Monkfish landings of fish less than the proposed size limit would, however, be discarded. When small monkfish account for a small fraction of the total landings, it is unlikely that fishermen will move to other areas to avoid discarding small monkfish.

If monkfish survival is reasonably high, then trawlers would be able to retain more larger monkfish when the survivors grow beyond the minimum size. On the other hand, discards caused by the size limit will initially be an appreciable proportion of monkfish catches taken by trawls, especially when monkfish are caught as a bycatch to

other species. The anticipated benefits from surviving fish will, of course, vary with discard mortality. This effect is explained in the section above.

### **Scallop dredges**

Scallop dredges appear to catch more small monkfish than other gears. The mean size of monkfish in dredges is 29.7 cm, or 11.7 inches tail length during 1992-1993. In 1995-1996, the mean size of landings was 13 to 13½ inches tail-length. Discards averaged 9 to 9 ½ inches in tail-length equivalent. Even though no size limits were in place prior to 1994, scallopers discarded 39 percent of their monkfish, presumably due to the likely price they would receive for monkfish compared to what they could make using their time to process scallops. Of the monkfish that are presently landed, scallop dredges would discard 31 percent of their monkfish (Figure 35, middle panel), or 27 percent by weight.

During 1995-1996, scallop dredges had nearly the same size-frequency of discards and landed monkfish as they had during 1992-1993, before state size limits. With an 11-inch minimum tail-length limit, scallopers the fish in the Southern Fishery Management Area would be forced to discard 29 percent (by number of fish) of the monkfish that are currently landed (Figure 39, middle panel). This fraction is very uncertain because the landing of monkfish tails less than 11-inches appears to be sporadic and poorly sampled. After May 1, 2000, scallopers would be forced to discard 65 percent (by number) of monkfish that are currently landed. Discard survival of these fish are believed to be low, because the monkfish epidermis is often nicked, abraded, and cut in the heavy scallop dredges.

The size selectivity of small fish by dredges may be no worse than for trawls, but large fish may be more successful in avoiding a noisy, narrower dredge (compared to a trawl). Dredges may, therefore, appear to catch smaller monkfish than other gears, when they may be just simply catching fewer large fish.

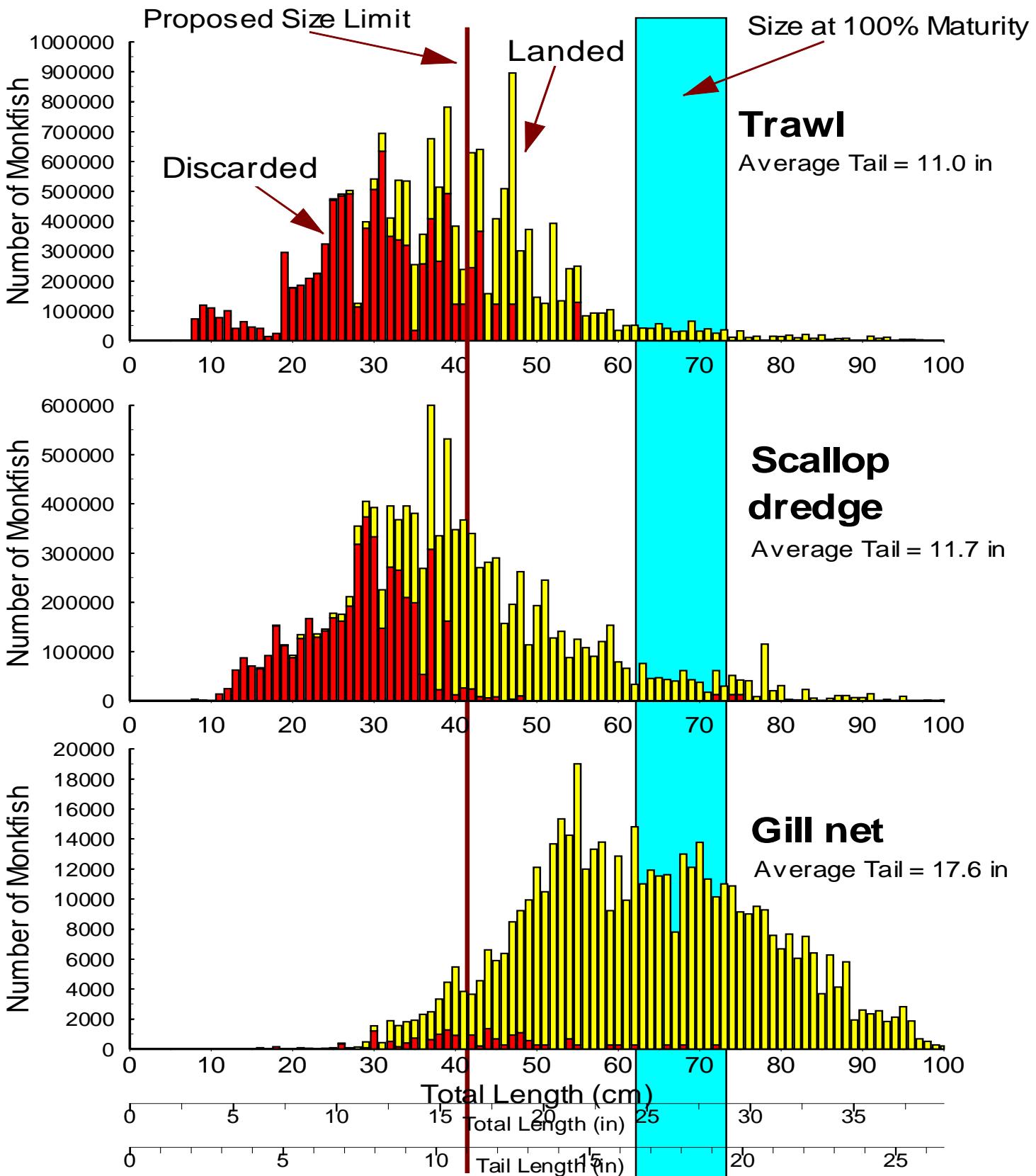
#### **8.1.5.1.1.6.7 Size frequency of bycatch versus targeted catch**

Trips that target monkfish (aka "Directed") tend to catch larger monkfish than trips where monkfish is a bycatch (Figure 36). Conversely, trips that target monkfish appear to keep a greater proportion of small fish (between 8 and 13 inches tail length). On directed trips, about 76 percent of monkfish would be less than the 14-inch size limit. The weight of fish between the current minimum size (11") and the proposed minimum size (14") is 29 percent of current landings. A greater proportion of the estimated future discards are already discarded in the present bycatch fishery, 12 percent (Figure 36, lower panel) versus 3 percent in the directed fishery (Figure 36, upper panel). Of the monkfish that vessels currently land, the size limit would make fishermen discard 37 percent of the fish currently landed in the directed fishery, or 29 percent by weight. The percent of current landings in this fishery sector that would be discarded is 38 percent, or 32 percent by weight. The total number of fish captured as bycatch, however, is nearly seven times the number of fish caught on trips targeting monkfish, however. Since 1993, the proportions of fish caught as a bycatch have declined compared to the targeted catch because of effort reductions in other fisheries and improving markets for monkfish.

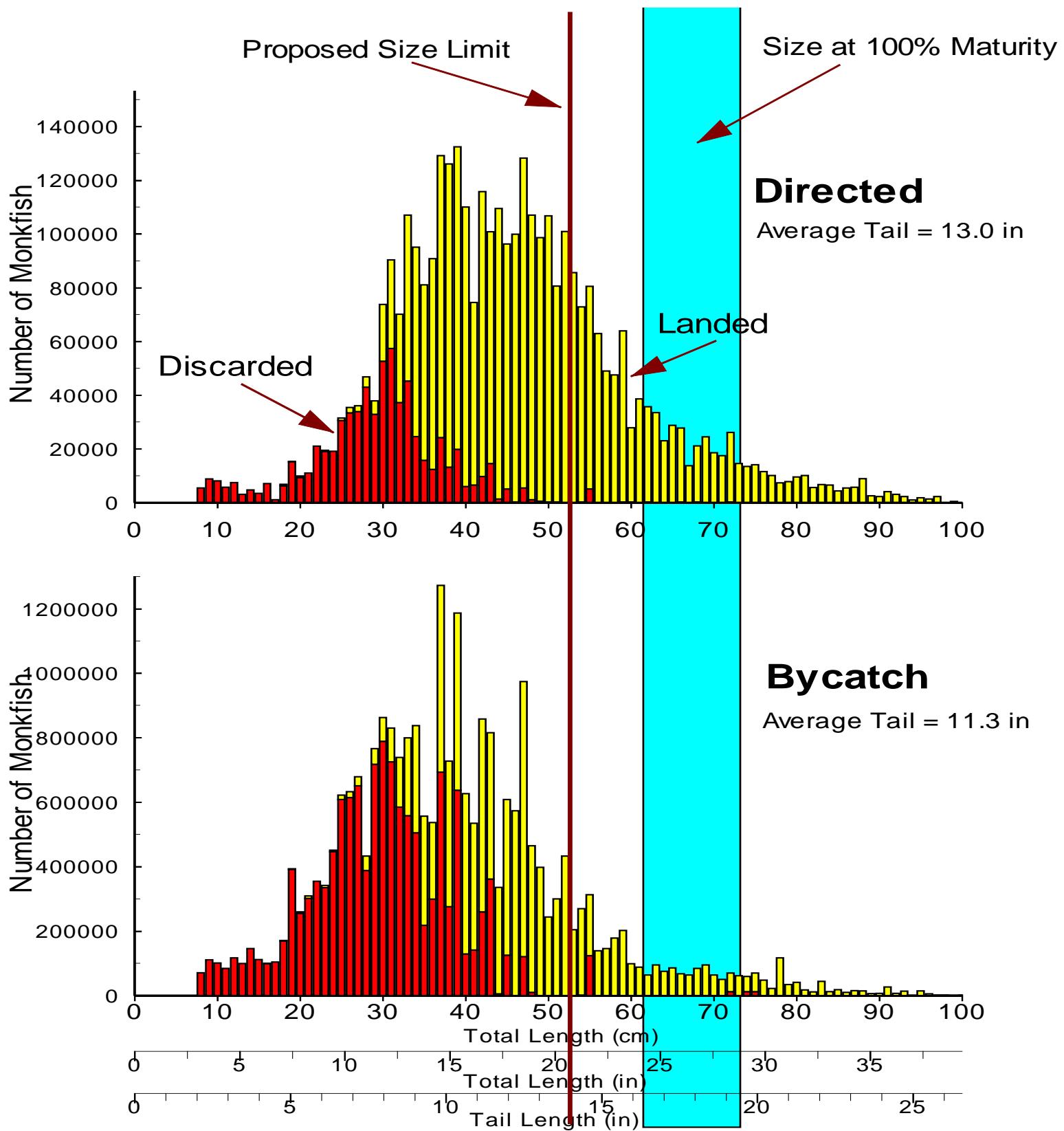
When expressed as a proportion of the catch, the proposed size limit would have a larger impact on the directed fisheries. Without changes in fishing patterns, the fisheries that target monkfish would discard about 50 percent of their catch by weight. The intent of the size limit, however, is to induce fishermen to seek larger fish in areas where small monkfish are less abundant. The directed fishery is the most likely group to shift effort away from small fish due to a size limit.

Conversely, the fisheries that capture monkfish as a bycatch are targeting other species and would be less likely to fish elsewhere to avoid discarding monkfish. This outcome is indicated by existing data that shows the majority of fish smaller than the proposed minimum size are already discarded. The benefits of the minimum size that would be derived from this fishery rely mainly on the survival rate from discarding. No formal studies of

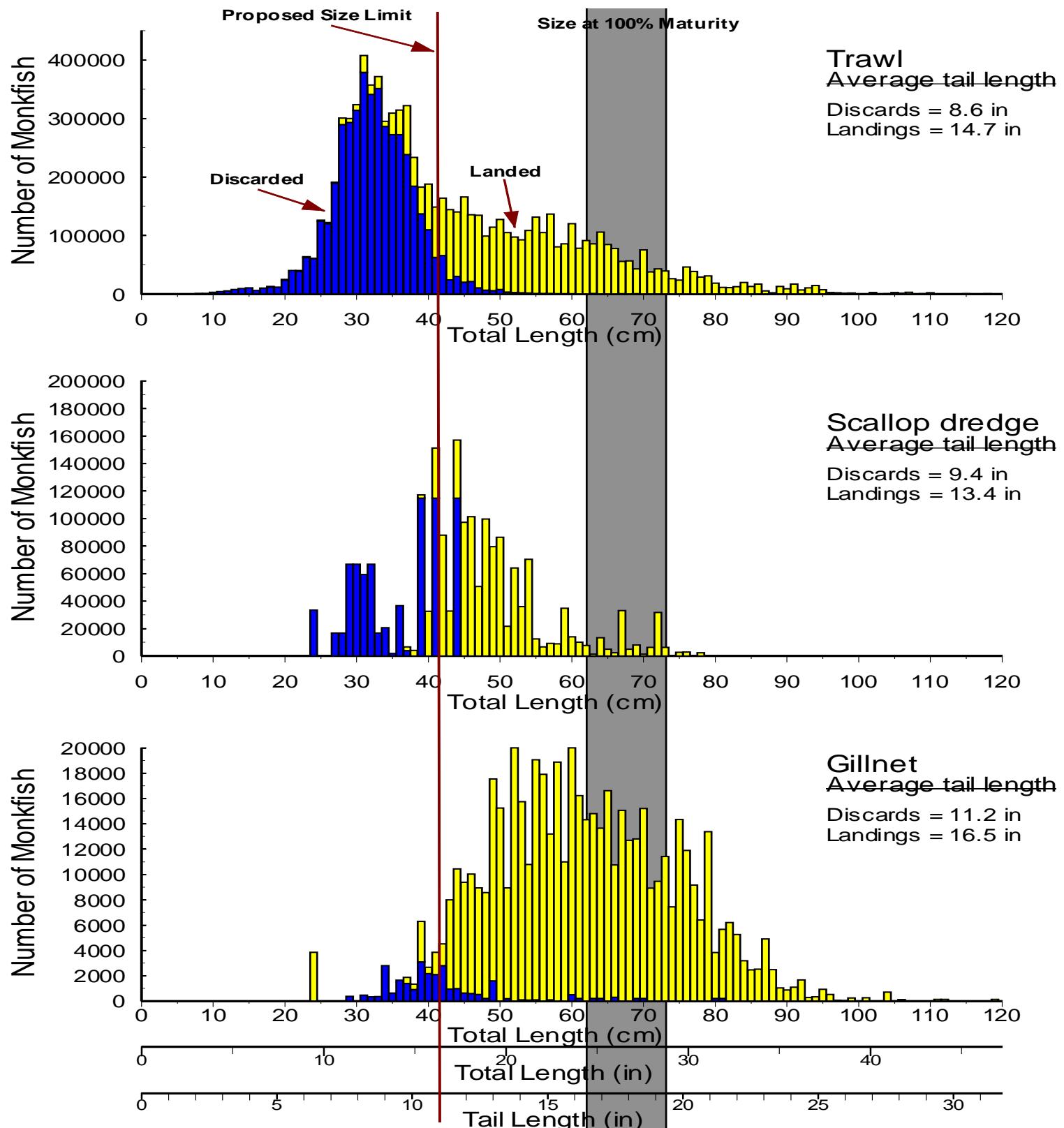
discarding survival are available, but anecdotal evidence suggests that the survival rate varies by season, gear of capture, and handling on deck.



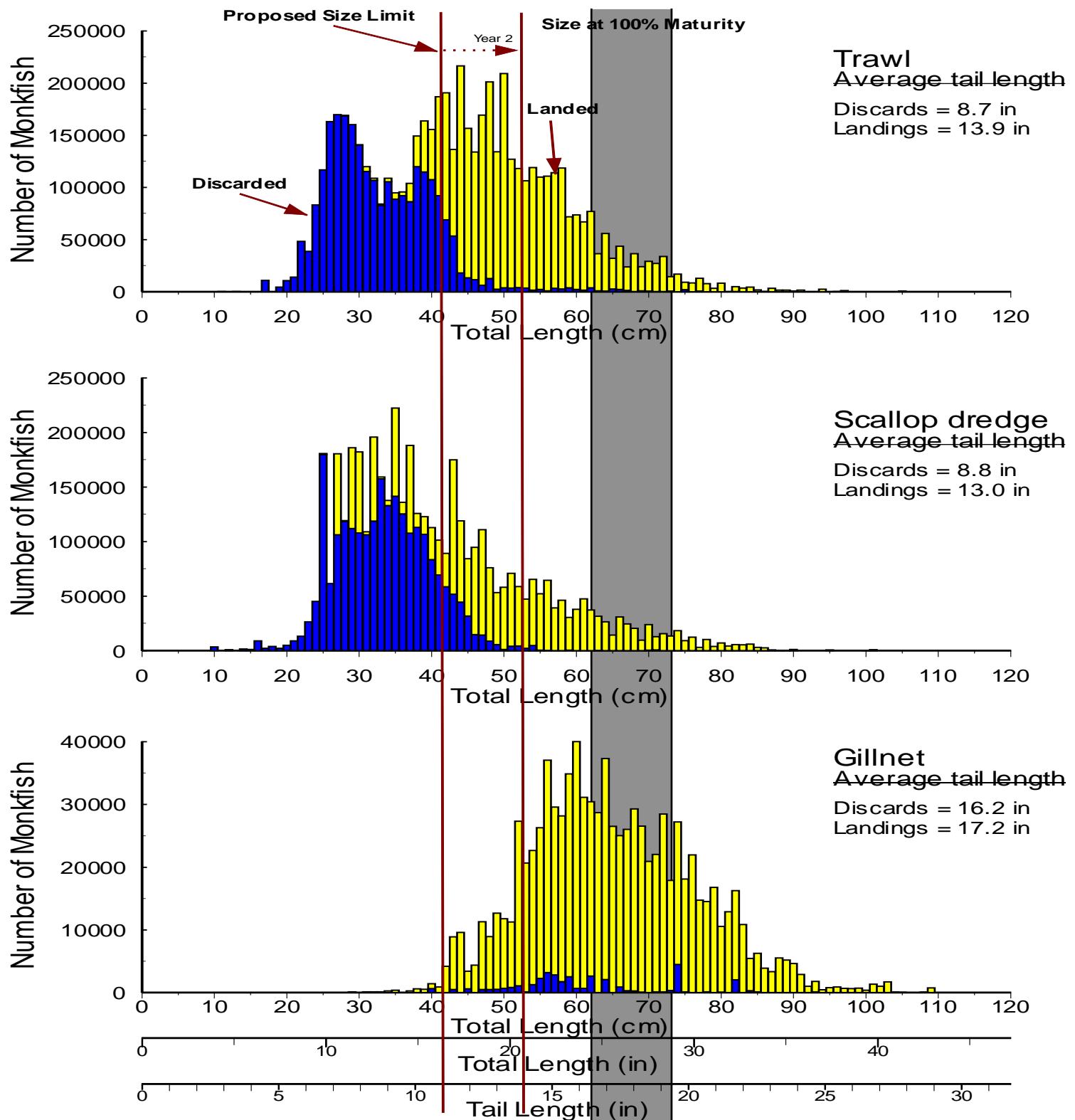
**Figure 35. Northern and Southern Fishery Management Areas combined:** Total length size-frequency of monkfish catch by gear of capture compared to tail length and size at maturity. Size frequency estimates were extrapolated to total landings from 1992-1993 via post-stratification of sea sampling data by gear, area, and directivity.



**Figure 36. Northern and Southern Fishery Management Areas combined:** Size-frequency of monkfish catch by directivity for monkfish compared to tail-length and size-at-maturity. Size-frequency estimates were extrapolated from 1992-1993 sea sampling data via post-stratification by gear, area, and directivity. 'Directed' trips were those that had greater than 50 percent of total revenue from the landings of monkfish.



**Figure 37. Northern Fishery Management Area:** Total length size frequency of monkfish catch by gear of capture compared to tail length and size at maturity for fishing effort. Size frequency estimates were extrapolated to total landings from 1995-1996 via post stratification of sea sampling data by gear and monkfish management area.



**Figure 38. Southern Fishery Management Area:** Total length size frequency of monkfish catch by gear of capture compared to tail length and size at maturity for fishing effort. Size frequency estimates were extrapolated to total landings from 1995-1996 via post stratification of sea sampling data by gear and monkfish management area.

### 8.1.5.1.1.7      *Limits on landings of livers*

The demand for monkfish livers has been very high, creating a significant incentive to increase fishing effort. The average 1995 price for monkfish livers was \$5.00 per pound with liver landings in excess of 1,100,000 pounds (

Figure 19). Although fishermen often had difficulty selling small monkfish tails associated with liver landings, a management induced incentive to discard valueless fish did not exist. Under a size limit, however, fishermen forced to discard small, undersized fish could cut and land livers from discarded fish. Such a response would eliminate the benefit of a minimum size.

#### **Rationale for the 25% liver to tail landings ratio**

The purpose of a limit on liver landings is to allow normal liver landings from legal size fish while not creating an incentive to cut livers from undersized fish. An analysis of 1992 landings shows that the majority of trips had liver to tail landings ratios below 25%. The median liver to tail ratios are approximately 14% for all states, except New Jersey and Maryland. The median ratio in New Jersey is about 18%. Notable exceptions to these trips occur in New Hampshire, Massachusetts, New Jersey, and Maryland. The data indicating high liver ratio trips occur for two possible reasons. Certain vessels may have retained only monkfish livers and had no market for monkfish tails. Alternatively, the monkfish tails might have been sold through dealers that did not participate in the weighout system. There were, however, trips with recorded monkfish tail landings and liver ratios in excess of 50%. A 25% liver to tail landings ratio limit would, in all but a few cases, allow the normal landings of livers from legal sized fish. Higher limits would allow a larger proportion of trips to cut and land the livers from discarded monkfish.

If fishermen are currently landing livers and discarding monkfish, the liver ratio limit could reduce liver landings. If monkfish livers were landed during 1992 without the associated tails (Case A, Table 107), then the potential impact on ex-vessel revenue is \$72,758 or 2.8%. Massachusetts and New Jersey would suffer the greatest adverse impact. If vessels having trips with only liver landings in the weighout data base actually landed their monkfish tails where they were not recorded (Case B, Table 107), then the potential impact is estimated to be \$41,436 or 1.6%. New Jersey, Rhode Island, Massachusetts, and Maine would be the most severely impacted, respectively.

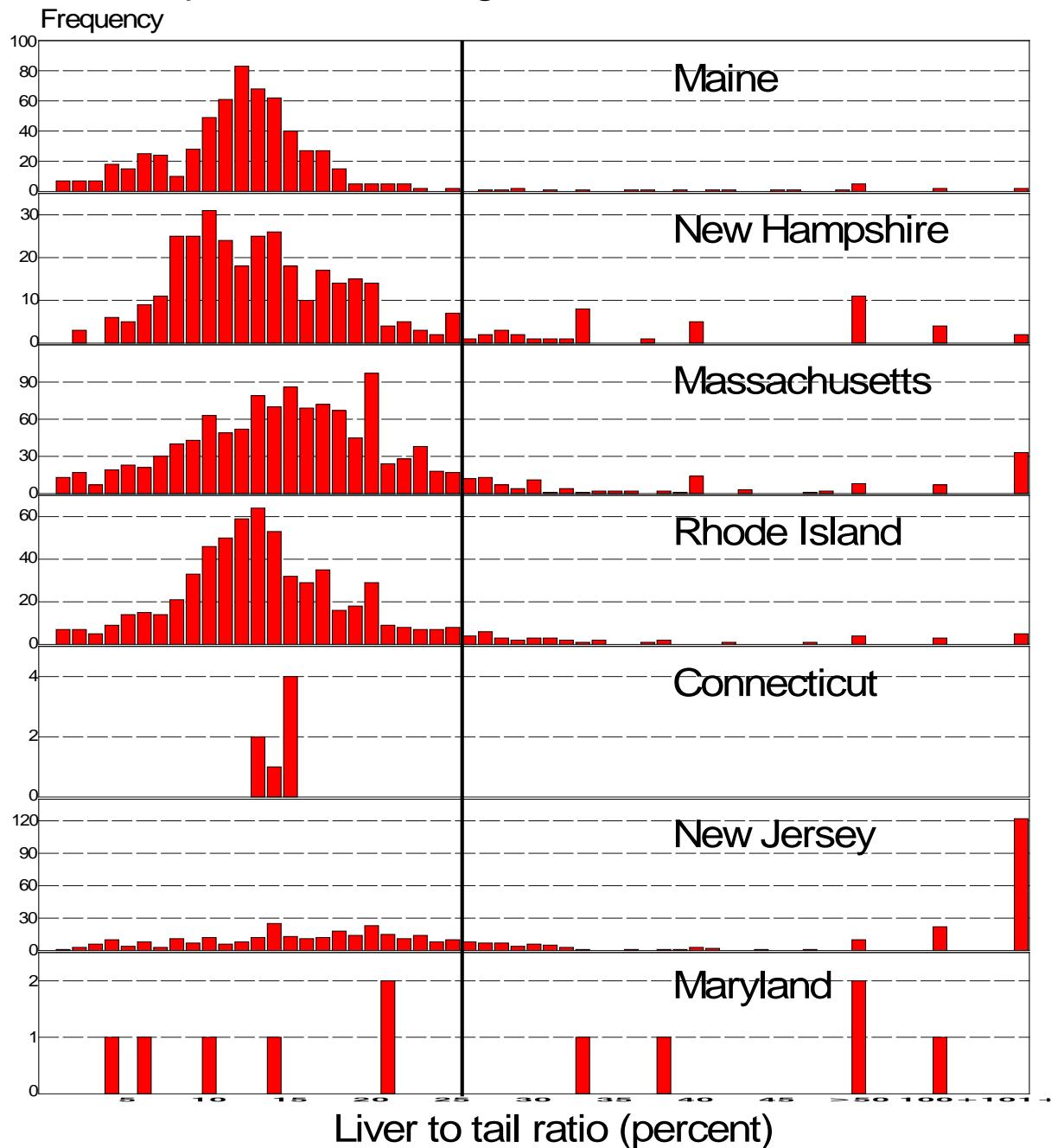
The proposed liver landing ratios--25 percent of tail landings and 10 percent of whole or round fish (live-weight equivalent)--could change landings and onboard processing practices in several ways increase landings in order to maintain monkfish revenues and to compensate for scheduled cutbacks in other fisheries, particularly groundfish and sea scallops. During 1994 and 1995, approximately 10 to 50 percent of all fishing trips reporting monkfish landings exceeded the 25 percent livers-to-tails ratio, the highest incidence being by sink gillnet fishermen. In addition, about 30 to 100 percent of the trips reporting liver landings exceeded the 10 percent livers-to-round fish ratio. To comply with the liver landings regulations, fewer livers would have been landed or tail or round fish landings would have been higher, depending also on possession limits (Section 4.6.1). Similarly, trips falling under the ratio limits could have increased liver landings. Finally, the high percentages associated with the 10 percent liver-to-round fish ratio are largely due to relatively few trips landing whole or round fish; therefore, the ratios also provide an incentive to increase landings of whole or round fish until the 10 percent liver-to-live weight limit is reached.

**Table 107.** Potential impact on ex-vessel revenues from a 25% liver to tail landing limit based on 1992 weighout data. Case A imposes the liver limit on all trips that had liver landings exceeding 25 percent of the landed tail weights. Case B excluded trips where only livers were landed according to the NMFS weighout data.

	Case A 25% Liver Landings Limit on All Trips		Case B 25% Liver Landings Limit on All Trips Landing Monkfish Tails	
	Ex-vessel Revenue	Percent	Ex-vessel Revenue	Percent
Maine	\$6,943	1.8	\$6,827	1.8
New Hampshire	794	5.8	734	5.3
Massachusetts	22,669	3.0	7,587	1.0
Rhode Island	8,468	1.6	8,024	1.5
Connecticut	0	0	0	0
New York	0	0	0	0
New Jersey	24,368	8.0	15,830	5.2
Delaware	0	0	0	0
Maryland	53	19.8	53	19.8
Virginia	9,463	12.7	2,381	3.2

# Monkfish Liver Landings

Proportion of Landings of Tails and Whole Fish



100+ - Liver landings greater than fish landings

101+ - Only livers landed

Source: 1992 NMFS Weightout Data

**Figure 39.** Ratio of liver landings to landings of monkfish tails and whole fish by trip, 1992.

#### *8.1.5.1.1.8 Gear limits*

##### **8.1.5.1.1.8.1 Minimum mesh size for trawls operating in monkfish limited access fisheries**

Although vessels in the limited access fishery would be required to use 10-inch square or 12-inch diamond mesh or larger to target monkfish, they would have to participate in an exempted fishery. The main reason to require very large mesh for targeting monkfish is to reduce the groundfish bycatch below the five percent tolerance. The FMP does not call for any initial changes to the exempted fishery, because the groundfish bycatch for vessels using 10-inch square mesh in the Gulf of Maine or on Georges Bank is unknown.

Monkfish mesh selectivity with these large mesh nets is unknown, but they could have a beneficial effect on monkfish size selection. The body shape of monkfish is, however, prevents even large changes in minimum mesh size from substantially improving monkfish selectivity. The preferred alternative, therefore, relies more on ceilings for total landings, days-at-sea restrictions, trip limits, and size limits to reduce fishing mortality.

##### **8.1.5.1.1.8.2 Gillnet limits**

###### **Gillnet minimum mesh**

The 10-inch minimum mesh requirements will not be restrictive for many vessels targeting monkfish. Most vessels, especially in the Mid-Atlantic use 12-inch mesh in the monkfish fishery and are unlikely to change to a smaller mesh because they catch more unwanted bycatch. Vessels targeting monkfish in the Gulf of Maine tend to use smaller mesh, possibly because they use mesh with thinner twine. Although the Monkfish FMP allows for 10-inch mesh in all areas, the Councils anticipate new regulations to protect harbor porpoise in the Mid-Atlantic area. These regulations will require a larger minimum mesh and a minimum twine thickness, at least during critical seasons and in critical areas. These harbor porpoise regulations are unlikely to change the fishery for monkfish, except to prevent gillnets that are customarily used in New England to be used in the Mid-Atlantic where they have had a higher marine mammal encounter rate.

The other non-groundfish fishery that fishermen use gillnets in offshore waters is for spiny dogfish. The minimum mesh regulations in the Monkfish FMP are unlikely to affect the spiny dogfish fishery, because that fishery is segregated from the monkfish fishery has very little monkfish bycatch. The 50-pound per trip small mesh bycatch allowance will be sufficient to land the small amount of monkfish bycatch in the spiny dogfish fishery. Other inshore gillnet fisheries do not appear to catch many monkfish although some fishermen use different nets to target monkfish and other species during a single trip. This limited practice will not be allowed under the Monkfish FMP because it would raise enforcement costs to unacceptable levels.

Sea sampling data for 1995 and 1996 indicate that vessels targeting monkfish used gillnet mesh averaging 9.9 inches in the Gulf of Maine, 11.6 inches in Southern New England, and 11.5 inches in the Mid-Atlantic (

Table 108). Vessels targeting spiny dogfish used gillnet mesh averaging 6.6 inches in the Gulf of Maine, 7.2 inches in Southern New England, and 6.8 inches in the Mid-Atlantic. These data show that the spiny dogfish gillnet fishery is prosecuted with smaller mesh, on average, than the mesh fishermen use to target monkfish.

**Table 108.** Average gillnet mesh size for vessels targeting monkfish or spiny dogfish. Targeting, in this case, was defined as trips with landings above 50 percent of the total landings by weight. Source: NEFSC sea sampling program, 1995- 1996.

Area	Target species	
	<i>Monkfish (&gt; 50% of total landings)</i>	<i>Spiny dogfish (&gt; 50 percent of total landings)</i>
<i>Gulf of Maine</i>	9.9	6.6
<i>Southern New England</i>	11.6	7.2
<i>Mid-Atlantic</i>	11.5	6.9

### Rationale for a net cap

Net controls have been considered by the New England Council as a way to control the proliferation of fishing gear in response to other restrictive multispecies management measures. Without controls on the number of nets, days-at-sea limits and closed areas would be only partially successful in controlling fishing mortality generated by gillnet vessels. Many of the proposals for managing groundfish are based on controlling the total fishing power of mobile gear, without recognizing that gillnet gear could fish harder without the vessel being at sea for equally longer periods.

Many of the issues that the Council examined for multispecies management are apropos to the monkfish gillnet fleet. Due partly to technical difficulties in designing a net reduction program, the Council is has amended the multispecies plan to establish a system of net caps combined with days-at-sea reductions. Since the preferred alternative includes days-at-sea limits, the New England and Mid-Atlantic Councils are proposing a similar system for the monkfish gillnet fishery. The Councils' intent on capping the number of nets is to:

Prevent uncontrolled increases in the number of nets used by vessels in response to limitation on days-at-sea,  
and

Establish, over time, standardization in numbers of nets in use that could be used in the future as a measurable  
adjustable component of an effort reduction program in addition to days-at-sea limits.

The Councils recognize that a net cap may result in a reduction for some segments of the fleet and may allow for an increase in nets used by other segments of the fleet. The Councils are proposing a limit of 160 monkfish nets in the water at one time. Although this limit was selected based on advice of monkfish gillnet advisors in the Mid-Atlantic region, industry practice in other areas is to fish more nets less frequently. The Councils recognize that fishermen use different methods to fish monkfish gillnets and the amount of nets that fishermen use vary widely. As a result of public comment, the Council raised the preferred net cap taken to public hearing to 160 nets. The intent is to establish a limit that will be effective in limiting the size of the potential increase in nets as a response to other restrictive limits on fishing activity. Having different net caps for the New England and Mid-Atlantic areas was determined to be too expensive to administer and too difficult to enforce. Although the different mesh limits were proposed for a pre-existing mesh area boundary (between the multispecies and Mid-Atlantic regulated mesh areas), the boundary for the harbor porpoise mesh regulations will be different. This difference between regulations could reduce compliance and pose problems for law enforcement.

## **Analysis of the net cap proposal**

Analysis of the net cap is hampered by a lack of data on the numbers of nets used, and by the diversity of gillnet fishing operations. Public comment at Council meetings suggests that in some areas, nearly all vessels fish fewer than 80 nets. In other areas, vessels fish more like they do for flatfish and set between 150 and 200 nets. Since the purpose of the cap is to limit uncontrolled increases in the numbers of nets fished, a reasonable upper limit that would be restrictive on a minority of fishermen will fulfill the intent of this measure.

### **8.1.5.1.1.9      *Mandatory Reporting***

NMFS has developed a mandatory landing reporting system that covers all regulated species managed by FMPs. The Councils have stated their strong support of a mandatory system as an integral part of proposed management systems. The specific process and data items that fishermen would use to report their landings has not been specified, and the Council has deferred the decisions for the details of the landings reporting system to NMFS.

The Council is proposing that the mandatory data collection program established for other species include monkfish in order to correct for problems caused by non-reporting. Because of the low value of monkfish tails compared to the livers, significant landings of monkfish tails are marketed through non-traditional channels and are therefore not reported. It represents a significant data gap when trying to estimate the importance of the fishery and when estimating fishing mortality rates. At-sea processing of monkfish presents another problem to obtaining size frequency data to assess the resource. The FMP for monkfish, therefore, calls for significant increases in sea sampling to collect the necessary data.

The costs of adding monkfish to the existing mandatory landings reporting system are negligible (Section **Error! Reference source not found.**). The net benefits of this measure cannot be quantified, but are thought to be considerable. The only added burden of adding monkfish reporting to the system is the additional reporting burden of fishermen who fish exclusively for monkfish or other unregulated species. Since most monkfish fishermen participate in the groundfish, scallop, or summer flounder fisheries, the increase in reporting requirements will be small. More detailed discussion of this measure is presented in the Paperwork Reduction Act analysis (Section **Error! Reference source not found.**).

### **8.1.5.1.1.10    *Permits***

Permits for the various entities in the monkfish fishery are needed for multiple reasons. In order to make sure that the only vessels directing fishing effort on monkfish are qualifiers under the limited access program, all vessels in the fishery need to be permitted. These vessel permits make enforcement easier at sea. The U.S. Coast Guard can quickly ascertain whether a fishing vessel should be fishing for monkfish. In addition, a vessel permit makes tracking the participants possible when vessels are sold or transferred.

The primary benefit of an operator's permit is to provide for accountability. Upon application for the permit, individuals would be notified that if the permit holder violates the regulations and is issued a "Notice of Permit Sanction", he/she will forfeit the right to work in any capacity on any commercial vessel fishing for federally regulated species during the period of sanction. There are approximately 600 vessels that will be eligible for monkfish limited access permits. The total number of operators requiring this permit would be equal to or slightly more than this number of vessels. More details are given in the Paperwork Reduction Act analysis (Section **Error! Reference source not found.**) on the number of vessels and operator permits.

Industry has expressed the view that permit sanctions are more effective than monetary penalties in deterring violations. Sanctions are no longer a "cost of doing business" when supply can be interrupted or employees laid off. The permit sanction would be viewed as a severe penalty to be applied only in the case of serious violations.

The primary purpose of a dealer permit is to improve enforcement of the regulations through dealer accountability. A second purpose is to improve the administration of the FMP by identifying the participants in the fishery and principle business locations. Once identified, the Council and NMFS can provide notices and other information to processors/dealers on changing regulations that might have an impact on how they conduct their business. Regulations that concern dealers include recording time landed (for days-at-sea) and amount of landings, minimum shell sizes, trip limits or possession limits (by-catch), and offloading windows that might interrupt the supply of product in the short term. Dealer identification also provides a secondary avenue for information dissemination to fishing vessels.

While the costs of administrating these permits is high (Section **Error! Reference source not found.**), they are certainly less than the costs of trying to collect comprehensive data and enforcing limited entry without a mechanism to determine participation in the fishery.

Permits are required to establish who is eligible to fish for monkfish and must report their landings. Operator permits will be useful in establishing culpability and in assessing meaningful sanctions for egregious violations. The costs of the permits will be established by the Regional Administrator to cover administrative expenses, but since most fishermen and dealers already require permits in other fisheries very few additional businesses will be required to apply for permits (Section **Error! Reference source not found.**). During public hearings, many fishermen and processors voiced strong support for mandatory reporting and sanctions for severe violations. Additional permitting requirements will have a low cost while offering the most efficient means of establishing who must report and offers a way to place sanctions against future fishing by violators.

#### **11.6.12 Framework adjustments to management measures**

The proposed regulatory measures in the Monkfish FMP are designed to reduce the catch, and therefore fishing mortality, on small monkfish and collect data necessary to achieve the FMP's goals. These short-term objectives will be achieved through the following management measures: a prohibition on landing monkfish measuring less than 11 inches tail length (or 17 inches total length for whole fish), a maximum liver to tail landings per trip ratio, and provisions for permitting of vessels, operators, and dealers as well as mandatory data reporting.

The Council recommends applying the frameworks and their procedures to the Monkfish FMP, as provided in 50 CFR 660.61. Like the Pacific Coast Groundfish FMP, the proposed measures will need adjustments to accurately reach the FMP's objectives. Achieving these adjustments through the proposed frameworks will reduce administrative costs and increase responsiveness and flexibility. The administrative cost reductions are unknown. They will depend on the frequency of adjustments and the framework processes employed to submit recommendations. A framework adjustment mechanism will, however, reduce costs by diminishing the need to publish a proposed rule or submit a full FMP amendment. Because the public is substantially involved in the Council process, the Council believes that publishing a proposed rule for proposed adjustments and allowing further public comment would be duplicative.

The abbreviated process for recommending and implementing changes to the management measures will be possible because of the high degree of public involvement in the Council process. The North Pacific and the New England Fishery Management Councils' review of management proposals is substantially similar. The New England Council has seventeen voting members and four non-voting members. Voting members are the state fishery directors of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut, the Northeast Regional Administrator of the NMFS, and eleven individuals who are knowledgeable about the New England fisheries and who are appointed by the Secretary of Commerce from lists submitted by the governors of the constituent states. Non-voting members are the Regional Administrator of the U.S. Fish and Wildlife Service, the Commander of the Coast Guard District, the Executive Director of the Atlantic States Marine Fisheries Commission, and a representative from the U.S. Department of State.

The Councils also utilizes several committees to seek expert advice and provide review of proposed measures. These committees are convened several times during the development of a new management proposal. The Council maintains a standing committee of industry advisors who represent the following interests: six fishermen who use otter trawls, three fishermen who use gillnets, and one dealer.. The fishermen represent diverse

groups from both large and small ports within the Councils' constituent states. One industry advisor is from Massachusetts, two are from Rhode Island, one each from Connecticut and New York, and two are from New Jersey. The Monkfish Oversight Committee, composed of News England and Mid-Atlantic Council members, and includes representation from Maine, Massachusetts, Rhode Island, New York and New Jersey.

The Council considers monkfish management issues at a series of Monkfish Oversight Committee meetings and at regularly scheduled Council meetings. All meetings of the Councils and its committees are open to the public. Council meeting notices, including a list of issues to be considered, are published in the *Federal Register*. Notices, agendas, and newsletters are distributed through a mailing list of approximately 1,600 names of individuals and organizations that includes vessel owners, processors, fishermen, fishermen's organizations, and fisheries service industries such as fishery consultants, joint venture companies and port managers. These persons may also receive draft and final FMPs, amendments and proposed regulations. The Council also maintains an interested-parties list of approximately 210 names of individuals and organizations that receive notices, agendas, and relevant information on Monkfish Oversight committee meetings.

Interested persons regularly attend Council meetings and obtain descriptions and analyses of the proposals being considered. Portions of the Council and Monkfish Oversight committee meetings are specifically set aside to receive public comment. The public is invited and regularly avails itself of the opportunity to make both oral and written comments, and to discuss any management issue with Council members and Council advisors.

#### 8.1.5.1.2 Non-preferred alternatives

A summary of the biological implications of the three non-preferred alternatives is presented in the following sections. After that, a more detailed description is given in Sections 8.1.5.1.2.4 to 8.1.5.1.2.9 on the biological impacts of management options that were not included in the preferred alternative.

Non-preferred alternatives 1, 2, and 4 were developed with mortality objectives that would stop overfishing by year seven of the FMP. The intent of these proposals was to stop overfishing in seven years and rebuild the stock in eight, unlike the preferred alternative which proposes to stop overfishing in four years and rebuild stock biomass in ten through additional fishing mortality reductions and management adjustments. At that time, the Sustainable Fisheries Act had just passed and there were no guidelines on how the Councils should comply with the revised National Standards. One of the main criticisms of these non-preferred alternatives was that they would take too long to stop overfishing and had unrealistic expectations for rebuilding. In part, that is why the Councils rejected these alternatives and looked to more aggressive strategies to manage monkfish.

The intent of all three non-preferred alternatives is approximately the same: to reduce mortality on a gradual schedule until it falls below the overfishing threshold and biomass exceeds the biomass threshold. The proposed actions would achieve this objective by gradually reducing landings, and associated catch, until the thresholds are achieved no later than the fishing year beginning on July 1, 2005. An initial 45 percent reduction from current landings is intended to take place during the fishing year ending June 30, 1999. A second 20 percent reduction in landings would be scheduled for the second fishing year, beginning July 1, 1999. Following the second year, the proposed action would hold the limited access fishery allocations at the 1999-2000 levels for the third through the sixth fishing years. Some reductions in landings and catch are expected due to presently scheduled limits in other fisheries that have a monkfish bycatch (multispecies, sea scallops, and summer flounder). If additional reductions in the TAC are necessary to achieve the thresholds in the fishing year beginning July 1, 2005, the additional reductions would be taken from the limited access fishery.

The benefits of a minimum size rely mainly on changes in fishing behavior to reduce mortality on small fish. Although specific areas with concentrations of only small fish cannot be a priori identified, fishermen that target monkfish say they can make ad hoc changes in where they fish to avoid small fish. There is not enough price difference over size to induce fishermen to target large monkfish, but the size limit will act as a disincentive to

continue fishing where small monkfish are prevalent. It is impossible to estimate how frequently this change in fishing practices will occur.

All the alternatives include a 14-inch tail length and a 21-inch whole length minimum size. Section 8.1.5.1.1.6.3 shows that any selection of a size limit above an 11-inch tail would not increase yield per recruit unless discard mortality is less than 38 percent. A 17-inch minimum tail size is the optimum size that gives a marginal gain in yield at the highest discard mortality rate. Limited studies in coastal waters indicate that monkfish mortality ranges from 43 to 92 percent. Due to increased chance of predation, larger surface-to-bottom temperature changes, and longer tow times with heavier gear, monkfish discard mortality is likely to be higher than these estimates.

The non-preferred alternatives also include a minimum mesh limit for vessels targeting monkfish in a limited access fishery. The main benefit of using large mesh to target monkfish is to reduce the bycatch of regulated groundfish, species that are overfished and at low levels of abundance. The Councils anticipate that many areas will have acceptably low levels of groundfish bycatch when vessels target monkfish with 10-inch square or 12-inch diamond mesh.

Size selectivity for monkfish is not likely to be significantly improved by using 10-inch square or 12-inch diamond mesh, especially in trawls. Most monkfish that are slightly below the proposed minimum size would be captured by trawls using this mesh. It will, however, prevent scallopers using dredges to target monkfish from intensifying their effort with gear that captures mainly small fish. Limited gear selectivity studies exist, but their practicality in the U.S. monkfish fishery has not been demonstrated, making it premature to introduce requirements to use separator gear in the monkfish fishery. One such study (Appendix III) uses separator gear in a limited mixed fishery that targets monkfish. Although it might be practical in the limited access fishery to use gear that allows small monkfish to escape, the gear will not work in a mixed fishery that includes smaller groundfish.

The non-preferred alternatives differ in how the TAL targets are allocated between the various fisheries, how much discarding would mitigate the effects of reducing landings, and how much current fishing behavior will change (either by avoiding areas with monkfish that cannot be landed or by intensifying fishing effort for monkfish within the proposed limits). It is difficult to quantify changes in fishing behavior under the proposed actions, because they depend on a variety of factors that cannot be anticipated. Where possible, a qualitative assessment of the potential changes is given.

#### *8.1.5.1.2.1 Non-preferred alternative 1*

Biologically, non-preferred alternative 1 has the greatest likelihood of achieving the biological objectives without future framework adjustments. The quotas are fixed and effectively close the directed fishery when landings exceed the allocations. Bycatch may increase some under the proposed trip limits, but the increases are limited by the effort reductions in other fisheries and by the proposed monkfish limits. These limits are a compromise between a landing cap at reasonable bycatch levels and lower levels that would cause unacceptably high discarding.

The management strategy for non-preferred alternative 1 is to determine a reasonable amount of monkfish bycatch in fisheries that target other species and what the landings would be if these vessels continued their current practices but had limits on monkfish landings. These estimates include the anticipated reduction of effort for fisheries that are currently managed by FMPs. These estimated landings from bycatch were deducted from the annual TAL to determine the amount of quota for the limited access fishery.

The trip limits for non-preferred alternative 1 were chosen so that few trips that previously landed monkfish would be affected by the proposed limit, unless it was targeting monkfish. In nearly all cases, the percent of trips targeting other species that would be affected by the proposed limits is less than 10 percent. When total revenue from monkfish landings was less than 15 percent, only one percent of the trips would be affected. In the other cases when monkfish revenue accounted for a significant fraction of the total, some changes in fishing behavior will be necessary to keep monkfish discarding below an acceptable level. Some vessels making trips with high monkfish

revenue will qualify for limited access and fish when quota is available. Others may seek other fishing locations if a large fraction of their catch cannot be landed.

On the other hand, many trips that target other species land much lower amounts of monkfish. Some vessels may begin landing more monkfish as they spend more time targeting monkfish. If many vessels 'fish-up' to the limit, the bycatch target allocations would be exceeded and additional action would be necessary if the limited access fishery also takes its quota.

#### *8.1.5.1.2.2 Non-preferred alternative 2*

It is less likely that the biological objectives would be met by non-preferred alternative 2, because many vessels would be able to increase effort on monkfish without exceeding the trip limits. These trip limits are substantially higher than those for non-preferred alternative 1, since the intent of non-preferred alternative 2 is to allow the prosecution of a mixed fishery (including monkfish) under the trip limits. No changes in fishing behavior to target monkfish were assumed to estimate monkfish allocations, but the higher trip limits left little biomass to be allocated to a limited access monkfish fishery. The Councils considered, but rejected this alternative for these two reasons.

#### **8.1.5.1.2.3      *Non-preferred alternative 4***

It is more likely that non-preferred alternative 4 would initially achieve the biological targets, because the days-at-sea allocations are based on the monkfish history of vessels that qualify for limited access and the lower trip limits would prevent increased landings from bycatch in other fisheries. This deficiency in the preferred alternative, however, is addressed by the proposed directed fishery trip limits.

Unlike the preferred alternative, the days-at-sea allocations are proposed based on the number of vessels that qualify and their history of landing monkfish. The more liberal qualification procedure allows more vessels in the limited access fishery. The allocation of monkfish-only days is correspondingly lower to achieve a fixed TAC allocation. Alternatively, a more conservative qualification procedure allows fewer vessels in the fishery and the days-at-sea allocations can be higher. The total number of days-at-sea per vessel is lower than non-preferred alternative 3, but some multispecies vessels could qualify for monkfish limited access and receive monkfish-only days to tack onto their multispecies days.

The trip limits for multispecies trawl and scallop dredge vessels are also lower, reducing the opportunity for fishermen to increase their monkfish bycatch. The proposed trip limits are lower than those proposed for non-preferred alternative 1 and preferred alternative. Non-preferred alternative 4 proposes a 200-pound (tail weight) per day-at-sea limit for multispecies and scallop fisheries. The expected landings from bycatch are lower, leaving a larger TAC allocation (and a greater number of days) for the limited access fishery. The lower limit, however, may cause increased discarding that would reduce the effectiveness of the proposed action to control monkfish fishing mortality.

#### **8.1.5.1.2.4      *Other mortality reduction and rebuilding schedules through adjustments to Total Allowable Catch (TAC)***

##### **Purpose**

The TAC limits will be used in two ways to manage the monkfish fisheries. On one hand, the TACs would not be strict limits, but would act as a guideline to indicate whether the management measures are effective. The other use is for a baseline, to set concrete fishing limits, like quotas. In all alternatives, trip limits set an upper limit to landings from certain fisheries, mainly as bycatch. The three non-preferred alternatives allocate landings, in the form of quotas or targets, by subtracting the expected amount of non-limited access landings (mostly as bycatch) from the TALs. The non-preferred alternatives proposed to use TALs (total allowable landings) as interim targets because not enough was known about how much regulatory discards would occur. In the preferred alternative, regulatory discards were estimated in the biological analysis, based on the assumptions within a model that applied the proposed rules to fishing trips during 1995 and 1996.

Annual limits on total allowable landings of monkfish will act as intermediate biological objectives to limit landings below a level estimated to achieve a certain fishing mortality rate. Landings, rather than catch (TAC), would be used as the controlling factor, because the amount of discarding is not well known and catch is difficult to monitor. Moreover, discarding is likely to change in unpredictable ways, making the amount of catch difficult to estimate.

## **Uncontrollable factors**

Without accounting for changes in discarding or the effects of a longer size limit and closed areas, the TAL objectives will nominally achieve mortality reductions in proportion to the reductions in landings. Two biological factors can also affect the realized fishing mortality rate: changes in exploitable biomass and changes in stock age-structure.

Under an invariant TAL established by reducing recent landings by a pre-determined percentage, decreases in exploitable biomass (the total biomass of fish that are vulnerable to fishing), will cause increases in fishing mortality. The increased fishing mortality occurs because a greater fraction of the exploitable fish is removed from the stock by fishing. In contrast, a fixed level of landings will remove a smaller proportion of the stock if biomass increases.

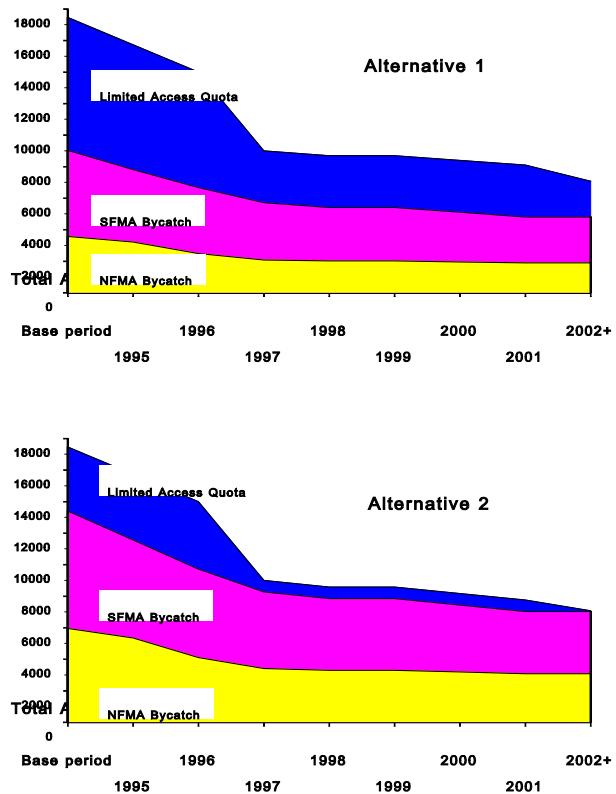
Similarly, changes in stock age-structure can also affect the realized fishing mortality rate. Landings from a stock of older fish will have a lower fishing mortality rate, because fewer, heavier fish fill the TAL limit. Removal of fewer fish, as a proportion by number, translates into lower fishing mortality.

## **TAL schedule**

In the non-preferred alternatives taken at the first round of public hearings, the Councils proposed to reduce the TALS in three major steps over a seven-year period. The first reduction would occur in the year beginning July 1, 1996<sup>31</sup>. The second landings reduction would occur in the next year, beginning July 1, 1997. The last reduction is scheduled at the start of the seventh year of management, if other management measures do not first stop overfishing.

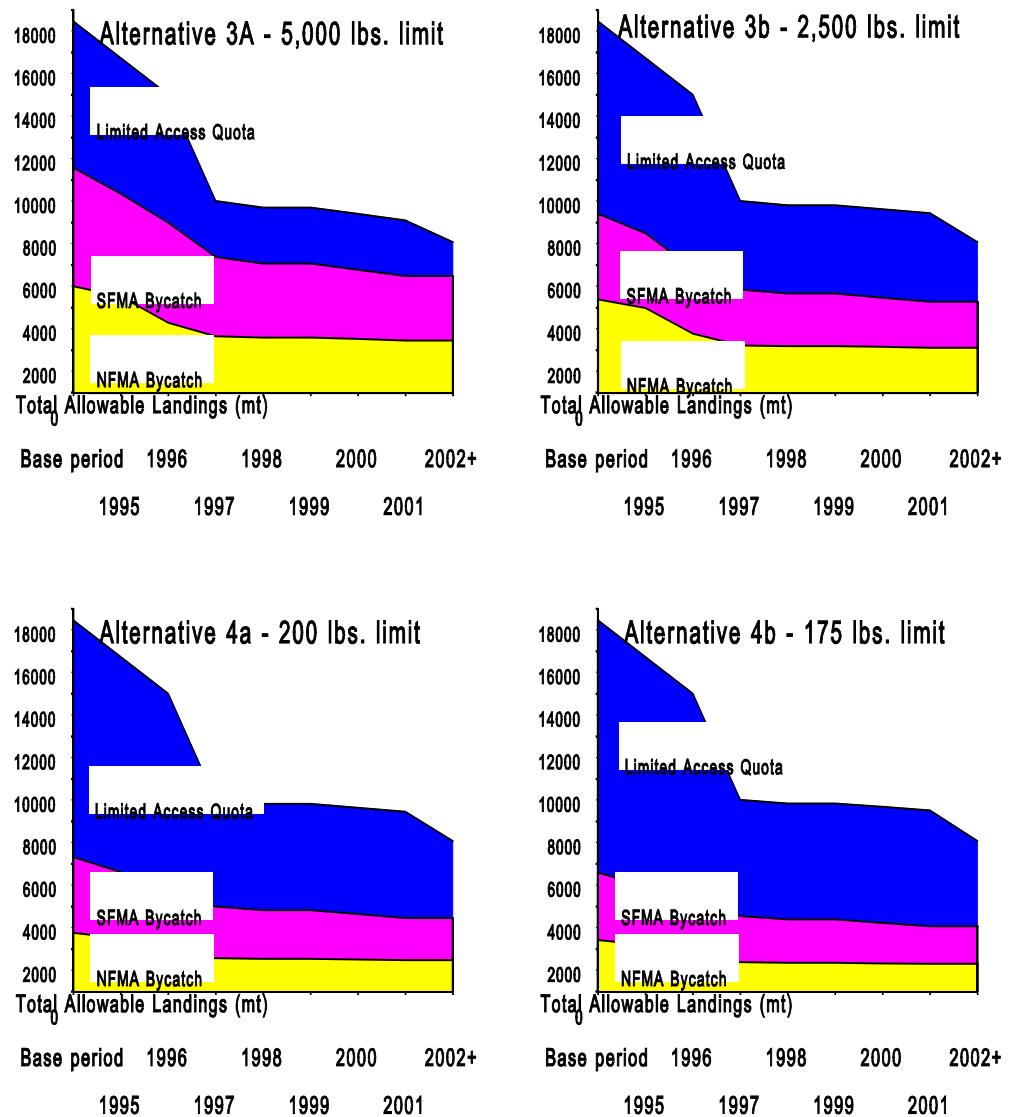
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<sup>31</sup> Dates for the original analyses have not been changed, so they remain consistent with the figures prepared for the DEIS. To compare these proposals with the analyses of the preferred alternative, advanced the year indicated within this section's text by two years, consistent with a May 1, 1999 implementation date.



**Figure 40.** Estimated TAL specifications and allocations between fishery sectors for non-preferred alternative 1 and 2 for a seven-year schedule to meet the overfishing mortality objectives.

Between the second and seventh years, slight reductions in the TAL (and associated mortality) would accrue from the effort and quota reductions already scheduled in other regulated fisheries. The TAL schedules, therefore vary slightly between the three alternatives, because the monkfish trip limits differ. These schedules are given in Table 74 (non-preferred alternative 1), and Section 8.1.4.4.3.3.2 (non-preferred alternative 4) in Section 8.1.5.1.2.3. The TAL schedules are also shown graphically in Figure 40 and Figure 41.



**Figure 41.** Other TAL reduction schedules and allocations that the Council included as options for the first rounds of public hearings in February 1997. These TAL reductions were based on a seven-year schedule to reduce mortality below the maximum fishing mortality threshold, specified in the overfishing definition.

## **Overfishing stops by year seven**

The fishing mortality rate that would be achieved by the various management measures in year six is uncertain. Unless the Councils adjust other management measures (size limits, closed areas, and trip limits) to prevent overfishing within the seven-year schedule, a further reduction in the annual TAL and the limited access allocation will take place on July 1, 2002, the seventh year of the planned mortality reduction.

Compared to the threshold mortality rates that define overfishing (0.051 in the NFMA, 0.217 in the SFMA<sup>32</sup>), current levels of fishing mortality need to be reduced by 70 and 52 percent, respectively. Without taking into account the effect of other management measures, the landings would have to be reduced to 2,148 and 4,927 mt, respectively, to reduce mortality below the overfishing threshold.

Overfishing may be relieved or exacerbated by other management measures or by external biological events. The potential effects of possession limits and size limits are described in Sections 8.1.5.1.1.5 and 8.1.5.1.1.6, respectively. Increased discarding will cause increases in fishing mortality above those nominally expected by the reductions in TACs. The possible implications are described in Section 8.1.5.1.1.6.

### **8.1.5.1.2.5      Limited entry qualification criteria**

The characteristics of vessels that potentially qualify for monkfish limited access is given in Section 6.4.5.5. Based on 1991 - 1995 weightout data, 1,871 vessels<sup>33</sup> landed at least one pound of monkfish on one or more trips. Fifty-seven percent had multispecies limited access (days-at-sea) permits, sixteen percent had a sea scallop limited access permit, and eleven percent had no permit. Most vessels are home-ported in Massachusetts. Most are between 61 and 100 feet in length and between 5 and 150 gross registered tons, but there seems to be a secondary cluster of vessels between 31 and 45 feet. Many of the latter are probably gillnet vessels.

#### **Qualification criteria 1- One pound on one trip**

Option 1 would qualify the most vessels (1,871 minus those removed by the vessel capacity reduction program). Seven-hundred and seventy-six (776) vessels do not have multispecies permits<sup>34</sup>, while 1,095 have multispecies days-at-sea permits. An additional 310 vessels (68% of limited access scallop permits) have a history of landing monkfish and would therefore qualify for the monkfish-only days-at-sea fishery under this option. Of the 1,871 qualifiers, seven percent are less than 5 gross registered tons (grt). Forty-two percent are between 5 and 50 grt, 36% are between 51 and 150 grt, and 15% are larger than 151 grt. The majority (59%) had multispecies days-at-sea permits and a greater proportion (75%) participated in a fishery managed by days-at-sea. Vessels with scallop permits contributed to an increasing number of qualifiers for vessels greater than 50 grt. The proportion that had days-at-sea permits increased with vessel size, 69% for vessels less than 5 grt, 67% for vessels between 5 and 50 grt, 79% for vessels between 51 and 150 grt, and 91% for vessels greater than 150 grt.

Over the four years, the 1,871 qualifying vessels averaged 48 days-at-sea for trips that had monkfish landings. Some of these vessels fished seasonally in fisheries that typically have monkfish bycatch. Other vessels may only have a partial history of monkfish landings. The mean number of days-at-sea is affected by these conditions and it is therefore an underestimate of the average days-at-sea for vessels that continually landed monkfish. The maximum number of days-at-sea was 283. Many of the 1,871 vessels landed monkfish as a bycatch in other fisheries. Only 255 vessels out of the potential qualifiers for option (a) had landings of monkfish that contributed to 20% or more of its total revenue and they averaged only 5 days-at-sea annually. One possible reason

<sup>32</sup> These fishing mortality targets were estimated by NEFSC 1992. More recent biological reference points have been estimated by NEFSC 1997. While the reference point in the Northern Fishery Management Area did not change, the threshold fishing mortality rate in the Southern Fishery Management Area was revised to 0.14.

<sup>33</sup> Eight of the vessels that potentially qualify for monkfish limited access have been removed by the groundfish vessel capacity reduction program.

<sup>34</sup> As of June 1995.

for this low average is that a few of the 255 vessels appeared in the weighout data for one or two trips where monkfish was a high proportion of landings.

**Table 109. Qualification criteria option 1:** Distribution by ton class and permit holdings of vessels that would qualify for monkfish limited access under qualification option 1.

Ton Class (grt)	Multispecies permit?		Days-at-sea permit?	
	No	Yes	No	Yes
< 5	42	88	40	90
5 - 50	297	505	261	541
51 - 150	286	379	141	524
151 - 500	151	123	24	250
Sum	776	1095	466	1405

#### **Qualification option 2 - 50,000 pounds (tail weight)**

Under this option, 316 vessels qualify based on NMFS weighout data from 1991 to 1994, inclusive. Sixty percent (191) have multispecies days-at-sea permits. An additional 114 scallop vessels (25% of all scallop permits) with days-at-sea permits would also qualify for the monkfish-only fishery. The distribution of qualifying vessels by size is considerably different than under option (a), favoring large vessels. No vessels less than 5 grt would automatically qualify. Only 10% of qualifying vessels are between 5 and 50 grt, while 42% are between 51 and 150 grt and 48 percent are over 150 grt.

**Table 110. Qualification criteria option 2:** Distribution by ton class and permit holdings for any vessel that landed one or more pounds of monkfish during the qualification period.

	Ton Class (grt)	Multispecies permit?		Days-at-sea permit?	
		No	Yes	No	Yes
Qualifier	< 5	0	0	0	0
	5 - 50	5	27	4	28
	51 - 150	36	97	4	129
	151 - 500	84	67	3	148
	Sum	125	191	11	305
Non-qualifier	< 5	42	88	40	90
	5 - 50	292	478	257	513
	51 - 150	250	282	137	395
	151 - 500	67	56	21	102
	Sum	651	904	455	1100

**Qualification option 3- 10,000 pounds tail weight per trip on five or more trips, etc.**

Under this qualification option, 114 vessels would automatically qualify based on the 1991-1994 NMFS weightout data. Over two-thirds (77) of these qualifying vessels have multispecies days-at-sea permits. An additional 29 scallop vessels (6 percent of the scallop fleet) would also qualify. Compared to qualification option (b), a greater proportion of smaller vessels would qualify. Thirty-two percent of the vessels are between 5 and 50 grt, while 23% are between 51 and 150 grt and 46% are over 151 grt. This option appears to qualify fewer scallop vessels for the monkfish-only fishery.

**Table 111. Qualification criteria option 3:** Distribution by ton class and permit holdings for any vessel that landed one or more pounds of monkfish during the qualification period.

	Ton Class (grt)	Multispecies permit?		Days-at-sea permit?	
		No	Yes	No	Yes
Qualifier	< 5	0	0	0	0
	5 - 50	7	29	6	30
	51 - 150	3	23	1	25
	151 - 500	27	25	1	51
	Sum	37	77	8	106
Non-qualifier	< 5	42	88	40	90
	5 - 50	290	476	255	511
	51 - 150	283	356	140	499
	151 - 500	124	98	23	199
	Sum	739	904	458	1299

#### 8.1.5.1.2.6 Quotas (Non-preferred alternatives 1 and 2)

Quotas can be a very effective limit on fishing mortality, and therefore, are often a favored method to manage fisheries. If fishing power increases, for example, the catches can be controlled simply by closing the season earlier. It is also clear when vessels should not be fishing, making enforcement easier. On the other hand, management by quotas can also have some undesirable effects. Quotas may give vessels an incentive to high-grade or to avoid reporting their landings. They also force vessels to fish in restricted seasons, not when the price or weather is favorable. Quotas do not allow fishermen to decide when they should fish and they tend to make fishermen overcapitalize their business to catch more fish while the season is open. Short seasons can also depress prices as the market responds to concentrated supply.

Alternative 1 is the only non-rejected management strategy to use quotas. The quotas begin at 7,329 mt in 1996-1997 and fall to 3,290 mt in 1997-1998 (Table 74). The non-preferred alternative 1 quota would remain constant at 3,290 mt through year six (2001). Due to the insufficient quotas for the limited access fishery and the high trip limits, the Councils have considered and rejected non-preferred alternative 2. Non-preferred alternative 2 quotas would be 730 mt, instead of 3,290 mt under non-preferred alternative 1.

#### Impact on qualifying vessels

The average allocation of monkfish quota to qualifying vessels depends on the number of vessels that would be allowed to fish in the limited access fishery. The Councils propose three potential methods that qualify different vessels. The number of qualifying vessels presented here is a minimum estimate, because additional vessels will qualify based on their own sources of data. This underestimate is especially relevant for small vessels that often land at dealers that did not participate in the voluntary weightout system. More qualifying vessels would cause the averages given below to be overestimated.

The most liberal of these alternatives would qualify 1,871 vessels that have an average annual history of landing 19,110 mt of monkfish. The 3,290 mt quota, therefore, represents an 83 percent reduction in monkfish for these vessels (Table 112). Each vessel would, on average, be allowed to land 1.76 mt, or 1,168 pounds tail-weight. At 1995 prices, this allocation would allow the average vessel to derive \$2,326 in annual revenue from monkfish.

Option 2 (50,000 pounds of monkfish tails over four years) would qualify at least 316 vessels. They have an average annual history of landing 14,346 mt of monkfish. Even though this qualification option would allow 83 percent fewer vessels than the option discussed above, these 316 vessels landed 75 percent of the amount landed by the 1,871 vessels during 1991-1994. The 3,290 mt quota represents a 77 percent reduction in landings for these vessels (Table 112). Each vessel would, on average, be able to land 10.41 mt, or 6,914 pounds tail-weight. At 1995 prices, this allocation would allow the average vessel to derive \$13,773 in annual revenue from monkfish.

Option 3 qualifies the fewest vessels, but would allow qualifying vessels to derive the most income from targeting monkfish. This qualification option would allow at least 114 vessels to fish in the limited access fishery. Historically, these vessels had an average annual total landings of 7,418 mt. The 3,290 mt quota would, therefore, correspond to a 56 percent reduction (Table 74). The average vessel would land 28.86 mt, or 19,164 pounds tail-weight. At \$1.99 per pound (average 1995 prices including livers), the average vessel would derive \$38,175 in annual revenue from monkfish.

**Table 112.** Comparison of annual monkfish landings during 1991-1994 with the a quota needed to meet the mortality reduction objectives and stop overfishing.

	<i>Number of qualifying vessels</i>	<i>Average annual landings (mt)</i>	<i>Quota (mt)</i>	<i>Average allowable landings per vessel (mt)</i>	<i>Average revenue per vessel (mt)</i>
<i>Option 1 - One pound of monkfish on one or more trips</i>	1,871	19,110	3,290	1.76	\$2,326
<i>Option 2 - Monkfish landings exceeding 50,000 pounds tail weight</i>	316	14,346	3,290	10.41	\$13,773
<i>Option 3 - 10,000 pounds tail weight on five or more trips, etc.</i>	114	7,418	3,290	28.86	\$38,175

#### Biologic impacts

Two factors affect the biological results of quotas for a limited access fishery: the size selectivity of the fishery and the amount of discards. Allocations that favor more size selective fisheries would reduce discarding of small fish and fishing mortality. Lower fishing mortality would result because fewer fish would be required to fill a quota defined by weight. High discards, on the other hand, would make the management measures less effective and would require greater reductions in landings or adjustments to other measures to stop overfishing.

Although mesh selectivity is believed to be marginal owing to the morphology of monkfish, vessels that target monkfish will be more likely to search for and target monkfish that are larger than the size limit to avoid discarding valuable fish. Vessels that catch monkfish as a bycatch are targeting other species and the target species may be concentrated in areas where there are many small monkfish. Allocations that favor the limited access fishery may, therefore, have fewer discards and more effectively control fishing mortality at a constant TAL amount.

On the other hand, greater restrictions on landings (and hopefully catch) are required to reserve the monkfish TALs for the limited access quota. Since fisheries with monkfish bycatch are targeting other species by definition, there are few management measures to reduce monkfish bycatch without affecting a vessel's efficiency to target other species. Trip limits are sometimes used to control the amount of bycatch in mixed fisheries. If the trip limits are too high, they do not effectively limit bycatch. In fact, some vessels may increase their catches of monkfish with high trip limits. If the limits are too low, vessels targeting other species may not be able to avoid monkfish and would have to discard the excess. The proposed possession limits and their effects are discussed in Section 8.1.5.1.5.

### Economic impacts

Seasonal quotas could create a "race" for monkfish because limited access monkfish fishermen will compete for quota before seasons close. This behavior has implications for dockside prices and revenues, fishing costs, and product flow. The dockside prices of monkfish products do not appear to be affected by landings, but prices change seasonally because of seasonality in overseas demand, particularly for livers (Section 6.4.5.2.1). For example, during 1995 liver landings peaked during December when prices were also highest--an average of \$8.64 per pound. If fishing effort increases in response to the management system, it could end a limited access fishery earlier than if fishing practices had not changed in response to quota management. In a race to land fish while the limited access fishery is open, quotas could, however, end the season early during October or November when prices are lower--\$5.71 and \$7.43, respectively, during 1995.

In addition to reducing revenues from livers landings, the "race" for fish in quota fisheries typically increase fishing costs as fishermen invest more heavily in gear and change fishing practices to catch fish before the fishery closes. Furthermore, changing fishing practices in response to single-species regulations implies lost revenues from the harvest of other species.

Finally, "races" for fish typically interfere with the steady flow of fish products from the dock to consumers and export markets, including during future years when likely overages are subtracted from future quotas through the framework process. Processors and exporters need to assure buyers of a steady, reliable supply of products in order to keep market channels open.

The wide range of landings criteria and the potential for appeals using non-official records makes it difficult to predict which vessels might qualify for a limited access fishery or, therefore, which qualified vessels might select this option. Based on monkfish revenues as a percentage of gross vessel earnings (Section 6.4.5.3), though, it seems likely that sink gillnet fishermen would be in a limited access category under each alternative, particularly gillnetters lacking either Multispecies or Sea Scallop permits. In addition, trawlers and dredge operations in the Multispecies and Sea Scallop fisheries might qualify and choose to participate in a limited access fishery under non-preferred alternative 1.

Total monkfish revenues from 1994 and 1995 are reported by proposed fishing season and gear in Table 113. During these years, the seasonal distribution of revenues earned by scallop operations most closely matched the proposed quarterly limited access quotas. In contrast, the proposed closed season was the most important season for sink gillnetters as a group; during these months alone, gillnetters received 35 to 40 percent of their total annual monkfish revenues.

**Table 113.** Monkfish revenue (million dollars) by season and gear.

Gear	Year	Season			
		January 16 to March 31 (25 percent of annual quota)	April 1 to June 30 (closed)	July 1 to October 14 (25 percent of annual quota)	October 15 to January 15 (50 percent of annual quota)
Fish Trawl	1994	23.3	18.2	24.8	33.7
	1995	24.6	19.9	22.1	33.3
Sea Scallop Dredge	1994	18.8	9.7	20.1	51.4
	1995	19.6	12.6	25.3	42.4
Sink Gillnet	1994	6.2	34.7	23.2	35.9
	1995	8.1	39.9	19.3	32.7
Other	1994	11.1	8.4	29.9	50.7
	1995	22.5	15.1	4.8	57.7

#### 8.1.5.1.2.7 Days-at-sea limits (Non-preferred alternative 4)

The analyses presented below take a different approach to evaluating days-at-sea and trip limit allocations between a potential targeted and bycatch monkfish fishery. The analysis shows that qualification criteria 1 (50,000 pounds of monkfish landings) would qualify too many vessels to allow a 50 day-at-sea annual allocation and still meet the accepted TAL targets. An annual allocation of 50 days-at-sea is possible when qualification criteria 2 applies (qualifying 114 vessels) if the 'bycatch' trip limit is reduced to about 175 pounds tail weight per day-at-sea. A schematic diagram showing the potential consequences is shown in Figure 43.

A different approach for the allocation of monkfish total allowable landings (TAL) between 'bycatch' and a limited access fishery is to first decide on the management objective for the limited access fishery, then determine the 'bycatch' trip limit that would be permissible and meet the overall TAL objective. Other alternatives take a different approach, first establishing a reasonable 'bycatch' or 'mixed' catch trip limit, then allocating the remainder of the TAL to the limited access fishery. The approach used for non-preferred alternative 4 initially ignores the potential amount of discard mortality, leaving the method for minimizing bycatch to other management solutions, once the severity of potential discarding is established.

The Council objective for non-preferred alternative 4 was to allocate 50 days-at-sea for each qualifying vessel to target monkfish. The initial proposal was made without information on whether this allocation would meet or exceed the target TAL. The proposal was also made without regard for the number and type of vessels that would qualify for limited access. The following discussion contains an analysis of the potential trip limits to meet the 50 days-at-sea objective for limited access vessels. The effect of these lower trip limits is discussed above and in Section 8.1.4.4.1.1.

Three qualifying options have been proposed for the monkfish fishery, outlined in the summary of management alternatives. The least restrictive (one pound, one trip) would automatically qualify 1,871 fishing vessels, based on NMFS weighout data. The most restrictive criterion would automatically qualify 114 vessels.

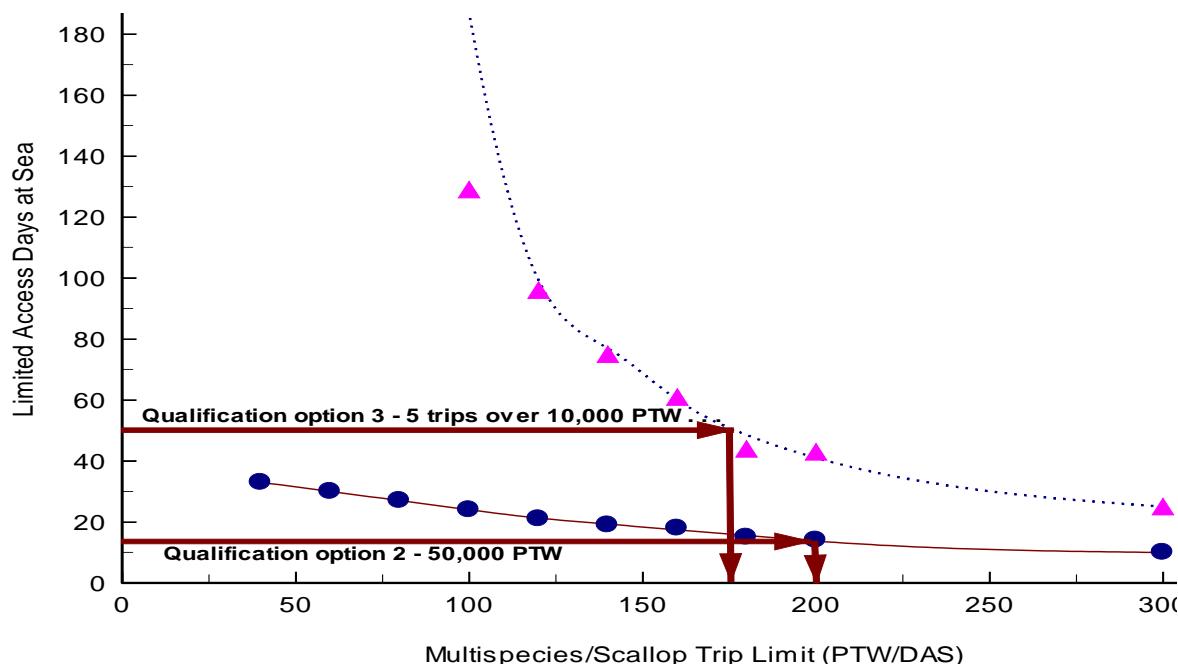
Since the original intention for non-preferred alternative 4 was to qualify vessels that targeted monkfish before the control date, the least restrictive criterion does not apply and was not further analyzed.

The potential allocations of monkfish-only days-at-sea, given a plausible range in the 'bycatch' trip limit for multispecies trawls and scallop dredge vessels is given in 8.1.4.4.1.1. The expected landings of qualifying vessels were estimated by examining the most productive trips of qualifiers in terms of monkfish landings would be expected during their participation in a limited access fishery.

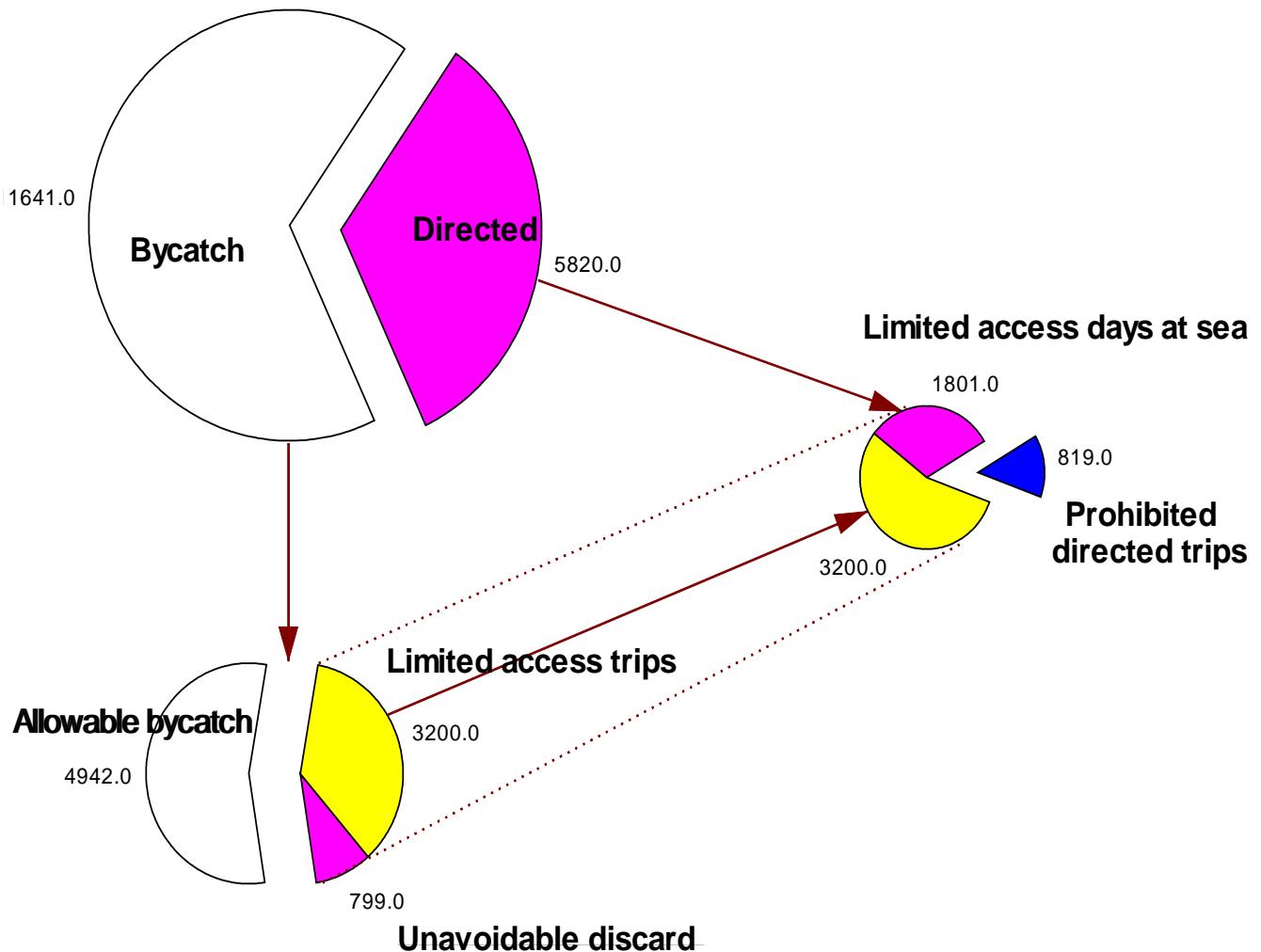
Even when the potential bycatch trip limit is severely reduced, the landings of the 316 qualifiers with option 1 would exceed the total TAL within 50 days-at-sea for each vessel. Roughly, three days-at-sea are gained for these qualifiers for every 20-pound tail weight (PTW) reduction in the bycatch limit.

One the other hand, the more restrictive qualification criterion would allow fewer vessels in the limited access fishery. Although there is likely to be some unanticipated increases in fishing effort for monkfish during a monkfish day-at-sea, the aggregate landings of these vessels is lower, which in turn, allows for more days-at-sea per vessel. Based only on information from the landing history of the potential qualifiers, their projected landings reach an asymptote and they are not capable of taking the entire TAL without intensifying their monkfish fishing effort.

Yet another way of looking at this problem is to ask how many qualifying vessels can be permitted, and still allow allocations of 50 days-at-sea to limited access vessels and 200 pounds per day-at-sea in the 'bycatch' fisheries. The information in Figure 42 indicates that slightly more restrictive qualification criteria would be necessary.



**Figure 42.** Limited access monkfish-only days-at-sea allocations over a range of potential monkfish bycatch trip limits for multispecies trawl and scallop dredge vessels. The potential trip limits are expressed in units of monkfish pounds tail-weight per day-at-sea (PTW/DAS). All other fisheries and vessels, unless qualified for monkfish limited access, would be limited to 1,000 pounds tail-weight per trip or 10 percent of total weight of fish onboard, whichever is less. Qualification criteria 1 would allow for pre-qualification, based on existing weigh-out landings records of 316 vessels. Qualification criteria 2 would allow for pre-qualification of 114 vessels. The proportion of landings excluded by the trip limit would be equivalent to discards if there is no re-direction of fishing effort and no vessels qualify to target monkfish in the limited access fishery.



**Figure 43.** Schematic of monkfish bycatch and limited access fisheries. Total bycatch is reduced by effort reductions in associated fisheries. Additional trip limits apply to trips catching monkfish (lower left). Some trips with catches that exceed the proposed trip limits will be able to land monkfish under the limited access days-at-sea program for monkfish. Some directed trips for monkfish will be prohibited because those vessels did not meet the qualification criteria.

#### 8.1.5.1.2.8 Trip limits

The non-preferred alternatives incorporate a wide-range of trip limits that would have varying effects on the fisheries and have different implications for discards, depending on what vessels these rules would apply. The Councils examined all trips made by vessels that would not qualify for limited access under each qualification option. The impact of various trip limit options for the preferred alternative are described more thoroughly in Section 8.1.5.1.3.

In general, the proposed trip limits for non-preferred alternative 1 were based on the 95th percentile of monkfish landings for individual trips during 1994 and 1995. These trip limits would have been effective to limit true monkfish bycatch, but could have caused problems in mixed species fisheries. If qualification option 1 had

been selected, the program with these trip limits would not have met the mortality objectives and the monkfish quotas would have been zero. On the other hand, if the qualification criteria were too restrictive, vessels in mixed-species fisheries (including monkfish) would be required to discard a portion of their valuable catch under the proposed non-preferred alternative 1 trip limits.

The trip limits for non-preferred alternative 2 were chosen at much higher levels to accommodate the mixed-species catch, if the qualification criteria are more restrictive. The Councils no longer support non-preferred alternative 2, mainly because the more liberal trip limits would become the primary management measure to control fishing mortality. Other plans that have relied on trip limits have been unsuccessful.

The bycatch trip limit for non-preferred alternative 4 was intentionally set low at 200 pounds per day-at-sea to reduce bycatch as much as possible. While this strategy theoretically reduced bycatch and allowed higher day-at-sea allocations, the additional discarding would have caused the management program to exceed the mortality targets. For this reason, the Councils designated alternative 4 as “non-preferred” during public hearings and did not subsequently develop it further.

#### **8.1.5.1.2.9     *Seasonal closures***

A fishery closure should not have an excessive impact on one sector of the fishery, but not other sectors. Area or seasonal closures can be controversial because it is difficult to avoid placing an unequal burden of the management measure on a particular fishing sector. In order for closures to be equitable, they should occur over a period having equal impact for all fishing sectors or at least occur so that all sectors have a reasonable opportunity to fish at other times of the year.

##### **8.1.5.1.2.9.1 Spring Spawning Closure**

The main effect of a spawning closure is meant to reduce directed fishing activity when the fish are spawning and shift it to seasons that monkfish return a higher value. On one hand, the attractive feature of a spawning closure is to reduce the catches of fish when they are most vulnerable to the fishing gear, usually when they form spawning aggregations. Monkfish spawning occurs during May and June. Fishermen have reported that monkfish often extrude their egg veils on deck during this time of year. Armstrong (1992) reported that the weight of reproductive tissue as a percent of total weight peaks in May and June for females and March through June for males.

One of the benefits of closures is to delay harvest to periods when monkfish value is higher, either due to seasonal variations in demand or due to growth. Some growth will occur for monkfish that survive between spawning and the fall fishery, but the major benefit will be from seasonal price changes. Prices for monkfish tails show little seasonal variation, but prices for livers varies by a factor of nine over the year (Section 6.4.5.2.1). Since livers average 18 percent of the tail weight, the total value of monkfish parts increases in November and December to \$2.22 per pound of tails, versus \$1.18 per pound of tails in the spring. Without accounting for growth and natural mortality, the delayed harvest would cause an increase of revenue of 188 percent for every pound of monkfish landed in the spring directed fishery.

Most of the landings by trawl and dredge vessels in a directed monkfish fishery now occur in October through January (Figure 10 and Figure 11). This seasonality coincides nicely with the Councils' objective for proposing a spring spawning closure. Since the closure only applies to vessels targeting monkfish in the limited access fishery, the impact of spring spawning closures on these vessels will be tolerable. It is clear that any effort for monkfish in the springtime could be shifted to the fall and winter when monkfish are more valuable.

The majority of landings by gillnet vessels, on the other hand, occurs in May and June, precisely when monkfish appear to spawn in the Mid-Atlantic (Armstrong 1992). May and June landings by vessels using gillnets to target monkfish account for 52 percent of the annual landings by this fishing sector. The proposed spring spawning closure also includes the month of April, bringing the proportion of monkfish landings by gillnets to 58 percent for the three month period. Except for some landings in New Jersey, there appears to be little evidence that

gillnet fishermen could materially shift their monkfish fishing effort to other seasons. If the spring spawning closure applies to gillnet fishermen, the most likely outcome is that they will intensify their fishing effort in July to catch the last portion of the spawning activity when the monkfish are moving.

Shifting fishing effort from gillnets in the spring to trawls and dredges in the fall and winter may mitigate the gains in revenue caused by harvesting the fish when they are most valuable. Gillnet fishermen catch larger monkfish than do trawl and dredge fishermen (Section 8.1.5.1.1.6.6). This generalization may not be true in all cases, particularly for the directed fishery, but significant differences occur between gear types if bycatch and directed fisheries are considered together. Because of the differences in size landed by these fishing sectors, the monetary value per recruit could be significantly reduced by shifting fishing effort from gears that catch larger fish to those that catch smaller fish. The net result of these two factors (higher prices in the fall and winter; lower tail weights in the trawl and dredge fisheries) is difficult to estimate because of the confounding effects of inter-annual growth, mortality, and geographical distribution of the catch.

#### 8.1.5.1.2.9.2 Gear-specific area closures

Area closures that apply to a specific fishing gear can also be effective in increasing the economic value from a fishery. Since the size of monkfish caught by the three major gear types differs (Figure 35, Figure 38, and Figure 39), closing an area to the least size-selective gear (in this case scallop dredges) when it is used to target monkfish could enhance yield by delaying harvest until the fish are larger. This type of closure does not depend on seasonal growth or price differences to enhance value, but instead delays harvest on some fish until they grow and become vulnerable to other portions of the fishery.

There are two issues that can be addressed by closing areas (prohibiting possession of monkfish) when vessels use certain gears or are permitted for certain fisheries. One issue is whether vessels using certain gears can be prevented from fishing for monkfish when and where another target species is not present. Can vessels using scallop dredges, for example, be prevented from targeting monkfish in areas where scallops are less abundant? The second issue is whether closed seasons (possibly area-specific) can be used to delay harvesting monkfish until seasonal prices are more favorable.

The first issue can be analyzed by examining the research vessel survey data and commercial landings. Both data sets have strengths and weaknesses. The survey is conducted with standardized methods and the geographical resolution of the data is high. Samples are taken only once annually for scallops and twice annually for monkfish. These survey data give little information about seasonal patterns. Commercial data, on the other hand, have a coarse geographical resolution because it depends on the reported fishing area, usually a three digit statistical box. Better seasonal information can be obtained from this data set, and it also reflects the seasonality of the fishery in response to prices, weather, other fishing opportunities, and custom.

The distribution of monkfish (officially known as goosefish) is shown in **Error! Reference source not found.** and **Error! Reference source not found.**. One aggregation occurs in the Gulf of Maine, the other in Southern New England and the Mid-Atlantic Bight. There is some southerly and inshore migration of monkfish notably in the southern aggregation. Monkfish in the autumn survey are found further north and along the shelf edge in the Mid-Atlantic.

Scallops, on the other hand, exhibit limited migration, but there are geographic concentrations of spat that vary over time. Thus, the densities of scallops shown in **Error! Reference source not found.** are not representative of the general condition. The general locations where the 1995 survey catches scallops, however, are representative of the general distribution of scallops in any year. There are, for example, few scallops found directly south of Block Island and New Bedford and scallops are generally concentrated near the Delmarva region, Hudson Canyon, and the Great South Channel.

The research survey data indicates that monkfish coincide with the distribution of scallops from directly south of Long Island to nearly Cape Hatteras, N.C. in both spring and autumn. There appear to be more scallops and fewer monkfish in the South Channel area, west of Georges Bank. Scallops and monkfish also have coincidental distributions on the margins of Georges Bank. Few monkfish or scallops are observed in survey tows in the center of Georges Bank. Scallop surveys were not conducted in the Gulf of Maine during 1995, and therefore no inferences can be made about co-distribution of the two species.

Another approach to defining closed areas for scallopers targeting monkfish is to examine the relative catch per unit effort within commercial fisheries data. We don't have sufficient samples to characterize the catch for each statistical area, but we do have reported landings according to three-digit statistical area (**Error! Reference source not found.**). Areas could be closed that have a high ratio of monkfish landings to scallop landings. For an initial evaluation, this ratio was determined for 25 statistical areas for each month during 1991 to 1993. The average ratio for all areas ranged from 0.38 in April to 1.86 in November. The following areas were found to have a high monkfish landing per day fished compared to scallops:

**Table 114.** Ratio of monkfish landings (pounds whole-weight) to sea scallop landings (meat weight) by statistical area (**Error! Reference source not found.**) and season for vessels using scallop dredges during 1991-1995. Shaded blocks represent areas and seasons that might be closed to vessels using scallop dredges to discourage targeting monkfish and reducing monkfish bycatch.

Statistical Area		August	September	October	November	December	January
Gulf of Maine	513				5:1	5:1	
	514				2:1	2:1	
	515			3:1			
Georges Bank	522	2:1	2:1	2:1	2:1	2:1	
	525	2:1	2:1	2:1			
Southern New England	537	3:1		2:1	2:1	5:1	2:1
	538			5:1			
	539	3:1		2:1	5:1	5:1	3:1
	613			2:1	3:1	2:1	2:1

Grouping these seasons into manageable blocks of times and areas, and including seasons and areas where there was no scallop landings reported by scallop vessels, suggests the following time/area closures for scallopers would be effective in reducing the monkfish catch without substantially decreasing the opportunity for scallop vessels to target scallops.

Areas 513 and 514:

November and December

Area 515:

October, November, and December

Areas 537, 538, 539, and 613:

October through January, inclusive

If these areas were closed to fishing with scallop dredges, the allocations for the limited access fishery could be increased by about 220 metric tons. The actual amount will vary depending on the final monkfish possession limit for scallopers.

Closed areas or seasons could also be used to preserve quota for more valuable seasons. Monkfish (especially liver) prices are known to vary seasonally and are high in the late fall and around Christmas. Prices for tails and whole fish have less seasonal variation and may be partially out of sync with seasonal liver prices. Part of the seasonal variation in price is due to quality of product and part due to market demand, somewhat driven by the holiday season in the orient.

**Table 115.** Total landings of monkfish (mt, whole) vs. scallop meats (mt) by month and three-digit statistical area (**Error!**

**Reference source not found.**) for vessels using scallop dredges, 1991-1993. Shaded cells represent seasons and areas where the ratio of monkfish to scallop landings is high. Landings for all areas include three-digit statistical areas where landings of monkfish and scallops were negligible. Source: NMFS Weighout data.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
521	Monkfish (mt)	12	25	12	13	33	102	170	151	147	157	135	44	1,001
	Scallop meats (mt)	41	75	66	80	105	101	150	113	121	90	98	50	1,090
	Ratio	0.3	0.3	0.2	0.2	0.3	1.0	1.1	1.3	1.2	1.7	1.4	0.9	0.9
522	Monkfish (mt)	9	10	10	26	60	79	176	210	173	202	147	91	1,193
	Scallop meats (mt)	29	37	47	107	135	86	100	86	62	67	47	41	844
	Ratio	0.3	0.3	0.2	0.2	0.4	0.9	1.8	2.4	2.8	3.0	3.1	2.2	1.4
525	Monkfish (mt)	10	19	25	38	93	43	125	199	158	128	47	20	905
	Scallop meats (mt)	22	63	97	94	91	43	87	70	69	56	33	12	737
	Ratio	0.5	0.3	0.3	0.4	1.0	1.0	1.4	2.8	2.3	2.3	1.4	1.7	1.2
526	Monkfish (mt)	97	43	38	57	65	194	180	230	203	165	153	126	1,551
	Scallop meats (mt)	210	128	184	227	137	231	163	125	124	118	85	101	1,833
	Ratio	0.5	0.3	0.2	0.3	0.5	0.8	1.1	1.8	1.6	1.4	1.8	1.2	0.8
537	Monkfish (mt)	10	2	2	4	3	5	1	3	4	5	10	34	83
	Scallop meats (mt)	6	2	2	3	3	4	2	1	3	3	3	6	38
	Ratio	1.7	1.0	1.0	1.3	1.0	1.3	0.5	3.0	1.3	1.7	3.3	5.7	2.2
539	Monkfish (mt)	10	4	0	1		1	3	6	2	9	35	33	104
	Scallop meats (mt)	3	2	1	3		2	2	2	2	4	6	7	34
	Ratio	3.3	2.0	0.0	0.3		0.5	1.5	3.0	1.0	2.3	5.8	4.7	3.1
561	Monkfish (mt)	10	4	6	3	23	28	55	58	43	55	93	50	428
	Scallop meats (mt)	43	20	41	20	65	54	79	66	22	27	59	63	559
	Ratio	0.2	0.2	0.1	0.2	0.4	0.5	0.7	0.9	2.0	2.0	1.6	0.8	0.8
562	Monkfish (mt)	23	16	20	18	56	111	130	140	105	64	21	14	718
	Scallop meats (mt)	87	133	141	100	154	175	163	113	57	28	10	14	1,175
	Ratio	0.3	0.1	0.1	0.2	0.4	0.6	0.8	1.2	1.8	2.3	2.1	1.0	0.6
612	Monkfish (mt)	14	11	3		5	4	3	6	2	3	4	16	71
	Scallop meats (mt)	13	11	7		8	6	7	11	4	7	6	9	89
	Ratio	1.1	1.0	0.4		0.6	0.7	0.4	0.5	0.5	0.4	0.7	1.8	0.8
613	Monkfish (mt)	54	65	21	37	38	37	31	27	34	52	60	68	524
	Scallop meats (mt)	24	38	23	38	42	32	47	31	33	29	22	31	390
	Ratio	2.3	1.7	0.9	1.0	0.9	1.2	0.7	0.9	1.0	1.8	2.7	2.2	1.3
615	Monkfish (mt)	75	96	70	55	47	65	48	38	25	19	40	63	641
	Scallop meats (mt)	73	126	147	121	102	125	113	70	43	36	46	40	1,042
	Ratio	1.0	0.8	0.5	0.5	0.5	0.5	0.4	0.5	0.6	0.5	0.9	1.6	0.6
616	Monkfish (mt)	21	30	46	53	55	64	65	61	16	11	4	17	443
	Scallop meats (mt)	28	61	107	201	191	145	168	67	34	14	6	9	1,031
	Ratio	0.8	0.5	0.4	0.3	0.3	0.4	0.4	0.9	0.5	0.8	0.7	1.9	0.4
621	Monkfish (mt)	31	30	14	7	10	16	5	3	4	7	9	16	152
	Scallop meats (mt)	31	28	20	19	22	33	8	8	8	22	23	15	237
	Ratio	1.0	1.1	0.7	0.4	0.5	0.5	0.6	0.4	0.5	0.3	0.4	1.1	0.6
622	Monkfish (mt)	18	22	10	23	25	26	18	19	20	13	15	17	226
	Scallop meats (mt)	27	24	25	56	84	83	53	57	47	29	29	19	533
	Ratio	0.7	0.9	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.9	0.4
All areas	Monkfish (mt)	415	418	325	400	563	799	1,021	1,161	949	905	814	661	8,431
	Scallop meats (mt)	655	788	969	1,175	1,264	1,167	1,168	847	662	556	500	451	10,202
	Ratio	0.6	0.5	0.3	0.3	0.4	0.7	0.9	1.4	1.4	1.6	1.6	1.5	0.8

**Table 116.** Average landings per day absent of monkfish (lbs, whole) vs. scallop meats (lbs) by month and three-digit statistical area (**Error! Reference source not found.**) for vessels using scallop dredges, 1991-1993. Shaded cells represent seasons and areas where the ratio of monkfish to scallop landings is high. Average landings per day absent for all areas include three-digit statistical areas where landings of monkfish and scallops were negligible. Source: NMFS Weight data.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
521	Monkfish (lbs)	246	104	181	182	299	760	907	938	744	928	835	547	663
	Scallop meats (lbs)	714	825	906	941	902	759	901	682	601	569	618	564	719
	Ratio	0.3	0.1	0.2	0.2	0.3	1.0	1.0	1.4	1.2	1.6	1.4	1.0	0.9
522	Monkfish (lbs)	263	723	201	254	419	807	1,191	1,541	1,411	1,291	1,303	981	962
	Scallop meats (lbs)	851	965	825	912	925	808	683	657	535	465	451	448	678
	Ratio	0.3	0.7	0.2	0.3	0.5	1.0	1.7	2.3	2.6	2.8	2.9	2.2	1.4
525	Monkfish (lbs)	302	285	241	341	774	828	1,072	1,483	1,123	1,063	839	767	827
	Scallop meats (lbs)	712	923	912	842	812	830	707	552	479	496	547	466	684
	Ratio	0.4	0.3	0.3	0.4	1.0	1.0	1.5	2.7	2.3	2.1	1.5	1.6	1.2
526	Monkfish (lbs)	392	302	209	277	443	816	981	1,167	1,029	790	953	715	664
	Scallop meats (lbs)	793	836	947	1,035	879	941	863	675	600	585	579	567	777
	Ratio	0.5	0.4	0.2	0.3	0.5	0.9	1.1	1.7	1.7	1.4	1.6	1.3	0.9
537	Monkfish (lbs)	1,626	433	521	610	637	754	317	1,616	931	858	1,003	1,734	1,216
	Scallop meats (lbs)	731	560	517	976	745	670	660	434	554	407	356	267	490
	Ratio	2.2	0.8	1.0	0.6	0.9	1.1	0.5	3.7	1.7	2.1	2.8	6.5	2.5
539	Monkfish (lbs)	2,887	1,240	96	417		903	1,559	2,232	447	1,331	1,717	1,849	1,724
	Scallop meats (lbs)	736	600	927	1,091		894	688	612	455	197	263	397	496
	Ratio	3.9	2.1	0.1	0.4		1.0	2.3	3.6	1.0	6.8	6.5	4.7	3.5
561	Monkfish (lbs)	223	145	125	103	314	459	661	802	957	1,204	874	520	582
	Scallop meats (lbs)	899	1,012	737	645	957	863	917	852	479	731	585	629	758
	Ratio	0.2	0.1	0.2	0.2	0.3	0.5	0.7	0.9	2.0	1.6	1.5	0.8	0.8
562	Monkfish (lbs)	247	135	151	221	179	511	741	967	1,066	970	948	624	533
	Scallop meats (lbs)	881	1,082	989	1,113	1,381	861	896	775	570	442	462	530	877
	Ratio	0.3	0.1	0.2	0.2	0.1	0.6	0.8	1.2	1.9	2.2	2.1	1.2	0.6
612	Monkfish (lbs)	1,117	667	320		580	891	250	642	217	194	356	864	628
	Scallop meats (lbs)	1,070	586	973		836	1,761	853	562	515	553	571	353	698
	Ratio	1.0	1.1	0.3		0.7	0.5	0.3	1.1	0.4	0.4	0.6	2.4	0.9
613	Monkfish (lbs)	1,197	990	731	552	575	710	497	683	524	783	1,179	1,253	830
	Scallop meats (lbs)	524	591	779	621	592	615	657	604	465	404	380	434	542
	Ratio	2.3	1.7	0.9	0.9	1.0	1.2	0.8	1.1	1.1	1.9	3.1	2.9	1.5
615	Monkfish (lbs)	598	452	349	308	332	356	247	260	281	190	277	669	368
	Scallop meats (lbs)	533	574	604	604	614	668	589	440	461	326	315	383	527
	Ratio	1.1	0.8	0.6	0.5	0.5	0.5	0.4	0.6	0.6	0.6	0.9	1.7	0.7
616	Monkfish (lbs)	438	394	429	320	288	430	285	373	419	335	295	850	368
	Scallop meats (lbs)	553	655	750	844	930	882	696	588	485	394	388	284	734
	Ratio	0.8	0.6	0.6	0.4	0.3	0.5	0.4	0.6	0.9	0.9	0.8	3.0	0.5
621	Monkfish (lbs)	507	475	522	211	259	326	286	294	230	134	139	470	335
	Scallop meats (lbs)	462	451	551	498	609	602	169	448	398	363	361	315	447
	Ratio	1.1	1.1	0.9	0.4	0.4	0.5	1.7	0.7	0.6	0.4	0.4	1.5	0.7
622	Monkfish (lbs)	121	410	328	308	262	262	195	194	215	216	173	343	258
	Scallop meats (lbs)	447	416	564	635	680	713	638	552	480	440	312	123	543
	Ratio	0.3	1.0	0.6	0.5	0.4	0.4	0.3	0.4	0.4	0.5	0.6	2.8	0.5
All areas	Monkfish (mt)	505	410	299	304	379	545	671	862	810	783	910	768	602
	Scallop meats (mt)	684	730	770	807	815	787	741	620	529	489	488	455	666
	Ratio	0.7	0.6	0.4	0.4	0.5	0.7	0.9	1.4	1.5	1.6	1.9	1.7	0.9

#### 8.1.5.1.2.9.3 Groundfish area closures

Monkfish occur in areas now closed to fishing for groundfish, but these closures do not appear to have reduced monkfish fishing mortality because landings have not declined since the closures and directed effort for monkfish has increased. A model used by the Northeast Fisheries Science Center to predict the effect of area closures indicates that the landings of monkfish could be reduced as much as 17 percent (9 of 52 million lbs.) by the Georges Bank area closures (J. Walden, pers. comm.). These area closures, coupled with reductions in days-at-sea, appear to have intensified fishing effort on monkfish in Southern New England and possibly in the Gulf of Maine as well. Monkfish landings have remained high despite these closures and fishermen report increased monkfish effort during 1995 and 1996<sup>35</sup>.

Recent management changes, however, may have reduced monkfish mortality more so than did the Georges Bank area closures. Amendment 7 to the Multispecies FMP prohibits fishermen from targeting non-groundfish species unless the bycatch of groundfish is below acceptable levels. This management change prohibits vessels from targeting monkfish east of 72°30' W longitude, unless they are participating in an exempted fishery<sup>36</sup>. Two monkfish gillnet fisheries were exempted from the multispecies days-at-sea requirements during fall 1996, but are now closed because acceptably low groundfish bycatch has not yet been demonstrated. As of November 1996, a fishery for monkfish has been exempted from the multispecies regulations if they use trawls with 8-inch or larger mesh, south of 40°10' N latitude.

Although some monkfish effort has shifted south, outside the multispecies regulated mesh area, the multispecies prohibition on non-exempt monkfish effort, coupled with the multispecies and sea scallop days-at-sea reductions<sup>37</sup>, could have reduced monkfish mortality, especially in the northern area and on Georges Bank. Most of this reduction comes from landings that would otherwise have occurred in a directed monkfish fishery.

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<sup>35</sup> Data is not yet available to estimate changes in landings by statistical area during 1995 and 1996. Landings have not declined from 1994 levels, even though significant area closures on Georges Bank were implemented during 1995 and fewer multispecies and sea scallop days-at-sea were available. Fishermen reported increases in fishing activity during 1995 and 1996, especially by trawlers working in deep water of Southern New England and for gillnet fishermen in the Mid-Atlantic and Southern New England.

<sup>36</sup> Fisheries that target species other than regulated groundfish cannot occur under Amendment 7 rules unless their bycatch of groundfish is less than five percent of the total weight of fish onboard.

<sup>37</sup> The effect of the days-at-sea reductions on monkfish landings have been included in the TAL allocations (Section 8.3.1).

### 8.1.5.2 Other significant effects

#### 8.1.5.2.1 Discard mortality

#### 8.1.5.2.2 Caused by size-limit discarding

Size limits for monkfish, due to the size structure of the monkfish resource and the non-selectivity of most of the fishing gear in use, has the potential to cause significant discarding. Gear has not yet been developed U.S. to help fishermen capture only larger monkfish while retaining smaller target species. Some fishermen in Europe are required to use a grate in their trawls to separate large from small monkfish (see Appendix III), but this technology has not been used in the U.S. fishery for monkfish. Although research on finfish excluders in sea scallop dredges is now underway in the U.S., it is intended to separate large finfish from the catch of smaller scallops. Scallopers will, therefore, lose an important component of their landings by using the device. It will not be suitable for use when scallopers partially target monkfish during their scallop days-at-sea or when scallopers target only monkfish with beam trawls.

The primary focus of the size limit is to induce behavioral changes in the directed fishery, so that fishermen will fish less in areas where small monkfish are prevalent. The resource could also realize some benefits from the survival of discarded monkfish, but Section 11.6.6.1 suggests that gains will not be realized unless discard mortality is less than about 40 percent. Monkfish discard mortality is uncertain and no data on this exists for individual fisheries. Discard survival in limited studies ranged from 8 to 57 percent.

It is unknown how often fishermen will seek larger monkfish because of the size limit. Fishermen that target monkfish stand to lose a significant portion of their catch due to small size. Without regard to directivity, the percent of landings (by weight) between 11 inches (the current minimum size) and 14 inches (the proposed minimum size) that would be lost by fishermen given the age structure during 1992-1993 is: trawls - 40 percent, scallop dredges - 27 percent, and sink gillnets - 0.8 percent. Fishermen using trawls and dredges to target monkfish may seek larger monkfish to increase their retained catch relative to the amount of undersized monkfish and reduce costs.

In addition to affecting dockside prices ([see Section 8.1.6.1.2](#)), the minimum size limits will most likely cause discarding in traditional trawl, dredge, and gillnet fisheries. For example, if the size limits were in effect during 1994 and 1995, the peewee and perhaps half of the small market categories would have been discarded if landings in the small category were evenly distributed by size, amounting to approximately 15 to 20 million pounds of monkfish in live weight, or about 30 percent of actual landings. Discard mortality will delay stock rebuilding and future benefits.

#### 8.1.5.2.3 Caused by trip or possession limits

The Alternative 1 and 3 trip or possession limits for vessels that target species other than monkfish were chosen to affect the fewest number of trips while, at the same time, acting as a disincentive for non-qualifying vessels to target monkfish. Discarding as a result of these limits should therefore be at an acceptable level that contributes to keeping mortality at reasonable levels. In general, the limits were chosen based on the landings history of vessels during 1991 to 1994. Less than one percent of trips where monkfish accounted for less than 15 percent of revenue would be affected by the proposed limits. Less than 10 percent of trips in each fishery (defined by area, gear, and target species) would be affected by the proposed limits. These limits would affect a much greater proportion of total monkfish landings, because trips that partially or exclusively targeted monkfish would not be able to occur under the proposed action. Some vessels that previously landed these high-volume monkfish trips will qualify for monkfish limited access and some of these trips could still occur under a quota or days-at-sea based management program. Other vessels would no longer be able to target monkfish and would have to target other species.

Non-preferred alternative 4 has more restrictive limits than do alternatives 1 and 3, since the limits were chosen to achieve a desired allocation for the limited access fishery. The lower trip or possession limits (175 or 200 pounds per day-at-sea) may, in some fisheries, cause unacceptably high discarding while the vessels pursue species other than monkfish (groundfish, sea scallops, summer flounder). Since discard survival is thought to be low, the gains from growth are not likely to overcome the losses from discard mortality.

The amount and frequency of discarding as a result of the proposed trip or possession limits is explained in greater detail in Section 8.1.5.1.1.5.

#### 8.1.5.2.4 Changes in fishing behavior

The proposed action will not be effective unless it changes fishing behavior. Little change in fishing behavior is expected in fisheries that target species other than monkfish. Some vessels that currently target monkfish, however, will have insufficient history, either due to their entry into the fishery after the control date or because they simply did not fish very frequently for monkfish during the qualification period, to qualify for limited access. These vessels will have to return to the type of fishing they had previously conducted or they will have to seek opportunities in other fisheries.

Vessels that qualify for monkfish limited access may not have the same opportunity to fish for monkfish as much as they did in the past. The proposed management program could shorten their season, either by a seasonal quota or by annual day-at-sea allocations. If the management program to reduce monkfish mortality shortens their season, these vessels will also have to target other fisheries or remain at the dock until the monkfish season re-opens.

The proposed size limits will substantially affect the proportion of monkfish catch that fishermen may land. It is impossible to estimate how frequently the size limit will induce fishermen to target monkfish in areas where large fish are more prevalent. Some of the losses will be recouped by gains due to the growth of survivors while the resource could realize other benefits by the redirection of effort onto larger fish. The Councils expect these two factors to produce net positive benefits to the resource and the fishery.

#### 8.1.5.2.5 Long-term productive capability of the stocks

##### 8.1.5.2.5.1 *Monkfish*

A predictive model for monkfish that gave plausible results could not be developed because of poor understanding of stock dynamics at that level of detail. The Monkfish Technical Workgroup, a precursor to the PDT, attempted to model the monkfish population via a length-based transition model. The models and various assumptions gave unreliable results or required unreasonable assumptions. Back-testing of the model could not reproduce the survey biomass observations when past fishing mortality and recruitment levels were applied. The Technical Workgroup concluded that data were insufficient to provide reliable estimates of future yield by applying the catch equation and various assumptions about natural mortality, survey catchability, growth rates, and recruitment.

As a rough approximation of future yields, the PDT decided to project recent changes in biomass into the future to calculate the expected yield for the No Action alternative. This approach was taken in lieu of a more comprehensive model that takes into account current age structure, exploitation patterns, and average recruitment. In the Northern Fishery Management Area, yield for the No Action alternative is expected to decline from 12,739 mt in 1995-1996 to 5,628 mt in 2018, 20 years after the implementation of the Monkfish FMP. Yield would decline from 14,667 mt in 1995-1996 to 10,559 mt in the Southern Fishery Management Area..

For the preferred alternative, the PDT assumed the future yield from the TAC plan objectives until 2005 and then from the anticipated 10-year rebuilding objective. The yield associated with relative biomass rebuilding targets (2.91 kg/tow in the north, 1.87 kg/tow in the south) was estimated by calculating a ratio between the research

survey weight per tow and the commercial yield, accounting for changes in fishing mortality. For the preferred alternative, the Councils expect the yield from the Northern Fishery Management Area to decline from 12,739 mt in 1995-1996 to 4,047 mt in 2004, followed by a rebound to 10,739 mt when the stock is rebuilt. In the Southern Fishery Management Area, the Councils expect the yield to decline from 14,667 mt in 1995-1996 to 2,224 mt in 2004, followed by 32,235 mt when the stock is rebuilt.

Stochastic methods were applied to estimate uncertainty in the projections from the variance of the input parameters. These projections, however, may represent but do not directly account for recruitment variability or changes in mean size at age. These projections are rough estimates of future yield, in lieu of an age-based or length-based population model that would estimate the probable stock response to reduced fishing mortality. The projections presented below assume that biomass remains constant throughout the mortality reduction phase (or that fishing mortality increases if biomass declines, or vice versa) and then rebounds with a slight decrease in fishing mortality (for the southern area only) to target levels. Whenever sufficient data or methods allow, future monkfish projections should be based on other methods than those used here.

The projected yield for the preferred alternative and the No Action alternative were used to estimate the net economic benefits or costs in Section 8.1.5.2.5.1.1.

#### 8.1.5.2.5.1.1 Yield forecast for the preferred alternative

The expected landings for the preferred alternative were estimated by adjusting the TAC objectives for additional regulatory discards caused by the new management measures and for the changes in discards expected from day-at-sea changes in the multispecies and scallop fisheries. The increased regulatory discards were deducted from the TACs, because the additional discards would come at the expense of yield. In the Northern Fishery Management Area, the discard deductions were 246 to 250 mt in the first three years, increasing to 2,007 mt (Table 94) when no days-at-sea allocations are planned. The discard deductions in the Southern Fishery Management Area were 419-425 mt in the first three years, followed by 1,184 mt in regulatory discards (Table 95) when no monkfish days-at-sea are allocated. On the other hand, future declines in multispecies and scallop days would contribute to decreases in discarding that could be translated into landings. This management change is expected to contribute 333 to 484 mt to future landings in the northern area and 236 to 285 mt in the southern area.

After mortality is reduced to target levels and the stock is expected to rebuild, the monkfish yields are expected to increase to a level consistent with the stock biomass targets and target exploitation rates. The Councils assumed that stock biomass and yield will increase linearly from the time that overfishing stops in year 4 to when the stock is rebuilt in year 10 (Figure 44). The shape of the recovery is however uncertain. It could be delayed by continuing biomass declines during the mortality reduction phase of the FMP, or stock rebuilding could occur earlier than expected if the reference points are more conservative than necessary to allow stock rebuilding. The Council believes that its assumption is the best compromise between these two possibilities and should be used to project yield until a more analytical approach is possible.

Relating current yield to the survey biomass observations was necessary to estimate future yield when the stock is rebuilt. This was accomplished by a simple modification to the traditional catch equation:

$$Y = C * \bar{w} = N \bar{w} e^{-Z} \left( \frac{F}{Z} \right) r \quad \text{Equation 1}$$

where:  
 N = number of fish caught  
 w = mean weight of fish caught  
 F = fishing mortality  
 Z = total mortality

$r$  = ratio of commercial landings to the yield predicted by applying the fishing mortality rate to survey biomass.

Changes in this ratio, embedded in the equation above, are a measure of the relationship between landings and fishing mortality. Changes are due to decreased discarding of monkfish bycatch because of improving markets and increased official landings due to improvements in data collection and fewer fish being landed outside normal markets (i.e. ones more likely to report). Both factors have undergone considerable change over the history of the monkfish fishery.

This ratio of landings to calculated yield can be estimated by rearranging Equation 1:

$$r = \frac{Y}{be^{-z} \left( \frac{F}{Z} \right)}$$

**Equation 2**

where:  $Y$  = reported landings

$b$  = mean survey weight per tow

$F$  = estimated fishing mortality from NEFSC (1997).

Given the factors that would contribute to the value of the ratio, it is not surprising that the ratio between yield and the survey weight per tow changed substantially since 1967. During 1992-1996, the average ratio in the Northern Fishery Management Area was 23,706, a 40-fold increase over the ratios calculated for 1967 to 1973. In the Southern Fishery Management Area, the ratio for 1992-1996 was 69,818, a 630-fold increase over the ratios calculated for 1967 to 1973. The larger difference in the southern area could reflect the magnitude of foreign catches of monkfish, although reported foreign catches were low, usually less than 100 mt.

The Councils assumed that the 1992 to 1996 ratio would remain constant in the future and applied the target mortality rate and target biomass to estimate future yield for the rebuilding phase of the preferred alternative. To account for some sources of uncertainty associated with discarding and reporting, the Councils also calculated the predicted yields assuming a normal error structure with a standard deviation equal to the one standard deviation for the 1992 to 1996 catch ratios described by Equation 2. Five hundred samples were drawn from the estimated variation in the catch ratio via Latin hypercube re-sampling to estimate probability distributions for future yields. Expected landings through 2004 were assumed to be known without error, because they are specified by the FMP. In lieu of an analytic population model to predict rebuilding, the PDT assumed a linear increase in landings and stock biomass until management achieved the target in 2009.

With a target mortality rate equal to 0.05 and a target biomass level of 2.44, the median expected yield when the stock is rebuilt in the Northern Fishery Management Area is 10,700 mt (Table 117). Including the variation in the catch ratio, the future landings at the rebuilding targets is estimated to have an 80 percent probability of being between 8,600 and 12,900 mt (Figure 44).

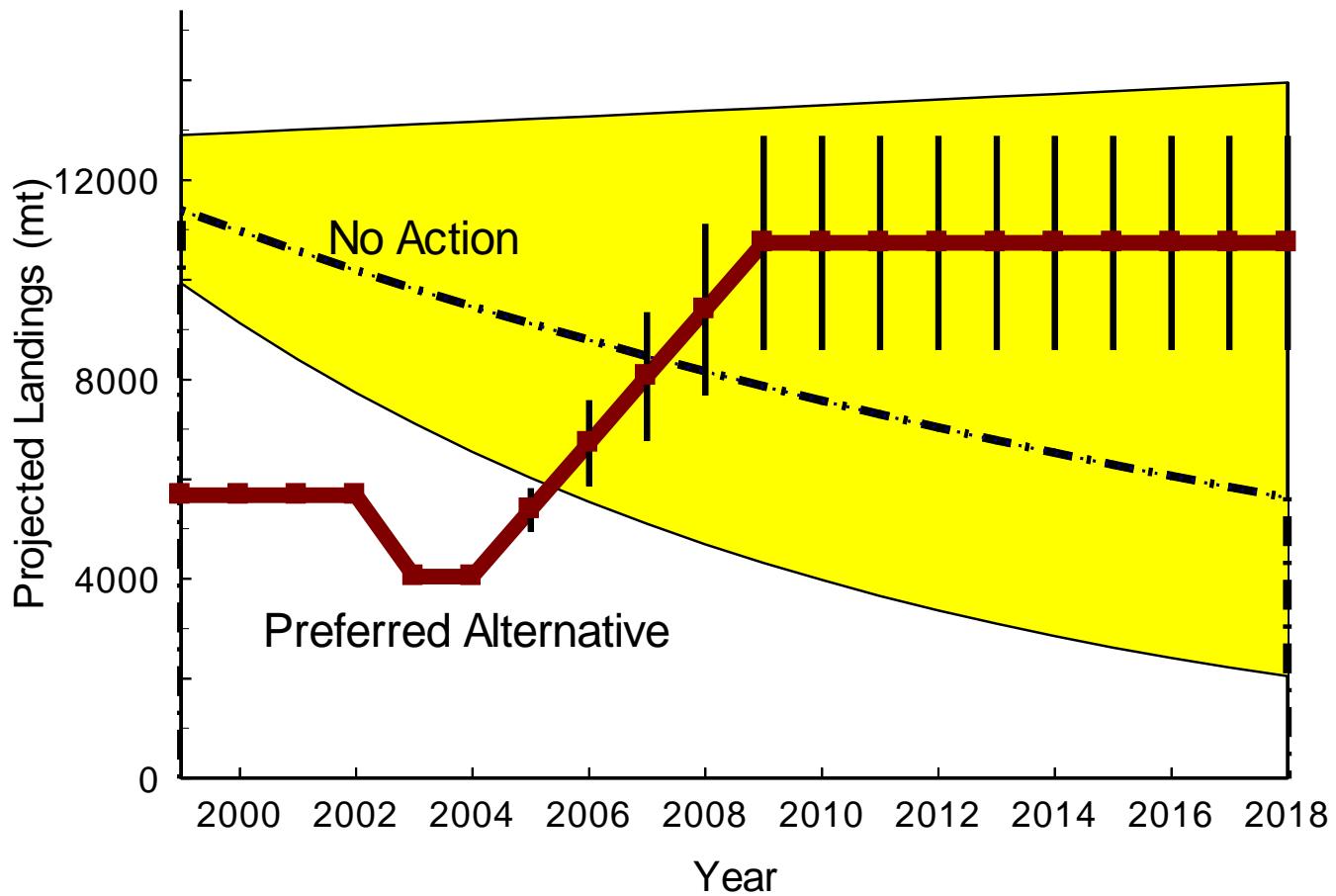
The predicted yield associated with a rebuilt stock in the Southern Fishery Management Area is 32,200 mt (Table 117). This result is based on a target fishing mortality rate of 0.1, a target survey biomass level equal to 2.94 kg/tow, and a catch ratio of 62,692. Accounting for the uncertainty in the catch ratio (error in discards and unreported landings), the future landings when at the rebuilding targets is between 25,400 and 39,000 (Figure 45).

Compared with the status quo (Section 8.1.5.2.5.1.2), the median estimates are 5,100 and 21,700 mt higher for the preferred alternative in the northern and southern areas, respectively. The larger difference in the southern area is attributable to the larger area and potential biomass and the more depleted condition of the resource. In the northern area, biomass has increased due to recent recruitment, although the biomass is composed of mainly young

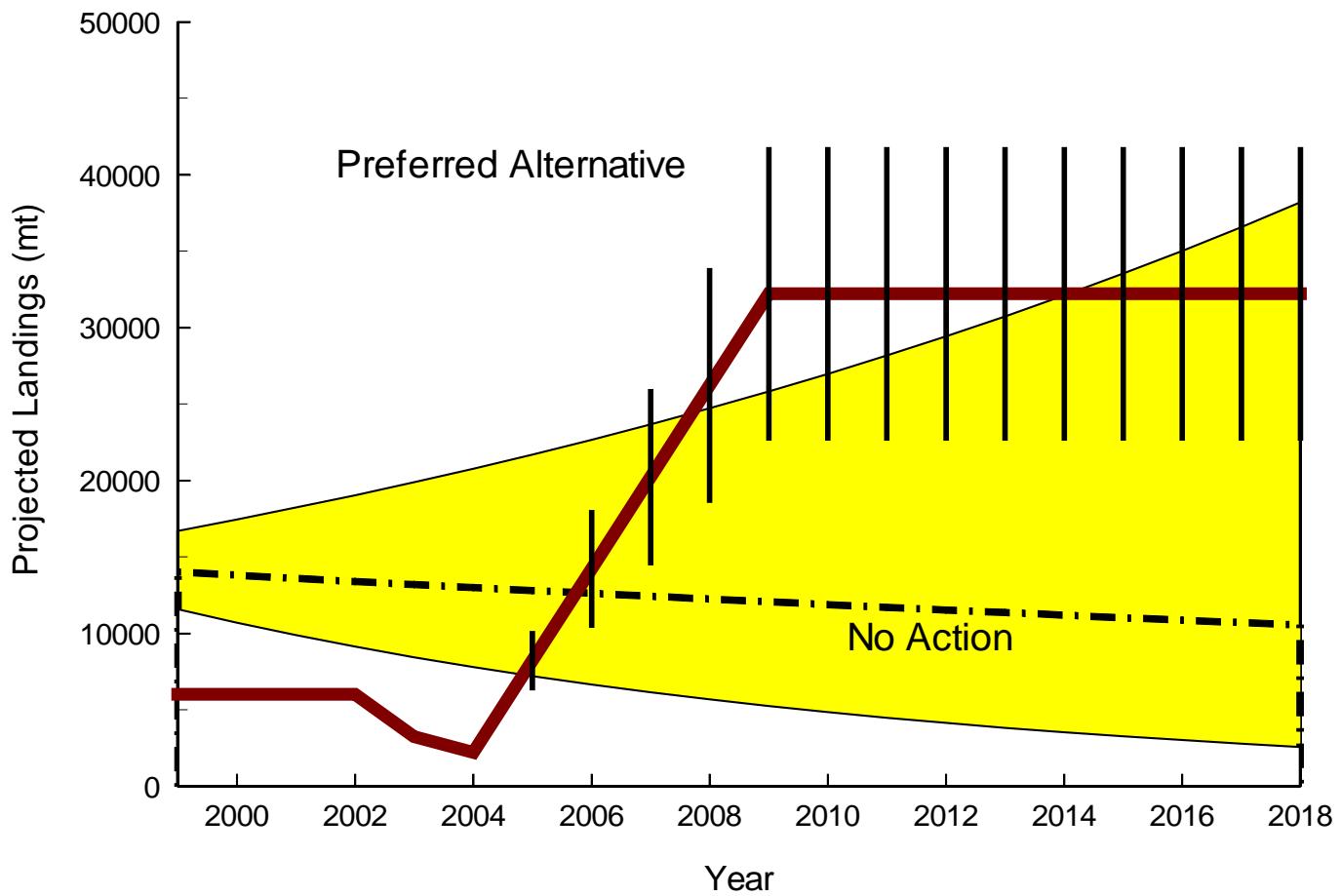
monkfish. In the southern area, the survey biomass is at time-series low value. These target yield estimates and the projections of yield during the rebuilding phase are the inputs used to estimate net benefits in Section 8.1.6.

**Table 117.** Comparison between the No Action alternative (status quo) and the preferred alternative for projected median landings and total allowable catch. The No Action alternative is projected based on the average annual decline in total stock biomass between 1992 and 1997. The FMP projection represents the total allowable catches that correspond with the FMP's mortality reduction objectives, with recovery of stock biomass to  $B_{target}$  conditions, equivalent to 2.44 kg/tow in the Northern Fishery Management Area and 2.94 kg/tow in the Southern Fishery Management Area.

Calendar year	Fishing year (begins May 1)	Median expected landings (mt) — No Action —		Median expected landings (mt) - Preferred alternative		
		North	South	North	South	
1995-1996 baseline		12,739	14,667	FMP projection		
Annual percent change (1992 – 1997)		-3.7%	-1.7%			
1999	1	11,396	14,024	5,673	6,024	
2000	2	10,981	13,816	5,673	6,024	
2001	3	10,581	13,611	5,673	6,024	
2002	4	10,195	13,410	5,673	6,024	
2003	5	9,823	13,211	4,047	3,252	
2004	6	9,465	13,015	4,047	2,224	
2005	7	9,120	12,822	5,385	8,226	
2006	8	8,788	12,632	6,724	14,228	
2007	9	8,468	12,445	8,062	20,231	
2008	10	8,159	12,260	9,400	26,233	
2009	11	7,862	12,078	10,739	32,235	
2010	12	7,575	11,899	10,739	32,235	
2011	13	7,299	11,723	10,739	32,235	
2012	14	7,033	11,549	10,739	32,235	
2013	15	6,777	11,378	10,739	32,235	
2014	16	6,530	11,209	10,739	32,235	
2015	17	6,292	11,043	10,739	32,235	
2016	18	6,062	10,879	10,739	32,235	
2017	19	5,841	10,718	10,739	32,235	
2018	20	5,628	10,559	10,739	32,235	



**Figure 44. Northern Fishery Management Area:** Projected monkfish landings for the No Action (dotted line) and preferred alternatives (heavy solid line). The shading around the No Action estimates and the vertical bars around the Preferred Alternative represent the 80th percent confidence interval derived from the uncertainty in the input parameters.



**Figure 45. Southern Fishery Management Area:** Projected monkfish landings for the No Action (dotted line) and preferred alternatives (heavy solid line). The shading around the No Action estimates and the vertical bars around the Preferred Alternative represent the 80th percent confidence interval derived from the uncertainty in the input parameters.

### **Length-structured analytical model**

A more analytical approach for predicting future stock size and yield was attempted by the Council, but the recent stock data that was entered into the model gave unreliable predictions. In the Northern Fishery Management Area, the model predicted that stock rebuilding from current levels was impossible, even if fishing mortality was zero. In the Southern Fishery Management Area, the model predicted that rebuilding was possible even at current fishing mortality levels. Unreasonable assumptions about the relative efficiency of the dredge to capture small monkfish in the two areas or about differences in natural mortality had to be made to obtain plausible results from the model.

The Monkfish Technical Working Group developed a length-based population projection model to assess the implications of various management measures for stock rebuilding. The model used a von Bertalanffy growth equation to define an annual growth increment for each length category. The length frequency distribution in any given year consists of individuals which grew into the defined length range plus those that remained there (i.e., the computed growth step was less than a unit interval) and minus those that grew out of the range. A  $\square$ from-to $\square$  projection matrix identifies the starting length class in year t and the final length class in year t+1. The probability of surviving between year t and t+1 is modeled using usual exponential model for population decay and estimated catches are based on the classic catch equation. Recruitment can be handled in a variety of ways but for testing purposes recruitment was treated as constant vector of numbers by length category over the range xx to yy, corresponding to lengths for zz year old monkfish. Growth parameters and size-specific partial recruitment rates, baseline fishing mortality rates were allowed to vary by stock area.

The model is considered to be an accurate depiction of the current level of knowledge of monkfish population dynamics and the fishery. Several hypothesized mechanisms of population regulation, such as cannibalism or size-dependent natural mortality rate were not included owing to a lack of data. Such mechanisms may motivate innovative research or stimulate interesting theoretical advances but until their inclusion can be quantified, they have limited utility for management.

The Monkfish Technical Working Group initially hypothesized that the abundance levels and length frequencies observed during the 1970-79 period were characteristic of a stable period of abundance and mortality. The projection model provided a means of testing whether the estimated growth and mortality rates are consistent with this hypothesis. Lack of consistency would be evident if the projected population size structure failed to match the observed frequencies or if the overall population reached an equilibrium level significantly different from the target levels. Disagreement between observed and predicted could be induced by mis-specification of recruitment, growth rates, natural mortality, fishing and discard mortality, or some combination of these factors. Initial runs of the model for northern and southern stocks indicated that the projected northern population would decline from the 1970-79 baseline period, whereas southern stocks would increase. This suggested that different types of mechanisms might be involved and/or the direction of change for a given parameter might be different for these stock areas.

One option initially explored was the possibility that size dependent partial recruitment patterns and discard rates may be responsible for the divergences. Since actual catches (i.e., landings plus discard) were poorly estimated, changes in the magnitude of mortality on smaller individuals might be responsible. Projection runs suggested relatively little influence of this mechanism on the equilibrium population size structure in either area. Sensitivity analyses with respect to growth rates also had limited effect.

Discussions within the PDT began to focus on the possibility of modifying the magnitude of recruitment and natural mortality rate. The first mechanism implies a difference in selectivity of the survey for small versus large monkfish. Varying selectivity of the dredge by habitat area could explain differences between northern and southern regions. The northern area is characterized by rocky substrate known to be desirable monkfish habitat. Moreover, the NEFSC trawl may be less efficient in such areas. Thus estimates of abundance may be underestimated in northern areas relative to southern areas. The second mechanism implies that the longevity of monkfish may exceed current estimates. The inverse relationship between longevity and natural mortality rate is well known in fish stocks. Therefore, the possibility existed that natural mortality rates could differ. Of course

both recruitment levels and natural mortality rates could be mis-specified and a series of simulation experiments were conducted to explore these options.

Simulation experiments suggested that stability for the northern populations could be obtained by increasing the number of one-year old recruits by 50% and decreasing natural mortality from 0.2 to 0.07. Stability was defined as a stable population within 10% of the 1970-79 target. In the south, stability was achieved by reducing average recruitment for the effect of a pulse of year classes in early 1970's. This pulse, although evident in both the fall and spring NEFSC surveys, ultimately failed to materialize as a significant increase population biomass. Therefore, exclusion of these data seemed plausible. A slight reduction of natural mortality to 0.17 was also required.

Collectively, the necessary changes in parameterization implied an inadequate understanding of the dynamics of the stocks. Since the derived conditions for stability were not unique (i.e. other combinations of changes also could achieve stability) and since the scientific basis for such differences was weak, the PDT judged the current understanding of monkfish population dynamics to be inadequate for population projection. At the present time, the expected temporal for restoration of the stock to 1970-79 levels cannot be reliably predicted.

#### 8.1.5.2.5.1.2 Yield forecast for the No Action (status quo) alternative

In lieu of a better predictive model of changes in future stock biomass and yield, the best approximation is to project recent trends in biomass, reflecting recent recruitment, fishing mortality, and exploitation patterns. Recent trends, however, are affected by the choice of time period, the choice of the size of fish in the biomass index, and recruitment. This approach assumes that fishing effort remains constant and catch per unit effort declines at the same rate as stock biomass, ignoring any potential changes in fishing technology.

Landings in both areas have increased during the early to mid-1990s to about 12,000 to 15,000 mt (Figure 2). In the Northern Fishery Management Area, landings were 6,000 to 10,000 mt in the early 1990s and then jumped to 14,000 to 15,000 mt in 1995 and 1996. This jump in landings is attributable to recent good recruitment and the effects (increased monkfish fishing effort) of Amendment 7 to the Multispecies FMP. Until the most recent survey estimate, stock biomass in the northern area had been increasing, despite the high exploitation level. In the Southern Fishery Management Area, landings peaked at 15,000 mt in 1993 and have been slowly declining since then to 12,500 mt in 1997. Low recruitment has been evident in the southern area survey abundance during the 1990s.

The Council examined three time periods and two length classes to estimate recent trends in stock biomass (Table 118). The period 1992-1997 reflects current conditions when the fishery began targeting monkfish more frequently, possibly converting discards to landings due to improved prices for livers and tails. The period 1986 to 1997 was considered because it reflected a longer trend that had been observable in the survey data. The third time period excluded 1986, because that year had high biomass observations that may be attributable to interannual variability in the survey measurements of biomass. Total and exploitable biomass trends were also examined to estimate future trends. Total biomass includes all monkfish captured by the survey trawl. Exploitable biomass includes all monkfish greater than 42 cm, a size that would yield a legal 11-inch tail. The threshold for this size class is larger than the true exploitation pattern, because smaller fish may be landed in some important states and smaller fish are often discarded (Figure 38 and Figure 39).

The Councils calculated the mean annual percentage change in biomass as the slope of the time series divided by the average biomass during the time series. The total biomass trend for the Northern Fishery Management Area declined by 3.7 percent per year during 1992-1997 (Table 118), while exploitable biomass increased by 0.6 percent. The difference is due to recruitment of recent good year classes into the exploitable size range. Very recent recruitment in the northern area has been poor and contributes to the larger decline in total biomass since 1992. Since 1986, total biomass has been declining

at a 4.9 percent per year rate, while exploitable biomass declined by 6.2 percent. The rates for this period may overestimate the trend, because of the high biomass levels observed in 1986. Without 1986, the trends in total and exploitable biomass were -1.7 and -1.4 percent per year, respectively.

For all time periods, the decline in exploitable biomass has been steeper than for total biomass. For the southern area, total biomass declined by 1.7 percent per year during 1992-1997 (Table 118), while exploitable biomass declined by 2.7 percent per year. Over the longer period, total biomass has declined by 0.2 percent per year since 1986, but total biomass has increased by 0.5 percent per year when 1986 is excluded. Exploitable biomass has declined for all time periods examined, however, declining by 3.2 percent per year since 1986 and 2.1 percent per year since 1987.

After carefully examining the results, the PDT recommended projecting future yield using the trends in total survey biomass since 1992. That choice was made because the recent period was a better estimate of the effects from status quo exploitation and recent recruitment. The PDT recommended using total biomass, rather than exploitable biomass, because total biomass included recent recruitment conditions and also measured the effect of discard mortality. Variability in the biomass trend was estimated by assuming a normal error term for the residuals and resampling the assumed error distribution 500 times by Latin hypercube methods. For each iteration, the trend in the re-sampled annual biomass indices was re-estimated to project future landings. Some of these realizations produced a positive slope because the random errors were mainly positive for 1992 and 1993 and negative for 1995 and 1996. The method overstates variance the true trend estimated by linear regression during 1992 to 1996, but probably compensates for the uncertainty in future recruitment.

Using the 1992-1997 trends in total biomass, the Councils projected future status quo yield based on recent trends. This approach assumes that fishing effort remains constant and catch per unit effort declines at the same rate as stock biomass, ignoring any potential changes in fishing technology or the exploitation pattern. In the Northern Fishery Management Area, yield is expected to decline by 3.7 percent per year for status quo conditions (Table 118).

Northern Fishery Management Area landings would decline from 12,739 mt in 1995-1996 to 11,396 mt at the start of the monkfish management program in 1999 (Table 117). In twenty years, yield is expected to decline to only 5,628 mt under the status quo. Accounting for the uncertainty in the biomass trend, there is an 80 percent probability that landings would be between 2,000 and 14,000 mt in 2018 (Figure 44). About 25 percent of the re-sampled residuals resulted in a positive slope and therefore higher yield in 2018 than occur at present. Mortality reductions caused by declining days-at-sea in the multispecies and scallop fisheries could have some positive impacts that have not been taken into account, however.

Projecting the 1.7 percent annual decline in biomass into the future, the Southern Fishery Management Area yield in 1999 would be 14,024 mt and decline to only 10,559 mt in twenty years for the No Action alternative (Table 117). Accounting for the uncertainty in the biomass trend, there is an 80 percent probability that 2018 landings would be between 2,600 and 38,200 mt. Since recruitment during the late 1980s and early 1990s was very low, a 38,000 mt yield might be reasonable for the Southern Fishery Management Area if future recruitment improves. This outcome, however, ignores the relationship between spawning stock biomass and recruitment. At low spawning stock biomass levels, above-average recruitment is probably less likely than indicated by the current projection methodology. According to these projections, there is a nearly 40 percent probability that stock biomass would increase with the No Action alternative.

**Table 118. Time-trend regression on NEFSC autumn survey biomass (kg/tow).**

	<b>North</b>		<b>South</b>	
<b>1992 to 1997</b>	Total	Exploitable	Total	Exploitable
<b>Slope</b>	-0.041	0.007	-0.008	-0.011
<b>Intercept</b>	2.415	1.001	0.749	0.735
<b>Mean annual percent change</b>	-3.7%	0.6%	-1.7%	-2.7%
<b>1987 to 1997</b>				
<b>Slope</b>	-0.019	-0.018	0.002	-0.009
<b>Intercept</b>	1.724	1.798	0.414	0.683
<b>Mean annual percent change</b>	-1.7%	-1.4%	0.5%	-2.1%
<b>1986 to 1997</b>				
<b>Slope</b>	-0.061	-0.087	-0.001	-0.014
<b>Intercept</b>	3.054	3.936	0.516	0.848
<b>Mean annual percent change</b>	-4.9%	-6.2%	-0.2%	-3.2%

#### 8.1.5.2.5.1.3 Yield forecast for non-preferred alternatives

The predicted yield for the non-preferred alternatives are exactly the same as for the preferred alternative. There are no differences in the mortality reduction schedule, the TACs associated with them, or in the ability of the framework adjustment process to meet the mortality objectives. Other mortality reduction schedules that the Councils considered were incompatible with the SFA requirements and were therefore rejected. Other mortality reduction schedules that stopped overfishing sooner than year 4 were believed to create too much economic and social disruption and would not meet the needs of the fishing communities while rebuilding stock biomass.

Even if a more conservative approach were possible, the Councils' PDT could not develop a projection model that gave realistic results for both stocks. A quicker schedule would, therefore, achieve rebuilding in seven to nine years rather than ten years. In the preferred alternative, the catch increases are simply a linear interpolation between the TAC in year 4 and the expected catch in year 10 when stock biomass would recover to the target level. For more conservative options, the year 1 catch would have to decline to 4,047 mt in the northern area and 2,024 mt in the southern area. Assuming the same biological response was assumed for the preferred alternative would indicate that stock biomass could reach target levels (and therefore the proxy for MSY) in year seven.

#### 8.1.5.2.5.2 *Groundfish*

There may be some detrimental impacts on the rebuilding schedule for regulated groundfish stocks caused by the proposed restrictions on monkfish effort. Many vessels with multispecies limited access permits did not fully utilize their annual allocation of days during 1994, 1995 and 1996. During 1994 vessels with individual day-at-sea permits used 78 percent of their allocations, fleet vessels used 30 percent. During 1995, the proportion of days-at-sea used were 80 and 25 percent, respectively. These ratios rose to 82 percent for individual days-at-sea vessels and 29 percent for fleet days-at-sea vessels in 1996 due to the decreased allocation to 139 multispecies fleet days. In 1998, when the fleet allocation of multispecies days-at-sea is expected to be only 88 fleet days (and an equivalent amount of individual days), the proportion of days used to target multispecies is expected to increase to 90 percent for vessels with individual days and 37 percent for vessels with fleet days (MMC 1997).

Many vessels did not fish their full compliment of multispecies days-at-sea because they had not fished that often in the past or there were other fishing opportunities, like monkfish. If the opportunity to fish for monkfish is restricted by the proposed action, or the returns from fishing for groundfish become greater than those from fishing for monkfish, then these vessels may increase their utilization of multispecies days. If this occurs, the mortality rates on groundfish will rise, hampering the rebuilding program for groundfish.

Unlike the some of the non-preferred alternatives, the preferred alternative does not have the potential for shifting effort back into the multispecies program. Multispecies and scallop vessels that qualify for monkfish limited access would be allowed to use a portion of their existing annual days-at-sea allocations to target monkfish. If monkfish becomes more lucrative than groundfish or scallop fishing, then the preferred alternative may even relieve fishing pressure on those overfished stocks. Vessels that currently do not use their full complement of days-at-sea would use a greater proportion of them because they would be counted when the vessel targeted monkfish.

Increasing biomass of monkfish may also have negative repercussions due to predation on groundfish. Some groundfish species account for a significant fraction of the diet of monkfish. Atlantic cod (*Gadus morhua*), red hake (*Urophycis chuss*), and silver hake (*Merluccius bilinearis*) account for 22.4 percent of the monkfish diet by volume (Armstrong 1987), but only cod is a target of the multispecies rebuilding plan. By frequency of occurrence, groundfish species rank much lower in the observed diet of monkfish. Atlantic cod only account for 0.6 percent of the diet by number of animals. Haddock (*Melanogrammus aeglefinus*) and yellowtail flounder (*Limanda ferruginea*) did not appear in the diet, although this may be a function of where the samples were taken. For example, the gulf stream flounder (*Citharichthys arctifrons*) contributes to 2.4 percent of the gut contents, by number, indicating that monkfish could prey on yellowtail flounder if they happened to be available. No estimates are available on the total predation by monkfish on groundfish stocks.

#### **8.1.5.2.5.3      Other species**

Due to their opportunistic feeding habits, monkfish prey on a wide variety of other species. Red shrimp (*Dichelopandalus leptocerus*), sand lance (*Ammodytes* sp.), and long-finned squid (*Loligo pealeii*) account for 36 percent of the monkfish diet, by number (Armstrong 1987). With the exception of long-finned squid, these species are not a component of significant commercial or recreational fisheries. Due to this diet composition, monkfish appear to be more of a competitor of, rather than a predator on, other commercially- or recreationally important, piscivorous species.

#### **8.1.5.2.6      Damage to ocean and coastal habitats**

Habitat damage by fishing activity is being evaluated by the Councils to meet the essential fish habitat requirements of the Sustainable Fisheries Act. Once these and other anthropomorphic impacts have been identified and prioritized, the Council will be amending this plan to identify essential fish habitat and possibly define activities within them that would have deleterious effects and should be prohibited or curtailed. A generalized description of the effects of monkfish fishing is given below, but these descriptions will be updated by a future amendment for essential fish habitat.

##### **8.1.5.2.6.1      Physical**

Habitat damage caused by fishing for monkfish is similar to the physical effects of trawling for multispecies and dredging for sea scallops. Studies of changes in micro-habitat and reductions in biodiversity as a result of fishing activity are numerous (Jones 1992, Messeieh et al. 1991, Hutchings 1990, Sainsbury 1987). Due to the complexity of ecological interactions, however, it is more difficult to show negative consequences on a given species from fishing on another. Negative consequences have been shown by Wenner (1983) and Sainsbury (1987) in areas having a very fragile structure. In other areas, the consequences have been inconclusive or positive (ICES 1988, Arntz and Weber 1970, Medcof and Caddy 1971, Caddy 1973). Even though productivity for a species of interest may increase, however, biodiversity almost always declines in the face of fishing activity that alters the seabed. A broader discussion of the effects of trawling in the northeast multispecies fishery is given in Section 6.4.4.1 of the SEIS for Amendment 5 to the Multispecies FMP. Russell (1997) gives an overview of the damage often caused by trawling and the possible consequences of this activity.

Dredging generally results in greater physical alteration of the seabed than does trawling, due to the increased weight of the gear and its action of 'cutting' into the seabed to lift scallops into the dredge. Micro-habitat is often buried in the path of the dredge and the activity causes suspension of sediments (Caddy 1968). Direct effects of fishing activity often depend, however, on the spatial and temporal overlap of a given species and the one being fished (Roddick and Miller 1992). A more in-depth discussion of the physical impacts caused by dredging is given in Section VI.E.1 of the SEIS for Amendment 4 to the Atlantic Sea Scallop FMP.

Physical damage from fishing for monkfish may be less than that using similar gears to target multispecies and sea scallops, however. Unlike the multispecies trawls, monkfish gear does not have large rollers that might allow benthic-dwelling monkfish to evade capture. "Cookies" (rubber donuts made from disposed tires) are attached by fishermen on the footrope, but the gear is lighter and sweeps closer to the bottom. The wings, however, are typically wider than the standard groundfish trawl. No studies of damage caused by roller gear in the northeast are available, but they have been shown to cause considerable damage in more fragile habitats (Wenner 1983).

Due to this change and the reduced sedimentation (partly caused by a chain bag), the effects of monkfish beam trawls should be less than it is for a typical scallop dredge. Since the Regional Administrator and the Council classified scallop dredges as small mesh, scallopers began using beam trawls (i.e. modified scallop dredges with mesh, rather than chain, bags) to target monkfish. Use of this gear would not be prohibited by the proposed action, providing that fishermen use legal mesh. When targeting monkfish, fishermen often re-configure the cutting bar and lengthen the shoes so the dredge digs into the bottom less than it does when fishing for scallops.

Gillnets, because they are anchored, probably do less physical damage to the seabed and micro-habitats. Anchored monkfish gillnets lie along, but do not dig into, the seabed. Anchors help hold the gear to the bottom but the physical disturbance is minimal.

#### *8.1.5.2.6.2 Ecological*

The potential ecological damage caused by the proposed action would be caused by damage to habitat, changes in predation by monkfish and the spawning productivity of monkfish (as a food source for other species), and the direct bycatch of other species in the directed monkfish fishery. The degree of significant effects from these mechanisms is not estimable because of complex interactions and/or lacking data.

The future bycatch of other species in the monkfish fishery is uncertain. Changes in the number and type of vessels that target monkfish will occur, due to the proposed qualification criteria. How much and what species the activity encounters will depend on unpredictable changes in fishing behavior, the areas for monkfish effort that would be exempt from the multispecies days-at-sea regulations, and the number of days-at-sea available to target monkfish. The total number of days-at-sea used to target monkfish will depend on the status of groundfish rebuilding and on the economic viability (Section 8.3.5) of fishing for monkfish.

The percent species composition in the landings (Table 89) appears in the weightout data for trips where monkfish account for 50 percent or more of total revenue. On similar trips, the following species listed in Table 120 were observed in the catch by sea samplers during 1993.

**Table 119.** Percent of total landings for bycatch on trips when monkfish accounted for more than 50 percent of total revenue, 1991-1994. Source: NMFS weighout data.

<i>Species</i>	<i>Otter trawl</i>		<i>Sink gillnet</i>		<i>Sea scallop dredge</i>	
	Northern	Southern	Northern	Southern	Northern	Southern
<b>Number of trips</b>	1727	1088	2133	881	213	204
<b>Monkfish</b>	76.8	83.2	76.4	71.8	80.4	72.5
<b>Butterfish</b>	0.1	0.1	<0.1	<0.1	0.0	0.0
<b>Cod</b>	2.0	0.3	2.6	1.1	<0.1	0.1
<b>Cusk</b>	0.1	<0.1	0.3	0.0	<0.1	<0.1
<b>Winter flounder</b>	2.0	0.6	0.8	0.3	0.8	0.3
<b>Summer flounder</b>	0.1	1.6	0.1	0.1	0.3	1.4
<b>Witch flounder</b>	2.5	3.4	1.0	<0.1	0.7	0.1
<b>Yellowtail flounder</b>	1.6	0.6	0.3	0.1	0.6	0.8
<b>American Plaice</b>	6.8	0.2	0.7	0.0	0.7	0.3
<b>Windowpane flounder</b>	0.3	0.1	<0.1	0.0	0.1	0.1
<b>Other flounders</b>	4.7	0.4	0.8	<0.1	0.4	0.1
<b>Haddock</b>	0.1	<0.1	<0.1	<0.1	<0.1	0.0
<b>Red hake</b>	0.2	0.3	<0.1	<0.1	0.0	0.0
<b>White hake</b>	1.2	1.4	0.2	<0.1	<0.1	<0.1
<b>Herring</b>	<0.1	0.0	<0.1	<0.1	0.0	0.0
<b>Mackerel</b>	<0.1	0.1	0.1	0.4	0.0	0.0
<b>Menhaden</b>	0.0	0.0	0.0	0.1	0.0	0.0
<b>Ocean Pout</b>	0.1	<0.1	0.0	0.0	0.0	0.0
<b>Pollock</b>	0.3	<0.1	0.6	<0.1	<0.1	<0.1
<b>Redfish</b>	0.1	0.1	<0.1	0.0	0.0	0.0
<b>Scup</b>	<0.1	0.3	<0.1	<0.1	0.0	<0.1
<b>Black sea bass</b>	<0.1	0.1	0.0	<0.1	0.0	<0.1
<b>Dogfish</b>	0.5	0.2	7.0	3.1	0.0	0.0
<b>Skates</b>	4.1	1.2	2.3	11.4	0.0	0.5
<b>Tautog</b>	<0.1	<0.1	0.0	0.5	0.0	0.0
<b>Silver hake</b>	0.8	2.6	0.1	<0.1	<0.1	<0.1
<b>Wolfish</b>	0.3	0.1	0.6	0.0	0.4	<0.1
<b>Tilefish</b>	<0.1	0.2	0.0	<0.1	0.0	0.0
<b>Other finfish</b>	2.9	0.6	14.0	11.5	0.4	0.1
<b>Crabs</b>	<0.1	0.1	0.0	<0.1	0.0	<0.1
<b>Lobster</b>	0.2	0.6	<0.1	<0.1	<0.1	<0.1
<b>Shrimp</b>	<0.1	0.0	0.0	0.0	<0.1	0.0
<b>Sea scallop</b>	<0.1	<0.1	0.0	0.0	2.0	2.7
<b>Long-finned squid</b>	0.4	0.7	0.0	<0.1	0.0	0.1
<b>Short-finned squid</b>	<0.1	<0.1	0.0	0.0	0.0	0.0
<b>Other shellfish</b>	<0.1	<0.1	0.1	0.5	0.0	0.0

**Table 120.** Occurrence of species observed on sea sampled trips when monkfish accounted for more than 50 percent of total revenue, 1993. K = Kept, D = Discarded. Source: 1993 Sea Sampling Observer Program data.

Species	Otter trawl		Sink gillnet		Sea scallop dredge	
	Northern	Southern	Northern	Southern	Northern	Southern
<b>Number of trips</b>	1727	1088	2133	881	213	204
<b>Monkfish</b>	76.8	83.2	76.4	71.8	80.4	72.5
<b>Butterfish</b>	0.1	0.1	<0.1	<0.1	0.0	0.0
<b>Cod</b>	2.0	0.3	2.6	1.1	<0.1	0.1
<b>Cusk</b>	0.1	<0.1	0.3	0.0	<0.1	<0.1
<b>Winter flounder</b>	2.0	0.6	0.8	0.3	0.8	0.3
<b>Summer flounder</b>	0.1	1.6	0.1	0.1	0.3	1.4
<b>Witch flounder</b>	2.5	3.4	1.0	<0.1	0.7	0.1
<b>Yellowtail flounder</b>	1.6	0.6	0.3	0.1	0.6	0.8
<b>American Plaice</b>	6.8	0.2	0.7	0.0	0.7	0.3
<b>Windowpane flounder</b>	0.3	0.1	<0.1	0.0	0.1	0.1
<b>Other flounders</b>	4.7	0.4	0.8	<0.1	0.4	0.1
<b>Haddock</b>	0.1	<0.1	<0.1	<0.1	<0.1	0.0
<b>Red hake</b>	0.2	0.3	<0.1	<0.1	0.0	0.0
<b>White hake</b>	1.2	1.4	0.2	<0.1	<0.1	<0.1
<b>Herring</b>	<0.1	0.0	<0.1	<0.1	0.0	0.0
<b>Mackerel</b>	<0.1	0.1	0.1	0.4	0.0	0.0
<b>Menhaden</b>	0.0	0.0	0.0	0.1	0.0	0.0
<b>Ocean Pout</b>	0.1	<0.1	0.0	0.0	0.0	0.0
<b>Pollock</b>	0.3	<0.1	0.6	<0.1	<0.1	<0.1
<b>Redfish</b>	0.1	0.1	<0.1	0.0	0.0	0.0
<b>Scup</b>	<0.1	0.3	<0.1	<0.1	0.0	<0.1
<b>Black sea bass</b>	<0.1	0.1	0.0	<0.1	0.0	<0.1
<b>Dogfish</b>	0.5	0.2	7.0	3.1	0.0	0.0
<b>Skates</b>	4.1	1.2	2.3	11.4	0.0	0.5
<b>Tautog</b>	<0.1	<0.1	0.0	0.5	0.0	0.0
<b>Silver hake</b>	0.8	2.6	0.1	<0.1	<0.1	<0.1
<b>Wolfish</b>	0.3	0.1	0.6	0.0	0.4	<0.1
<b>Tilefish</b>	<0.1	0.2	0.0	<0.1	0.0	0.0
<b>Other finfish</b>	2.9	0.6	14.0	11.5	0.4	0.1
<b>Crabs</b>	<0.1	0.1	0.0	<0.1	0.0	<0.1
<b>Lobster</b>	0.2	0.6	<0.1	<0.1	<0.1	<0.1
<b>Shrimp</b>	<0.1	0.0	0.0	0.0	<0.1	0.0
<b>Sea scallop</b>	<0.1	<0.1	0.0	0.0	2.0	2.7
<b>Long-finned squid</b>	0.4	0.7	0.0	<0.1	0.0	0.1
<b>Short-finned squid</b>	<0.1	<0.1	0.0	0.0	0.0	0.0
<b>Other shellfish</b>	<0.1	<0.1	0.1	0.5	0.0	0.0

## **8.1.6 Economic Impact Analysis**

Economic assessment requires consideration of the benefits and costs of the proposed action. In the discussion that follows a quantitative assessment of gross benefits is presented. Due to the absence of an analytical assessment model for monkfish, no clear link between fishing effort, expected landings and fishing costs was possible. For this reason a quantitative assessment of expected costs could not be developed. A qualitative assessment of expected costs is, however, provided.

Although there is considerable uncertainty in the results, the preferred alternative appears to increase net benefits by \$20 million over 20 years, compared to the No Action alternative. There is a 52 percent chance that the gross revenues from the preferred alternative will exceed those from taking No Action. The gains in gross revenue are however underestimated for the preferred alternative, because the effect of the size limit and the rebuilt age structure will increase the proportion of larger, more valuable monkfish. The preferred alternative does not account for the gains in yield-per-recruit that are expected. In addition to the gains in gross revenue, there will create cost-savings of at least \$18 million compared to the No Action alternative. Higher cost-savings are possible, depending on the allocations of days-at-sea in years four through ten. The net changes in gross revenues and costs exceed the expected administrative costs by a wide margin.

Longer mortality reduction schedules were rejected by the Councils because of the higher uncertainty in achieving OY in year 10. Although there appears to be a considerable gain that could be realized (provided that the population biomass rebuilds according to the assumptions made here), the Councils rejected a quicker schedule due to the impacts on the fishery, the higher transitional costs, and the uncertainty in the targets that could require the elimination of the directed fishery. The three-year period until overfishing is stopped is necessary to collect better data and more accurately estimate the biological targets.

### **8.1.6.1.1 Limited entry qualification criteria**

Vessels that will qualify for monkfish limited access tend to rely more heavily on the landings of monkfish for their annual revenue during the four-year qualification period (Table 121). Monkfish revenue contributes 16-25 percent of the annual revenues for multispecies vessels that qualify for monkfish limited access vs. 7 percent for those that will not qualify. Similarly, scallop vessels that will qualify for monkfish limited access derive 9-15 percent of their annual revenue from monkfish landings, versus only 5 percent for non-qualifying scallop vessels. For vessels that do not have a multispecies day-at-sea permit, a scallop day-at-sea permit, or a summer flounder permit, the vessel that qualify for monkfish limited access derive 37-68 percent of their annual income from monkfish landings. Non-qualifying vessels derive only 22 percent of their annual income from monkfish landings. Vessels that do not have a Northeast Regional Office permit are likely to have underreported their monkfish landings in the voluntary weightout system. Revenue figures for these vessels are probably biased low.

**Table 121. Preferred alternative qualification criteria.** Percent of revenue derived from monkfish landings during the four-year qualification period. Data are from 1,815 vessels that landed at least one pound of monkfish during the qualification period and have not been removed from the fleet by the multispecies buyout program.

Permits currently held by vessel	Will not automatically qualify	Qualifies for low trip limit	Qualifies for high trip limit	Total vessels permitted in 1997
Multispecies DAS	7%	16%	25%	12%
Scallop DAS	5%	15%	9%	7%
Combination	4%	10%	13%	10%
Summer Flounder	8%	31%	16%	9%
Other	22%	37%	68%	24%
No NERO permit	10%	27%	18%	11%
All vessels	10%	17%	18%	12%

#### 8.1.6.1.2 Gross Benefits

Gross benefits consist of the sum of gross revenues from the sale of monkfish products and consumer surplus. For some of the reasons described below, no reliable relationship between domestic supplies and ex-vessel prices could be established and consequently consumer benefits could not be estimated. However, given the fact that most monkfish are not consumed in the U.S., gross revenues alone would comprise the majority of National benefits from the monkfish resource.

Estimates of monkfish revenues were obtained within the same stochastic simulation framework described in Section 8.1.5.2.5.1. This procedure reflects uncertainty in both the biological response to management and the economic conditions that might prevail. Given these uncertainties the economic results will be reported primarily in probabilistic terms. The following sections describe the procedures used to estimate gross revenues under the status quo and the preferred alternative.

#### Expected Prices

It is desirable to develop a statistical model of ex-vessel prices to forecast changes in price as anticipated landings change. Such models are only possible, however, where consistent relationships between quantities supplied and prices received can be estimated. Previous analysis of monkfish prices found no such consistent relationship between dockside prices and quantities supplied (Section 6.4.5.2.2). Correlations between prices and supplies were either statistically insignificant or the relationship was counter-intuitive. Consistent with economic theory, some correlation coefficients were negative, implying prices go down as quantities increase. In other cases, the relationships were positive implying that prices increase with increased supplies, disagreeing with standard economic theory.

The inability to estimate a reliable model of price behavior is probably due to the fact that international markets determine US domestic monkfish prices. Dominant factors such as economic conditions in exporting countries and global supplies of monkfish cause domestic prices to be insensitive to local supply.

In lieu of a predictive relationship between domestic supplies and domestic prices, monkfish prices were assumed to vary about a constant mean that was independent of domestic supply. Future prices were determined to be stochastic with a normal distribution having a mean and standard deviation equal to that from 1995-97 monthly price data by market category. This distribution of expected prices

was truncated at the minimum and maximum observed values. Prices used to forecast future benefits were restricted so that they would not occur outside the range observed data. These parameters that were used to predict price are given in Table 122.

**Table 122.** Monthly weighted average prices by market category (\$/pound 1995-1997).

<b>Mean</b>	Tails					Other product forms			
	Uncl.	Large	Small	Peewee	Livers	Round	Cheeks	Bellys	Whole
January	1.33	1.73	1.05	0.44	4.45	1.11	0.80		1.05
February	1.27	1.72	1.05	0.57	2.58	0.87	1.51	1.10	0.88
March	1.30	1.76	1.09	0.61	1.64	0.90	0.76		0.95
April	1.32	1.76	1.10	0.66	0.96	0.89	1.05	2.00	0.88
May	1.27	1.72	1.08	0.65	0.84	0.76	1.10		0.73
June	1.25	1.65	1.06	0.59	0.87	0.71	0.75	1.30	0.75
July	1.25	1.66	1.03	0.50	0.87	0.87	1.05		0.99
August	1.29	1.72	1.08	0.59	1.31	1.02	0.37		1.13
September	1.25	1.78	1.11	0.80	3.16	0.98	0.95		1.06
October	1.26	1.76	1.16	0.71	4.93	0.86	1.02		0.91
November	1.35	1.79	1.16	0.66	5.83	0.83			0.86
December	1.43	1.77	1.11	0.63	6.55	0.86	0.78		0.82
<b>Standard deviation</b>									
January	0.38	0.32	0.28	0.24	2.12	0.42	0.61		0.34
February	0.36	0.32	0.25	0.30	1.11	0.23		0.25	0.38
March	0.37	0.31	0.25	0.28	1.02	0.18	0.19		0.2
April	0.39	0.33	0.27	0.31	0.58	0.21	0.33		0.16
May	0.40	0.29	0.25	0.26	0.46	0.24	0.70		0.18
June	0.36	0.27	0.23	0.22	0.51	0.19	0.57	0.99	0.21
July	0.35	0.25	0.23	0.21	0.46	0.19	0.58		0.27
August	0.33	0.28	0.22	0.24	0.71	0.25	0.16		0.28
September	0.36	0.29	0.24	0.30	1.13	0.20	0.09		0.28
October	0.39	0.24	0.26	0.23	1.11	0.14	0.26		0.16
November	0.46	0.26	0.25	0.27	1.75	0.16			0.19
December	0.42	0.26	0.23	0.29	2.31	0.31	0.14		0.19
<b>Minimum</b>									
January	0.10	0.25	0.09	0.07	0.33	0.09	0.60		0.20
February	0.24	0.16	0.20	0.09	0.25	0.18		0.75	0.25
March	0.25	0.25	0.25	0.14	0.05	0.03	0.63		0.20
April	0.20	0.40	0.20	0.13	0.10	0.05	0.75		0.47
May	0.10	0.24	0.16	0.11	0.04	0.14	0.60		0.21
June	0.10	0.20	0.13	0.10	0.10	0.06	0.42	0.60	0.20
July	0.02	0.30	0.17	0.07	0.07	0.10	0.41		0.12
August	0.24	0.09	0.20	0.08	0.20	0.33	0.25		0.23
September	0.25	0.20	0.18	0.09	0.08	0.44	0.89		0.29
October	0.05	0.16	0.10	0.10	0.29	0.40	0.83		0.27
November	0.02	0.07	0.05	0.15	0.25	0.03			0.30
December	0.01	0.23	0.03	0.09	0.03	0.20	0.62		0.20
<b>Maximum</b>									
January	3.00	3.00	7.76	1.63	11.00	2.70	1.00		3.00

February	3.25	4.20	2.35	1.75	7.95	2.00		1.51	9.19
March	3.00	3.92	3.25	1.40	7.00	2.00	0.90		2.27
April	3.33	3.60	2.30	1.50	4.50	2.00	1.40		1.81
May	2.53	3.50	3.02	2.00	4.50	3.00	1.60		2.00
June	2.50	3.00	3.00	1.50	1.40	1.80	1.76	2.00	2.03
July	2.67	4.35	9.00	1.21	6.51	1.79	1.50		6.25
August	3.00	4.00	2.59	1.96	13.50	2.00	0.48		9.22
September	3.00	4.67	2.00	3.74	7.12	1.79	1.02		2.07
October	5.50	3.09	10.00	1.40	10.29	1.80	1.20		2.10
November	7.24	4.00	7.53	1.45	16.35	1.76			2.59
December	2.51	4.11	8.00	1.75	14.00	2.60	0.90		2.10

### Expected Landings

The procedures used to estimate future yield are described in Section 8.1.5.2.5.1. The median estimated yield values for the preferred and No Action alternatives are given in Table 117. The inability to predict future landings at age or size prevented estimation of improved economic benefits due to growth and delayed harvesting. Instead, the monthly average proportion of landings by market category were assumed to be unaffected by the management measures. Although the management measures would prohibit possession of monkfish in the pewee tail market category, it was not possible to project the improved yield that would result from harvesting these fish at a larger, more valuable size. It was also not possible to predict the future changes in market composition from an expanded age-structure that would result from reduced fishing mortality. Seasonality also affects the landings of monkfish by market category and it could not be assumed that an expanded age-structure would be applicable to all months or areas fished. As a substitute for a model that would predict future landings by size, the Councils assumed that landings by market category would occur in the same proportions as were observed during 1995-1997 (Table 123). The results given below, therefore underestimate the potential value of the preferred alternative relative to No Action.

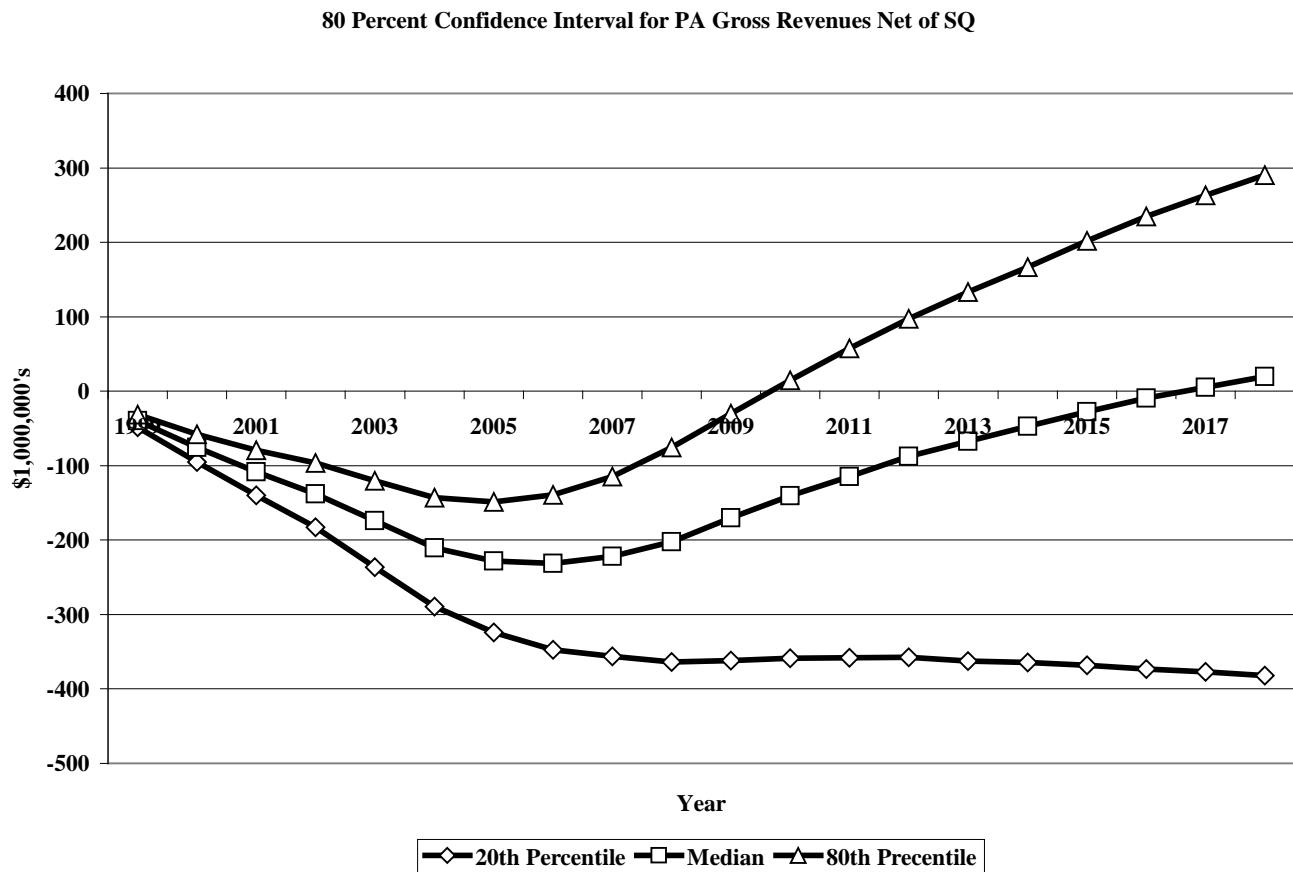
**Table 123.** Weighted Average Monthly Proportion of Monk Landings by Market Category (1995-1997).

	Tails				Other product forms				
	Tail Only	Large	Small	Peewee	Livers	Round	Cheeks	Bellys	Whole
January	0.7512%	1.4041%	1.5585%	0.2106%	0.5707%	0.8914%	0.0001%		2.3415%
February	0.5433%	1.5040%	1.7229%	0.1507%	0.5785%	0.9133%	0.0001%	0.0067%	1.8171%
March	0.5404%	1.5938%	1.6247%	0.2083%	0.3514%	1.5021%	0.0001%		1.5194%
April	0.4432%	1.4712%	1.4344%	0.1822%	0.1876%	1.2534%	0.0005%	0.0000%	1.4197%
May	0.9076%	2.1617%	1.9718%	0.2295%	0.2078%	2.3987%	0.0006%		4.2342%
June	0.8791%	2.5610%	2.4235%	0.2542%	0.0544%	1.2293%	0.0014%	0.0010%	3.2492%
July	0.4429%	1.7595%	2.0144%	0.1860%	0.0342%	1.1707%	0.0006%		1.1669%
August	0.2843%	1.3564%	1.8643%	0.1414%	0.1107%	0.8312%	0.0002%		1.1210%
September	0.2836%	1.4131%	1.9435%	0.1549%	0.3520%	0.5411%	0.0001%		1.5974%
October	0.4196%	2.1339%	2.9661%	0.1698%	0.6950%	0.8285%	0.0001%		2.2303%
November	1.0731%	2.1064%	2.7057%	0.1730%	0.8512%	0.6619%			3.3193%
December	0.8268%	2.1543%	2.3707%	0.1440%	0.8070%	0.5017%	0.0009%		2.6282%

### Gross Revenues

Gross revenues were estimated for the preferred and No Action alternatives by applying the prices described above to the yield estimates in Section 8.1.5.2.5.1. These revenue streams were discounted at a 7.0% annual rate. Applying this discount rate to the difference between revenues for the No Action and preferred

alternatives estimates the net present value of gross benefits to be gained by the preferred alternative relative to No Action. Figure 46 shows the median and the 80 percent confidence interval for the net present value of the difference in gross revenues for each year of the 20-year projection period.

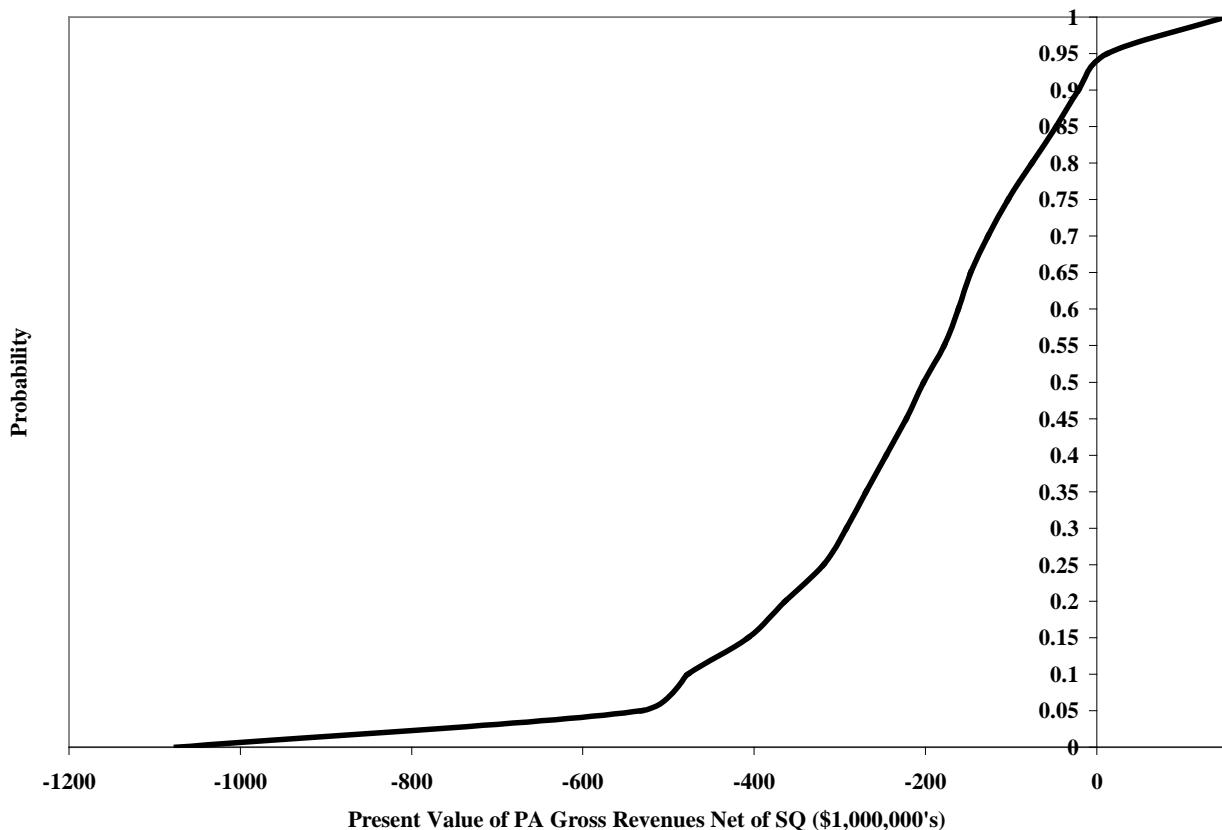


**Figure 46.** Cumulative change in net present value of gross revenues for the preferred alternative versus the No Action alternative.

The values reported in Figure 46 are therefore cumulative differences of the discounted stream of gross revenues, illustrating the present value of benefits from taking the preferred alternative for any given time horizon from 1 to 20 years. For example, the median net present value of the change in gross revenue is -\$174 million after year 5, -\$202 million after year 10, -\$68 million after year 15 and \$20 million after year 20. These results indicate that at median values, the present value of the preferred alternative does not exceed the No Action alternative until the year 2017. If these projections underestimate the future yield and pricing, the present value of the preferred alternative (at the 80<sup>th</sup> percentile) would exceed the No Action alternative by the year 2010 (two years after the projected 10 year rebuilding program). By contrast, if conditions turn out to be worse than anticipated, the present value of the preferred alternative (net of the No Action alternative) would be negative throughout the rebuilding period and beyond.

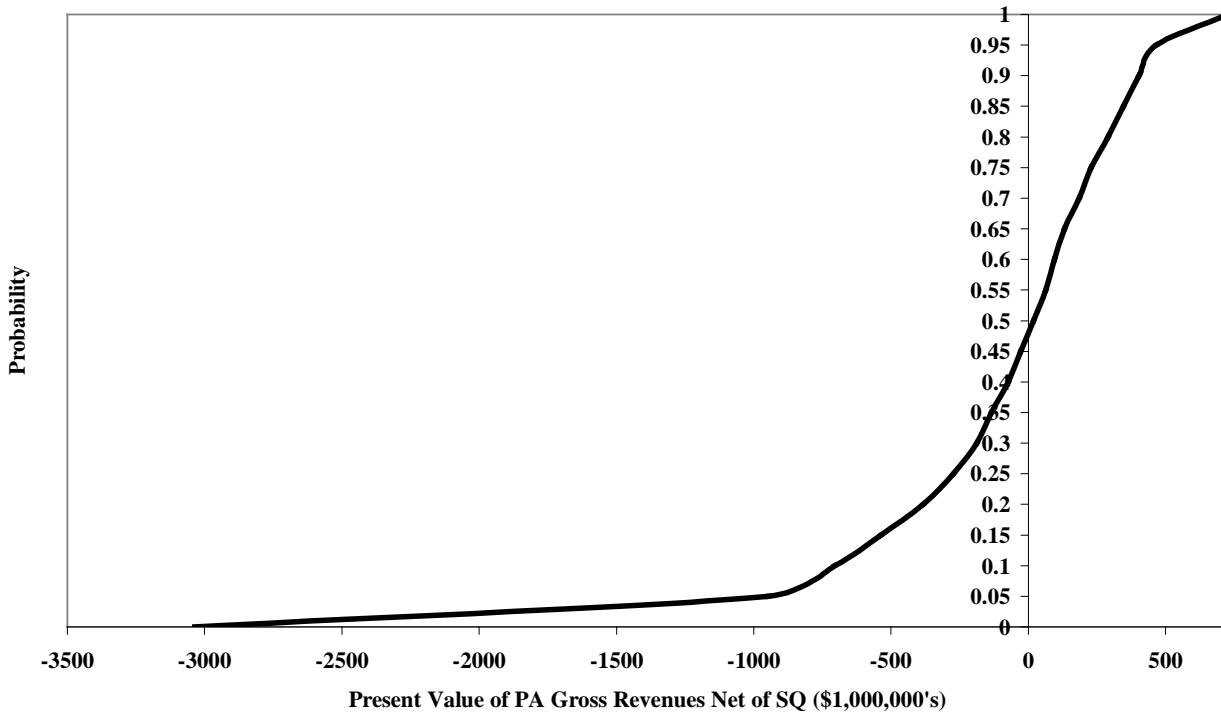
The probability that the present value of the preferred alternative gross revenues net of the No Action alternative would be positive after 10 and 20 years is illustrated in Figure 47 and Figure 48, respectively. In each case, the cumulative probability distribution of the net present value of the gain in gross revenues for the preferred alternative compared to the No Action alternative. For example, in year 10 there is a 50% chance that the present value of preferred alternative gross revenues net of the No Action alternative will be -\$200 million or less (Figure

47). Similarly, in year 10 there is a 94% chance that the present value of the preferred alternative gross revenues net of the No Action alternative will be less than or equal to zero. There is an 80 percent probability that the net benefits from gross revenues for the preferred alternative will be between \$80 and \$340 million less than the No Action alternative through year 10. The negative cumulative gross revenue results from the short run reductions in landings that would be required to rebuild the monkfish resource and that rebuilding does not result in increased yield compared to the No Action alternative until nine years into the rebuilding schedule.



**Figure 47.** Cumulative distribution of the difference between the preferred and No Action alternatives for net present value of gross revenues through ten years (2009). The distribution implies that there is a 94% probability that the net present value of gross revenues for the preferred alternative will be negative, compared to the No Action alternative.

Over a longer time period, however, the probability that the present value of preferred alternative gross revenues net of the No Action alternative will be positive increases to 55% (Figure 48) for the realizations of the present value of preferred alternative gross revenues net of the status quo in twenty years. There is an 80 percent probability that the net benefits from gross revenues for the preferred alternative will be between a net loss of \$380 million and a net gain of \$290 million less compared to the No Action alternative through year twenty. This increased likelihood of the benefits of the preferred alternative exceeding the No Action alternative is due to the large differences between the potential yield under rebuilt resource conditions as compared to allowing current exploitation rates to continue. The optimum yield, predicted to result beyond year 10 for the two management areas, is highly uncertain, reflected in the wide differences between the upper and lower 80th percent confidence intervals.



**Figure 48.** Cumulative distribution of the difference between the preferred and No Action alternatives for net present value of gross revenues through twenty years (2018). The distribution implies that there is a 47% probability that the net present value of gross revenues for the preferred alternative will be negative, compared to the No Action alternative.

#### 8.1.6.1.3 Fishing Costs

If implemented, the default measures for the preferred alternative would prohibit directed fishing for monkfish. The preferred alternative would allow the allocation of days-at-sea for limited access monkfish vessels only if there is sufficient TAC that exceeds the expected monkfish catch in other fisheries. The number of days-at-sea that would be allocated would depend on the harvesting capacity of the fleet and the target TAC net of the expected bycatch. It is not possible to predict the relative mix or timing of these measures at this time, however. In the short term, it is expected that the preferred alternative will require no allocation of days-at-sea until rebuilding occurs.

The economic analysis conducted for Amendment 7 to the Multispecies FMP used expected days-at-sea allocations to forecast fishing costs. In the present case the approach is not possible, because there is no way to predict whether the default measures will be required, how many years they may remain in place, and at what rate fishing effort will be permitted to increase. Given the current default measures there could be little expectation that the forecasted fishery yields could be produced without some allocation of days-at-sea to target monkfish. For these reasons no quantitative costs estimates could reasonably be predicted for any year after year 3 (calendar year 2001) and no net benefit (i.e. revenues net of fishing costs) estimates are provided.

In cases of mixed species fisheries, harvesting costs can be difficult to allocate to a specific species. For any given trip, a species may be the target, component catch, or simply an unexpected, yet marketable, bycatch. For purposes of analysis, fishing costs were assigned to monkfish if monkfish comprised 30% or more of total trip revenue. Since the preferred alternative will reduce the number of vessels as well as limit the number of days at sea for limited access vessels, the number of occasions where total monkfish revenues would exceed 30% of trip revenues is expected to decline. Some cost savings related to monkfish targeting would be expected to accrue for three or more years after plan implementation. While it is not possible to project management strategies and their attendant costs beyond year 3, the combination of limited access and days-at-sea limits will reduce costs beyond year 3 since qualified vessels will likely be more productive than if the current open access fishery were allowed to continue.

Fishing costs for the No Action alternative and years 1-3 for the preferred alternative were estimated in the following manner. A combination of vessel logbook and dealer data were used to estimate the total number of trips taken during calendar year 1997 where monkfish revenue comprised 30% or more of aggregate trip revenues. These data were then sorted by major gear categories (scallop dredge, bottom trawl, staked gillnet, and all other gears). The management measures including day-at-sea allocations and trip limits were applied as prescribed in the preferred alternative and the number of trips that exceeded monkfish revenues of 30% was recalculated. Average fishing costs for bottom trawl gear and scallop dredge were determined from Capital Construction Fund data. These average costs were \$1,082 and \$1,124 per day-absent for trawl and dredge vessels, respectively. An average cost per day absent for gillnet vessels (\$275) was based on the estimates for the multispecies fishery (see break-even analysis in the Amendment 7 FSEIS for the Multispecies FMP [Table E.7.2.8a]). A median value of \$500 per day absent was assigned to all other trips where gears other than trawl, dredge or gillnet were used. The resulting estimates of fishing costs are reported in Table 124. Note that there were only minor difference between year 1 and year 2 and 3 estimates of fishing costs (fishing costs in years 2 and 3 were slightly lower), so only year one fishing costs are reported.

**Table 124.** Estimated fishing costs.

	Status quo			Preferred alternative	
	Trips	Total Cost (\$)	Cost per Day (\$)	Trips	Total Cost (\$)
Other Gear	958	479,000	500	281	140,500
Trawl	6,990	7,563,180	1,082	3,452	3,735,064
Gillnet	5,329	1,465,475	275	1,339	368,225
Scallop	736	827,264	1,124	50	56,200
Totals	14,013	10,334,919		5,122	4,299,989

The total number of trips where monkfish revenues would exceed 30% of trip revenue was projected to decrease by nearly 66% and fishing costs were projected to be reduced from \$10.3 million to \$4.3 million; a savings of \$6.0 million. These savings would be expected to continue to accrue for three or more years for the preferred alternative, a savings of at least \$18.0 million.

#### 8.1.6.1.4 Other Costs

**Costs to processors, enforcement costs, and administrative costs are identified in the PRA analysis, Section Error! Reference source not found.. Other non-tangible costs to processors and enforcement costs are described below.**

##### Costs to Processors

There are few, if any, product substitutes for monkfish and there are no known alternative domestic sources for monkfish. For these reasons, processors whose business depends upon monkfish supplies will be forced to substantially reduce their business activity or will be forced to diversify into other product lines. Public hearing testimony offered by Dr. Dan Georgianna on behalf of the port of New Bedford, indicate that the processor value of monkfish products could exceed \$14.5 million in that port (Appendix . At median values, year 1 landings are projected to decrease by 62% relative to the No Action alternative. This would represent a proportional reduction in revenues to all processors. The impacts on New Bedford processors could be proportional to the total or could be proportionally greater or less than the total depending upon the relative share New Bedford processors have of the total monkfish processing market. In the longer run, processor revenues would be expected to increase substantially under the preferred alternative as compared to the No Action alternative.

##### Enforcement Costs

The additional measures for monkfish including different size restrictions by area and adding new vessels to the day-at-sea program will impose an added enforcement burden. The economic costs of these new enforcement requirements depend upon whether or not new revenues must be raised from taxpayers to pay for the added enforcement burden and/or the opportunity cost of the value of enforcement services that must be diverted from other activities to enforce the monkfish regulations.

In the event that no new revenues are raised from the public to pay for monkfish enforcement then, from a budgetary perspective, monkfish enforcement costs are merely a transfer payment from one enforcement activity to another. However, enforcement services have value and adding new enforcement responsibilities necessarily takes away from enforcement services that are devoted to other fisheries. Thus, the cost of adding monkfish is measured by the opportunity cost (i.e. forgone benefits) of reducing the enforcement services devoted to other activities to monkfish. Unfortunately, no empirical studies have been conducted to measure the value of enforcement services provided in Northeast region fisheries, making estimation of enforcement costs impossible.

### 8.1.6.1.5 Economic Impacts of Non-Selected Alternatives

The Councils rejected rebuilding periods longer than the preferred alternative, because they would not have met the Magnuson-Stevens Act stock rebuilding requirements. A four-year phase-in for mortality reduction was selected to minimize the transitional costs associated with a large mortality reduction and to gather better information before imposing management restrictions that would eliminate the directed fishery. This phase-in would reduce the economic dislocations that might be expected under a more rigorous effort reduction schedule.

Estimates of gross revenues for quicker effort reductions indicate that a shorter period could produce considerable economic gains. To provide some indication of the potential economic value of a quicker mortality reduction schedule, it was assumed that the targets would be met one year sooner as compared than the preferred alternative (i.e. mortality would decline below the overfishing thresholds in three years rather than four). Gross revenues for this non-preferred alternative in Section 8.1.6.1.2 were estimated using the same stochastic framework and assumptions described above.

**Table 125.** Comparison of the net present value of gross revenues (million dollars) for a four year mortality reduction schedule (preferred alternative) versus a three years (non-preferred alternative).

Percentile	10 Years			20 Years		
	Preferred alternative	Non-preferred alternative	Difference	Preferred alternative	Non-preferred alternative	Difference
<b>20th</b>	-364	-297	67	-382	-301	81
<b>50th</b>	-202	-146	56	19.6	77.9	58
<b>80th</b>	-75.7	-20.9	55	290	346	56

The median value of net present value of gross revenue for non-preferred alternative versus the No Action alternative is estimated to be -\$146 million after 10 years and \$77.9 million after 20 years. These values exceed that of the preferred alternative by \$56 and \$58 million, respectively. The minor difference between the year 10 and year 20 present values is due to the fact that the preferred alternative and non-preferred alternative expected landings are identical in years 11 through 20. Thus, nearly all of the improved economic benefits of achieving the biological targets one year sooner accrue during the first 10 years of the management program. About 1/3<sup>rd</sup> of that increase occurs in year 10 of the comparison due to the harvest of OY in year 10 for the non-preferred alternative. Specifically, the discounted expected value of gross revenues net of the No Action alternative was projected less for the non-preferred alternative compared to the preferred alternative, because mortality reduction and lower landings would be advanced by one year. During year 3 the discounted expected value of non-preferred alternative revenues was estimated to be lower than the preferred alternative by approximately \$10 million and was projected to be lower by \$2 million in year 5. For the next five years, however, the discounted expected value of non-preferred alternative revenues exceeded that of the preferred alternative by an annual average of \$13 million, due to the assumed rebuilding that would occur in nine years, rather than ten.

Compared to the median, the results indicate that the difference between the preferred alternative and the non-preferred alternative is approximately the same at the 80<sup>th</sup> percentile of the gross revenue realizations. By contrast, the results at the 20<sup>th</sup> percentile indicate that reaching the rebuilding targets earlier reduces the magnitude of the lower values of the gross revenue distribution proportionally more than at the median and 80<sup>th</sup> percentiles. Thus, there is a higher probability that the economic value of the non-preferred alternative would exceed the No Action alternative after 10 years (10%) and after 20 years (65%), compared to the preferred alternative (5% and 55% respectively).

## **8.1.7 Social Impact Assessment**

This section examines the social impacts of the proposed regulations, both in terms of the distribution of the economic impacts and in terms of likely resultant social and cultural impacts

### **8.1.7.1 Introduction**

Dyer and Griffith (1996, Chapter 2) note in their study of groundfish fishing communities that fishers tend to agree that the government is overregulating some species (e.g., haddock) while underregulating others (e.g., monkfish and dogfish). This is supported by numerous public comments received during public hearings for this Amendment. Thus there is a consensus that monkfish management is needed. However, monkfish has also become an important target and by catch fishery for some of the Region's fishermen, partly in response to increased prices but also as an alternative to increasingly restrictive regulations in traditional groundfish and scallops in recent years.

Dyer and Griffith further note, for example (ibid., chapter 3, part B), that attempts have been made in Gloucester to innovate and change in response to Amendment # 7 by shifting effort away from groundfish towards other underutilized midwater and bottom species including monkfish with their high value livers. Georgianna and Cass (1997, p.2) describe the same process in New Bedford, indicating that the bycatch fishery for scallopers has been a longstanding component of that fishery, but increased targeting by scallopers and others has resulted from Amendments 5 and 7 of the Northeast Multispecies FMP implemented in 1994 and 1996, respectively. McCay et al. (1993) described similar findings. Dyer and Griffith (Chapter 3) also comment on monkfishing in Chatham, describing the relatively harmonious relationship in Chatham between monkfisher gillnetters and lobstermen. Thus monkfishing is increasing common throughout New England.

Turning to the southern range -- Hampton Roads/Newport News, VA, and Wanchese, NC, Dyer and Griffith state (Chapter 4): At this, the southern range of the ground fishing fleet, fishers who are native to the area have developed a multi-species, multi-gear, highly flexible fishing strategy that relies on state and federal waters and includes the commercial exploitation of several species. Unlike the fleet based in the Gulf of Maine, the winter season along North Carolina's Outer Banks and the mouth of the Chesapeake is a heavy sink net fishing season, when commercial fishers target weakfish, various basses, flounder, monkfish bycatch, and dogfish. During this season, as well, fishers from several ports in the northeast also land fish at the fish houses of Wanchese, North Carolina and the two Virginia ports of Hampton Roads and Newport News. During a visit in March 1996, we encountered three New Bedford-based fishers off-loading monkfish and monkfish livers from a 40' craft at one of the principal seafood dealers in Wanchese, and in Portland we listened while fishers related stories of wintering off North Carolina's coast, as much to escape the chilling Gulf of Maine winter as to catch and land fish. In addition: Based on visits to the area and interviews primarily with seafood dealers, there are around 80 to 100 trawlers in the 60' to 100' range that land fish in the Hampton/Newport News area, although not all of these are local vessels. These fish for flounder--known throughout the Northeast as "fluke"--in the winter time and scallop in the summer. An important bycatch of the scallop fishery in this region are monkfish.

Although this impact assessment can only address impacts of this FMP, social impacts will continue to affect ports due to cutbacks days-at-sea allocations in the groundfish and scallop fisheries, and the cumulative impact of these combined regulations.

### **8.1.7.2 Overarching Issues**

There are several broad features of the proposed management measures which will affect all vessels limited entry and the use of days-at-sea for effort control. They will be discussed first. Then more specific measures affecting subsets of the monkfish fishery will be reviewed. Both limited entry and days-at-sea are already features of both the Multispecies and the Scallop FMP.

Given that a large number of the vessels in the monkfish fishery are involved in these two fisheries, using these features minimizes the complexity of the regulations for many fishermen. However, there are negative impacts for some vessels associated with each of these measures. Finally, the combination of measures will also have an effect. However, the exact nature of the combined effect cannot be predicted with any precision.

The subsections below describe: 1) those who began monkfishing after the control date, 2) those who fished within the qualifying period but had insufficient landings to qualify, and finally 3) the 1401 vessels identified in the RFA as economically impacted.

#### 8.1.7.2.1 Limited Entry

While there has been some concern among Northeast fishermen about the impacts of limited entry (see discussions in the Multispecies Amendment 5 and 7 EISs and Scallop Amendment 4 EIS), it is now an established tool in the repertoire of Northeast fishery management. To the extent concerns remain they are centered on issues of generational access (assuring children an opportunity to fish) and the potential for limited access being a first step toward property rights.

Vessels that will be adversely affected by monkfish limited entry fall into two categories: 1) those who began targeting monkfish after February 27, 1995 (308 vessels) and 2) those who fished within the qualifying period, but did not land sufficient levels of monkfish to meet the qualifying criteria (1,216 vessels). Within this second category, the impacts will be greatest on the vessels that targeted monkfish on at least one trip. For the purposes of the Regulatory Flexibility Analysis, a trip targeting monkfish is defined as one where 30% or more of total revenue is from monkfish landings. Even for these vessels, however, their annual monkfish revenue may not constitute >30% of their total revenue for all species landed throughout the year. This latter definition of targeting is used here in this section.

##### 8.1.7.2.1.1 *Vessels that began targeting monkfish after the control date*

The majority of these 308 vessels are under 45 ft and 50 GRT (Table 126 and Table 127). This is the size category that comprises the largest proportion of the overall Northeast fleet. Thus although small to mid-sized vessels will be most impacted among those who began targeting monkfish after the end of the qualifying period, this reflects the preponderance of that size category in the fleet rather than a disproportionate impact on one size category versus another.

**Table 126.** Vessels that targeted monkfish after the control date and do not qualify for monkfish limited access.  
Source: 1997 NER permit data.

Length category	Number of vessels	Percent
0-30 ft	45	14.6
31-45 ft	185	60.1
46-60 ft	31	10.1
61-100 ft	45	14.6
101+ ft	2	0.6
Total	308	100

**Table 127.** Vessels that targeted monkfish after the control date and do not qualify for monkfish limited access.  
Source: 1997 NER permit data.

Tonnage Category	Number of vessels	Percent
0-4 GRT	36	11.7
5-50 GRT	208	67.5
51-100 GRT	41	13.3
101-150 GRT	13	4.2
151+ GRT	10	3.2
Total	308	100

These vessels are concentrated in Massachusetts, followed by New York, Maine, New Jersey, Rhode Island, and New Hampshire (Table 128). The individual ports with the largest concentrations of these vessels (i.e., groups of 10 or more) are Boston, Gloucester, New York City and Montauk (Table 129). These are also ports with large numbers of permits overall, which can mitigate the impacts. The importance of groundfishing in Boston and Gloucester may make them more vulnerable to cumulative impacts of monkfish combined with groundfish restrictions.

**Table 128.** Distribution of vessels that targeted monkfish after the control date and do not qualify for monkfish limited access by state. Ports with less than three vessels are not shown. Source: 1997 NER permit data.

Home port state	Number of vessels	Primary port state	Number of vessels
MA	127	MA	118
ME	26	ME	34
NC	14	NC	20
NH	15	NH	20
NJ	21	NJ	32
NY	56	NY	50
PA	9	PA	
RI	16	RI	22
VA	7	VA	4
Other	17	Other	8

**Table 129.** Distribution of vessels that targeted monkfish after the control date and do not qualify for monkfish limited access by state. Ports with the majority of vessels are bold-faced and those with less than three vessels are not shown. Source: 1997 NER permit data.

State	Port	Number of vessels by home port	Number of vessels by primary port
MA	<b>Boston</b>	47	6
	<b>Chatham</b>	10	15
	<b>Gloucester</b>	20	25
	Green Harbor		4
	Harwich		3
	Harwichport		3
	Hingham		4
	Marblehead	6	5
	<b>New Bedford/Fairhaven</b>	5	10
	Rockport		4
	Scituate	6	6
ME	Kittery		4
NC	Beaufort-Morehead		4
	Vandemere	3	3
	Wanchese	4	6
NH	Hampton	3	3
	Portsmouth	4	7
	Rye		3
	Seabrook	3	4
NJ	Atlantic City		4
	Barneget Light	3	9
	Cape May	3	6
	Point Pleasant	5	5
	Sea Isle City	3	3
NY	Greenport		5
	Hampton Bays	3	3
	<b>Montauk</b>	11	16
	<b>New York</b>	31	4
	Shinnecock		8
PA	Philadelphia	9	
RI	Narragansett		3
	Newport		3
	Point Judith	5	9
VA	Norfolk	7	
WV	Falling Waters	3	

Of the 308 vessels, 49 hold no 1997 Federal permits at all (16%). One-hundred eighty-five vessels (60%) hold a multispecies permit (Table 130), with 133 of those being limited access day-at-sea permits. One-hundred forty-three vessels (46%) hold a scallop permit, but only 9 are limited access day-at-sea. All but seven of the summer flounder, one of the lobster, and twelve of the squid-mackerel-butterfish permits shown below are commercial category permits. The lobster commercial permits, furthermore, are limited access. The large number of limited access multispecies permits and small number of scallop limited access permits in this group make it more vulnerable to cumulative impacts from changes in the groundfish FMP than the scallop FMP. Relatively few of these vessels possess multiple permits. Thus the strongest candidates for alternative fisheries are squid-mackerel-

butterfish, tuna or species not yet under federal management. Longlines and □Other□ gear (Table 130) seem the most active in non-traditional species currently, followed by otter trawls and gillnets.

**Table 130.** Permits holding during 1997 by non-qualifying vessels that targeted monkfish during 1996-1997. Since some vessels hold more than one permit, total number of permits is higher than total number of vessels that are not expected to qualify for monkfish limited access.

Permit	Northeast Region Permit Status	Number of Vessels	Percentage of Vessels
By Individual FMP	Multispecies	185	60%
	Sea scallop	143	46%
	Summer flounder	59	19%
	Lobster	141	46%
	Squid/Mackerel/Butterfish	121	39%
	Scup	64	21%
	Black Sea Bass	54	18%
	Tuna	180	58%
	None	49	16%
By Common Combinations (10 vessels or more)	Tuna only	30	10%
	All 8 permits	12	4%
	Multispecies, Lobster, Scallop, Tuna	19	6%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Tuna	16	5%
	Multispecies , Lobster, Tuna	11	4%

Of the 308 vessels, 30 targeted monkfish by an annual measure in 1997; 27 in 1996; and 12 in 1995 (Table 131). That annual measure is that monkfish revenue constituted over 30% of that vessel□s annual revenue. The majority of the 308 vessels that are not expected to qualify are dependent on monkfish for 10% or less of their annual income. The anticipated marginal impacts on annual revenue are estimated and described in Section 8.3.6.

**Table 131.** Annual monkfish revenue compared to total revenue for vessels that targeted monkfish during 1995-1997<sup>38</sup>, but are not expected to qualify for monkfish limited access. Source: NMFS dealer data.

	Number of Vessels		
	1995	1996	1997
10%	100	117	134
20%	5	1	19
30%	0	6	8
40%	2	3	5
50%	0	4	4
60%	1	4	3
70%	3	4	3
80%	2	2	4
90%	1	3	5
100%	3	7	6
Total	117	151	191

Table 132 and Table 133 show that the gillnet and scallop dredge vessels have the largest per trip average revenues, and though scallop dredges take monkfish on many fewer trips per year than do gillnet vessels. Of the gillnetters, they are split between those with multispecies limited access permits and those without (Table 132). In all gears it is the 50-150 GRT fleet (the majority of Northeast vessels) that is hardest hit either because of a large number of trips or high average monkfish revenue per trip. The only exception to this size characterization is scallop dredge, where the highest revenues accrue to the largest vessels, those of 151 GRT or larger (Table 133).

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<sup>38</sup> In any one year, not all vessels were fishing  
Monkfish FEIS

**Table 132.** Annual monkfish revenue in 1997 by gear and limited access permit category for vessels that targeted monkfish, but are not expected to qualify for monkfish limited access.

Gear	Permit status	Monkfish revenue compared to total revenue	Average monkfish revenue per trip	Total DAS on monkfish trips
Fish Trawl	Multisp. DAS Only	8.77%	127	1581
	Scallop DAS Only	0.02%	35	14
	Multisp & Scallop DAS	0.00%	0	0
	Neither	0.95%	22	996
Gillnet	Multisp. DAS Only	33.49%	650	1178
	Scallop DAS Only	0.00%	0	0
	Multisp & Scallop DAS	0.00%	0	0
	Neither	26.00%	530	1121
Scallop Dredge	Multisp. DAS Only	0.12%	887	3
	Scallop DAS Only	2.36%	1319	41
	Multisp & Scallop DAS	0.00%	0	0
	Neither	2.68%	1912	32
Scallop Trawl	Multisp. DAS Only	0.00%	0	0
	Scallop DAS Only	0.01%	207	1
	Multisp & Scallop DAS	0.00%	0	0
	Neither	0.00%	0	0
Longline	Multisp. DAS Only	0.03%	<1	736
	Scallop DAS Only	0.00%	3	22
	Multisp & Scallop DAS	0.00%	0	0
	Neither	0.01%	<1	330
Other	Multisp. DAS Only	6.34%	93	1566
	Scallop DAS Only	0.01%	17	16
	Multisp & Scallop DAS	0.00%	0	0
	Neither	19.21%	182	2422

**Table 133.** Annual monkfish revenue in 1997 by gear and vessel size for vessels that targeted monkfish, but are not expected to qualify for monkfish limited access.

Gear	Vessel tonnage	Monkfish revenue compared to total revenue	Average monkfish revenue per trip	Total DAS on monkfish trips
Fish Trawl	0-4 GRT	0.19%	267	16
	5-50 GRT	7.48%	86	1987
	51-100 GRT	1.83%	90	467
	101-150 GRT	0.09%	49	40
	151+ GRT	0.16%	46	81
Gillnet	0-4 GRT	0.49%	223	50
	5-50 GRT	47.02%	486	2214
	51-100 GRT	11.99%	7833	35
	101-150 GRT	0.00%	0	0
	151+ GRT	0.00%	0	0
Scallop Dredge	0-4 GRT	0.00%	0	1
	5-50 GRT	2.51%	1638	35
	51-100 GRT	0.00%	0	0
	101-150 GRT	0.15%	159	22
	151+ GRT	2.50%	3171	18
Scallop Trawl	0-4 GRT	0.00%	0	0
	5-50 GRT	0.00%	0	0
	51-100 GRT	0.00%	0	0
	101-150 GRT	0.00%	0	0
	151+ GRT	0.01%	207	1
Longline	0-4 GRT	0.00%	<1	39
	5-50 GRT	0.02%	<1	800
	51-100 GRT	0.02%	2	195
	101-150 GRT	0.00%	<1	54
	151+ GRT	0.00%	0	0
Other	0-4 GRT	0.00%	<1	508
	5-50 GRT	9.59%	93	2361
	51-100 GRT	11.35%	746	348
	101-150 GRT	4.59%	220	478
	151+ GRT	0.03%	2	309

Unlike Table 133 that summarizes a vessel's dependence on the monkfish fishery, Table 134 illustrates the dependence of gear sectors on monkfish. Gillnet vessels depend on monkfishing for a much larger portion of their revenue than any other gear. Gillnet vessels are however among the most diversified vessels in terms of species landed and thus may be better able to switch to alternate fisheries. Otter trawls also are quite diversified and thus, as a group, may be the least affected in this set of 308 vessels. Scallop dredges and trawls depend on monkfish more heavily than do otter trawls and also have fewer alternatives. Given their heavy reliance of scallops and the currently proposed severe cutbacks in scallop landings, these gears are likely to be very hard hit by the combination of regulations in monkfish and scallops.

**Table 134.** Annual monkfish revenue in 1997 by gear and target species for vessels that targeted monkfish, but are not expected to qualify for monkfish limited access.

Gear	Contribution to total revenues (percent)				
	Monkfish	Ten large mesh groundfish	Sea scallops	Small mesh groundfish	Other species
Fish Trawl	6.8	25.1	1.7	18.9	47.5
Scallop Dredge	9.1	0.2	90.5	0	0.1
Gillnet	45.7	22.8	0	0.1	31.4
Scallop Trawl	4.6	0	95.4	0	0
Longline	0	10.7	0	0	89.3
Other	5.7	3.4	1.5	0	89.3

**8.1.7.2.1.2      Vessels that landed monkfish during the four-year qualification period, but are not expected to qualify**

There are 1,216 vessels that landed at least one pound of monkfish between February 28, 1991 and February 27, 1995, but are not expected to qualify for monkfish limited access. Many of these vessels landed monkfish as bycatch when targeting other species. Most of these vessels are small and mid-sized, generally within the 5-50 GRT category but split between the 31-45 ft. and the 61-100 ft. groupings (Table 135 and Table 136). As noted above, many vessels in the Northeast region are between 5 and 50 GRT.

**Table 135.** Vessels by length that landed monkfish during February 28, 1991 to February 27, 1995 and are not expected to qualify for monkfish limited access.

Vessel length <sup>39</sup>	Number of Vessels	Percent
0-30 ft	37	3.1
31-45 ft	487	41.4
46-60 ft	217	18.5
61-100 ft	412	35.1
101+ ft	22	1.9
Total	1175	100

<sup>39</sup> No vessel length data are available for 41 vessels that landed monkfish during the four-year qualification period.  
Monkfish FEIS

**Table 136.** Vessels by tonnage that landed monkfish during February 28, 1991 to February 27, 1995 and are not expected to qualify for monkfish limited access.

Tonnage <sup>40</sup>	Number of Vessels	Percent
0-4 GRT	28	2.4
5-50 GRT	618	52.6
51-100 GRT	255	21.7
101-150 GRT	171	14.6
151+ GRT	103	8.8
Total	1175	100

The largest aggregations of the 1,216 vessels that would fail to qualify for monkfish limited access are found in Massachusetts, Maine, Virginia, New Jersey and New York (Table 137). For individual ports (Table 138), most vessels are home-ported in Boston, Chatham, New Bedford, Gloucester in Massachusetts; Belford, Cape May and Point Pleasant in New Jersey; Hampton, Newport News, Norfolk, and Seaford in Virginia; and Montauk and New York City in New York. Among these vessels, no single port in Maine stands out. Rather, there are groups of small Downeast ports with a fairly regular distribution, each having a few permits. In addition, in a port-by-port examination Rhode Island suddenly gains in importance with Point Judith. New Hampshire and North Carolina are similar to Maine, in that no one port stands out but a number of smaller ports area all affected. The vessels in this category have landings in their homeport 46% of the time, and in their home state 71% of the time □ below the average reported in the Section 6.4.5.5.

**Table 137.** Location of 1,216 vessels that landed monkfish during the qualification period, but are not expected to qualify for monkfish limited access.

Home port state	Number of vessels	Primary port state	Number of vessels
CT	0	CT	10
DE	9	DE	5
FL	17	FL	14
MA	454	MA	403
MD	12	MD	24
ME	131	ME	200
NC	60	NC	71
NH	40	NH	52
NJ	72	NJ	118
NY	105	NY	93
PA	34	PA	
RI	42	RI	69
VA	112	VA	105
WV	12	WV	
Other	12	Other	11
Unknown	104	Unknown	41

<sup>40</sup> No vessel length data are available for 41 vessels that landed monkfish during the four-year qualification period.  
Monkfish FEIS

**Table 138.** Port distribution for 1,216 vessels that landed monkfish during the qualification period, but are not expected to qualify for monkfish limited access. Ports with the majority of vessels are bold-faced and ports with less than three vessels are not shown. Source: 1997 NER permit data.

State	Port	Home ports listed by non-qualifying vessels	Primary ports listed by non-qualifying vessels
CT	Stonington		7
DE	Wilmington	5	
FL	Miami	7	
MA	<b>Boston</b>	<b>201</b>	<b>8</b>
	Beverly	7	26
	<b>Chatham</b>	<b>26</b>	<b>43</b>
	<b>Gloucester</b>	<b>73</b>	<b>94</b>
	Harwich		4
	Harwichport	4	10
	Hull	3	4
	Hyannis	7	9
	Marblehead	4	6
	<b>New Bedford/Fairhaven</b>	<b>46</b>	<b>90</b>
	Newburyport	3	12
	Pigeon Cove		3
	Plymouth	7	12
	Provincetown	7	12
	Rockport	7	5
	Salisbury	3	3
	Sandwich	3	11
	Saugus		3
	Scituate	11	22
	Wellfleet		3
MD	Ocean City	11	23
ME	Boothbay	4	5
	Boothbay Harbor		8
	Cundys Harbor		9
	Cushing		3
	Harpswell	4	5
	Jonesport		4
	Kittery		3
	Mount Desert	3	3
	New Harbor		5
	Owls Head	3	
	Port Clyde	3	5
	Portland	21	42
	Rockland	5	6
	Saco	4	5
	South Bristol	3	
	Southwest Harbor	8	
	Sprucehead	4	4
	Stonington	3	8

<b>State</b>	<b>Port</b>	<b>Home ports listed by non-qualifying vessels</b>	<b>Primary ports listed by non-qualifying vessels</b>
	Vinalhaven		3
	Winter Harbor	3	4
NC	Atlantic	3	
	Beaufort-Morehead	8	11
	Belhaven	5	4
	Englehard		3
	Hobucken	3	3
	Lowland	7	7
	New Bern	4	3
	Oriental	4	7
	Swan Quarter	3	4
	Vandemere	4	7
	Wanchese	5	15
NH	Hampton	8	12
	Portsmouth	12	17
	Rye	3	7
	Seabrook	13	13
NJ	Atlantic City	5	7
	Barnegat Light	6	11
	<b>Belford</b>	<b>11</b>	<b>20</b>
	<b>Cape May</b>	<b>23</b>	<b>36</b>
	<b>Point Pleasant</b>	<b>11</b>	<b>23</b>
	Point Pleasant Beach		3
	Wildwood	4	6
NY	Freeport		7
	Greenport	5	5
	Hampton Bays		10
	<b>Montauk</b>	<b>14</b>	<b>23</b>
	<b>New York</b>	<b>70</b>	<b>18</b>
	Point Lookout		3
	Shinnecock	5	18
PA	<b>Philadelphia</b>	<b>34</b>	
RI	Narragansett	3	4
	Newport	5	15
	Providence	4	
	<b>Point Judith</b>	<b>21</b>	<b>37</b>
VA	Chincoteague		6
	<b>Hampton</b>	<b>17</b>	<b>36</b>
	<b>Newport News</b>	<b>9</b>	<b>22</b>
	<b>Norfolk</b>	<b>78</b>	<b>14</b>
	<b>Seaford</b>		<b>23</b>
WV	Falling Waters	13	

For these vessels that are not expected to qualify for monkfish limited access, many have multispecies and/or scallop day-at-sea permits, and many also have tuna permits (Table 139). Of the 694 multispecies permits, 547 are limited access, as are 122 of the 662 scallop permits. All but 12 summer flounder permits and all the lobster permits are commercial, as are all but 3 of the squid-mackerel-butterfish permits. Many of these vessels hold multiple permits, though few hold any particular combination. Yet most of these fisheries are under increasing

landings limits. If alternative fisheries are to be pursued, they will need to be non-traditional species for the most part. No federal permits are held by 338 of these vessels.

**Table 139.** Permits held during 1997 by vessels that are not expected to qualify for monkfish limited access and landed one or more pounds of monkfish during the four-year qualification period.

Permit categories	Northeast Region Permit Status	Number of vessels	Percent
Permit	Multispecies	694	57%
	Sea scallop	662	54%
	Summer flounder	397	33%
	Lobster	571	47%
	Squid/Mackerel/Butterfish	521	43%
	Scup	326	27%
	Black Sea Bass	253	21%
	Tuna	608	50%
Permit combinations (5 vessels or more)	Tuna only	32	3%
	All 8 permits	94	8%
	Multispecies, Lobster, Tuna	37	3%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Tuna	68	6%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Black sea bass, Scup, Summer flounder	31	3%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Scup, Summer flounder, Tuna	44	4%
	Multispecies, Lobster, Scallop & Tuna	65	5%

Of the 1,216 vessels that are not expected to qualify, 18 targeted monkfish in 1994; 36 in 1995; 36 in 1996; and 30 in 1997 (Table 140). Thus, again, the vast majority of these vessels relied on monkfish for 10 percent or less of their income. The drop in targeting levels after the sudden rise is likely related to worsening resource conditions. Nonetheless, the targeting vessels, especially, will feel the impacts of non-qualification.

**Table 140.** Annual monkfish revenue compared to total revenue for vessels that landed monkfish during the four-year qualification period, but are not expected to qualify for monkfish limited access. Source: NMFS dealer data.

	Number of vessels			
	1994	1995	1996	1997
10%	664	581	503	470
20%	23	25	25	37
30%	11	13	6	11
40%	5	6	10	5
50%	1	8	7	4
60%	2	5	6	3
70%	2	4	2	5
80%		3	3	4
90%	4	3	5	3
100%	4	7	3	6
TOTAL	716	561	570	548

Scallop dredges that would not qualify for monkfish limited access had the highest average monkfish revenue per trip during 1991-1995 (Table 141 and Table 142). Vessels that used otter trawls had a relatively low per trip revenue but a very high number of trips. Gillnet vessels had intermediate characteristics. Most of these vessels hold either a multispecies or a scallop limited access permit □ or both. Mid-sized otter trawls take a larger percentage of monkfish than do larger otter trawls but larger vessels have larger average trip revenues. Mid-sized (50-150 GRT) gillnets are the most dependent. For scallop dredges the dependence rises with vessel size. Thus, impacts vary according to both gear and vessel size.

**Table 141.** Annual monkfish revenue in 1997 by gear and limited access permit category for vessels that landed monkfish during the four-year qualification period, but are not expected to qualify for monkfish limited access.

Gear	Permits held in 1997	Percent of all monkfish revenues	Average monkfish revenue (dollars) per trip	Monkfish trips
Fish Trawl	Multisp. DAS Only	20.56%	71	15589
	Scallop DAS Only	1.72%	179	521
	Multisp & Scallop DAS	0.12%	16	415
	Neither	1.59%	44	1946
Gillnet	Multisp. DAS Only	37.97%	326	6296
	Scallop DAS Only	0.01%	8	54
	Multisp & Scallop DAS	0.00%	0	0
	Neither	9.15%	471	1052
Scallop Dredge	Multisp. DAS Only	0.37%	107	188
	Scallop DAS Only	18.51%	1408	711
	Multisp & Scallop DAS	0.06%	95	33
	Neither	0.63%	319	107
Scallop Trawl	Multisp. DAS Only	0.00%	0	0
	Scallop DAS Only	1.49%	302	267
	Multisp & Scallop DAS	0.05%	198	215
	Neither	0.01%	155	3
Longline	Multisp. DAS Only	0.17%	5	1891
	Scallop DAS Only	0.00%	7	5
	Multisp & Scallop DAS	0.00%	0	0
	Neither	0.02%	9	118
Other	Multisp. DAS Only	1.48%	13	6030
	Scallop DAS Only	0.28%	75	202
	Multisp & Scallop DAS	0.00%	0	1
	Neither	5.79%	72	4332

**Table 142.** Annual monkfish revenue in 1997 by gear and vessel size for vessels that landed monkfish during the four-year qualification period, but are not expected to qualify for monkfish limited access.

Gear	Vessel size in 1997	Percent of all monkfish revenues	Average monkfish revenue (dollars) per trip	Monkfish trips
Fish Trawl	0-4 GRT	0.10%	37	146
	5-50 GRT	8.68%	53	8944
	51-100 GRT	5.82%	48	6505
	101-150 GRT	5.68%	171	1799
	151+ GRT	3.71%	186	1077
Gillnet	0-4 GRT	0.45%	58	416
	5-50 GRT	34.63%	303	6190
	51-100 GRT	11.68%	896	705
	101-150 GRT	0.01%	28	12
	151+ GRT	0.37%	256	79
Scallop Dredge	0-4 GRT	0.00%	0	20
	5-50 GRT	0.00%	0	243
	51-100 GRT	0.61%	352	93
	101-150 GRT	8.46%	1146	399
	151+ GRT	10.51%	2001	284
Scallop Trawl	0-4 GRT	0.00%	0	0
	5-50 GRT	0.00%	0	0
	51-100 GRT	0.35%	237	81
	101-150 GRT	1.05%	321	177
	151+ GRT	0.15%	300	27
Longline	0-4 GRT	0.00%	<1	29
	5-50 GRT	0.11%	4	1742
	51-100 GRT	0.07%	19	198
	101-150 GRT	0.01%	21	30
	151+ GRT	0.00%	4	15
Other	0-4 GRT	0.00%	<1	318
	5-50 GRT	1.80%	16	5996
	51-100 GRT	2.25%	80	1527
	101-150 GRT	0.16%	9	952
	151+ GRT	3.35%	102	1772

Of the 1,216 that are not expected to qualify, the all gears are less dependent on monkfish than were the 308 who landed monkfish after the qualifying period. By definition, as non-qualifiers these vessels have a relatively low dependence on monkfish. Nonetheless, the general pattern of gillnets being the most dependent holds here as well. Vessels that used "Other" gear are most likely to catch "Other" species, followed by otter trawls and then longlines.

**Table 143.** Annual monkfish revenue in 1997 by gear and target species for vessels that targeted monkfish, but are not expected to qualify for monkfish limited access.

Gear	Contribution to total revenues (percentage)				
	Monkfish	Ten large mesh groundfish	Sea scallops	Small mesh groundfish	Other species
Fish Trawl	2.6%	16%	0.7%	10%	70%
Gillnet	23%	47%	0%	0.2%	29%
Scallop Dredge	5.3%	0.2%	95%	0%	0.1%
Scallop Trawl	2.3%	<0.1%	97%	0%	0.9%
Longline	0.2%	56%	0.1%	0.1%	44%
Other	1.0%	0.5%	0.6%	0.2%	98%

#### 8.1.7.2.2 Days-at-Sea

Fishermen resisted the idea of days-at-sea restrictions to control fishing effort when it was initially suggested for the multispecies and sea scallop fisheries. The industry has however adjusted to this type of management<sup>41</sup> as long as they can find a way to make a living under their days-at-sea allotments or by fishing in other fisheries. This is becoming more difficult to achieve, however, as days-at-sea allocations in groundfish and scallops continue to decline and other FMPs also impose lower quotas or more restrictive management measures. The impacts of scallop regulations are discussed in Section 8.1.11.1, for example.

##### 8.1.7.2.2.1 Limited access qualified vessels whose annual allocation in year one is less than their 1997 days absent while fishing for monkfishing

This section discusses the distribution of those vessels that will be allocated fewer monkfish days-at-sea than the vessel fished for monkfish during 1997. If a vessel had more than 40 days absent on trips where monkfish was caught, it is included in this section. Days absent are 24-hour days from the vessel trip reports, not a vessel's reported multispecies or scallop days-at-sea. There are 674 such vessels.

These vessels are mostly between 31 and 100 feet. They cluster in the 31-45 foot and the 61-100 foot categories (Table 144). By tonnage, the majority are 5-50 GRT, with the next largest group being 51-100 and then 100-151 GRT. The smallest group is the 0-4 GRT fleet (Table 145). Thus, again, while the 5-50 GRT category is most impacted (i.e., has the most vessels in it) this is due to that size category being most prevalent in the fleet rather than to any portion of the measure differentially impacting that group. Larger vessels, in fact, may be more likely to find the allocated monkfish days-at-sea are more restrictive than their current fishing effort.

**Table 144.** Vessels by length that qualify for monkfish limited access and their total fishing effort in 1997 was greater than the proposed allocation of monkfish days-at-sea.

Vessel length <sup>41</sup>	Number of vessels	Percent
0-30 ft	12	1.9
31-45 ft	235	37.8
46-60 ft	129	20.8
61-100 ft	240	38.6
101+ ft	5	0.8
Total	621	100

<sup>41</sup> Vessel length information is unavailable for 53 vessels.

**Table 145.** Vessels by tonnage that qualify for monkfish limited access and their total fishing effort in 1997 was greater than the proposed allocation of monkfish days-at-sea

Tonnage <sup>42</sup>	Number of vessels	Percent
0-4 GRT	14	2.3
5-50 GRT	297	47.8
51-100 GRT	132	21.3
101-150 GRT	110	17.7
151+ GRT	68	11.0
Total	621	100

The majority of these vessels is from Massachusetts, followed by Maine, New Jersey and Rhode Island (Table 146). By port, the biggest grouping is in Boston, followed by Gloucester, and eventually by Point Judith.

**Table 146.** Vessels by home and primary states that qualify for monkfish limited access and their total fishing effort in 1997 was greater than the proposed allocation of monkfish days-at-sea. Port information is unavailable for 52 vessels.

Home port state	Number of vessels	Primary port state	Number of vessels
CT	3	CT	10
MA	303	MA	255
MD	4	MD	9
ME	50	ME	83
NC	27	NC	34
NH	28	NH	33
NJ	37	NJ	53
NY	78	NY	62
PA	12	PA	
RI	32	RI	49
VA	41	VA	32
Other	3	Other	2

**Table 147.** Port distribution for vessels by home and primary states that qualify for monkfish limited access and their total fishing effort in 1997 was greater than the proposed allocation of monkfish days-at-sea. Port information is unavailable for 52 vessels

State	Port	No. Vessels Listing as Home Port	No. Vessels Listing as Primary Port
CT	Stonington		8
MA	Beverly		3
	Boston	119	14
	Chatham	18	30
	Fall River	3	
	Gloucester	48	52
	Green Harbor	4	4
	Harwichport	3	5
	Hyannis		3

<sup>42</sup> Tonnage information is unavailable for 53 vessels.

<b>State</b>	<b>Port</b>	<b>No. Vessels Listing as Home Port</b>	<b>No. Vessels Listing as Primary Port</b>
MA	Marblehead	5	5
	New Bedford/Fairhaven	47	77
	Newburyport	3	6
	Plymouth		6
	Provincetown	6	8
	Rockport	3	
	Sandwich		7
	Scituate	7	10
	Westport		3
	MD	Ocean City	4
ME	Boothbay		6
	Cundys Harbor	3	5
	Five Islands		4
	New Harbor		5
	Port Clyde		5
	Portland	10	21
	Saco		3
	South Bristol		6
	Southwest Harbor	3	
NC	Atlantic	4	
	Beaufort-Morehead	3	4
	Oriental		6
	Vandemere		3
	Wanchese	5	10
NH	Hampton	5	5
	Portsmouth	6	12
	Rye	4	6
	Seabrook	10	9
NJ	Belford	10	13
	Cape May	15	20
	Point Pleasant	5	11
	Wildwood	3	5
NY	Freeport		4
	Greenport	5	6
	Hampton Bays		6
	Montauk	9	13
	New York	54	9
	Shinnecock	3	
PA	Philadelphia	12	18
RI	Little Compton		3
	Narragansett		3
	Newport		8
	Point Judith	19	30
	Providence	3	
VA	Hampton	4	12
	Newport News		13
	Norfolk	32	3
	Seaford		4
WV	Falling Waters	4	

The more active monkfish vessels tend to have more traditional permits than other groups of vessels (Table 148). Relatively few active monkfish vessels have scup or black sea bass, for example. Of the 561 multispecies permits, 470 are limited access. Of the 524 scallop permits, 96 are limited access. Of the 363 summer flounder permits, 357 are commercial. Of the 466 lobster permits, all but one is commercial. There are 77 vessels with no federal permits. Increased effort in any of the permitted fisheries is likely to be minimal, given current stocks. For the 77 active monkfish vessels that would qualify for monkfish limited access, but have no other federal fisheries permit, species not currently managed by limited access are the most likely sources of alternative revenue.

**Table 148.** Permits held during 1997 by vessels that qualify for monkfish limited access and their total fishing effort in 1997 was greater than the proposed allocation of monkfish days-at-sea.

Permit Groupings	Northeast Region Permit Status	Number of Vessels	Percent
Individual permits	Multispecies	561	83%
	Sea scallop	524	78%
	Summer flounder	363	54%
	Lobster	465	69%
	Squid/Mackerel/Butterfish	423	63%
	Scup	291	43%
	Black Sea Bass	214	32%
	Tuna	422	63%
	None	77	11%
	All 8 permits	114	17%
Combinations	Multispecies, Lobster, Scallop, Tuna	51	8%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Tuna	51	8%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Black sea bass, Scup, Summer flounder	39	6%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Scup, Summer flounder, Tuna	39	6%

The highest per trip revenues are found among scallop dredges, though they have relatively fewer trips where monkfish is caught (Table 149 and Table 150). This occurs because vessels that use scallop dredges often take trips that are twice as long as for vessels that use other fishing gear. Vessels that use otter trawls have the highest number of trips with monkfish landings. Vessels that use gillnets are intermediate. Most non-scallop vessels possess a limited access multispecies permit but not scallop and vice versa (Table 149). Larger vessels are the most dependent of this group, with per trip revenues rising by vessel tonnage among all gears (Table 150). Except for scallop dredges, however, the number of trips declines with vessel size.

**Table 149.** Annual monkfish revenue in 1997 by gear and limited access permit category for vessels that exceeded 40 days absent while fishing for monkfish during 1997 and are expected to qualify for monkfish limited access.

[Table omitted because of formatting problems]

**Table 150.** Annual monkfish revenue in 1997 by gear and vessel size for vessels that exceeded 40 days absent while fishing for monkfish during 1997 and are expected to qualify for monkfish limited access.

Gear	Tonnage	Proportion of total revenue from monkfish	Average monkfish revenue per trip	Total days absent on monkfish trips
Fish Trawl	0-4 GRT	0.01%	35	29
	5-50 GRT	5.26%	71	7281
	51-100 GRT	9.78%	149	6490
	101-150 GRT	19.50%	688	2798
	151+ GRT	15.04%	1410	1054
Gillnet	0-4 GRT	0.01%	7	176
	5-50 GRT	22.19%	395	5548
	51-100 GRT	4.98%	898	548
	101-150 GRT	0.28%	1000	28
	151+ GRT	0.00%	6	46
Scallop Dredge	0-4 GRT	0.00%	0	20
	5-50 GRT	0.00%	0	141
	51-100 GRT	0.21%	984	21
	101-150 GRT	5.72%	2039	277
	151+ GRT	15.61%	3247	475
Scallop Trawl	0-4 GRT	0.00%	0	0
	5-50 GRT	0.00%	0	0
	51-100 GRT	0.12%	272	43
	101-150 GRT	0.44%	551	79
	151+ GRT	0.08%	297	28
Longline	0-4 GRT	0.00%	<1	23
	5-50 GRT	0.05%	4	1376
	51-100 GRT	0.05%	39	135
	101-150 GRT	0.00%	0	2
	151+ GRT	0.00%	0	1
Other	0-4 GRT	0.00%	<1	193
	5-50 GRT	0.51%	13	3935
	51-100 GRT	0.02%	2	1384
	101-150 GRT	0.13%	29	457
	151+ GRT	0.00%	<1	415

While the 674 vessels that use will be fishing fewer than their 1997 days for monkfish, in general they are among the least dependent on monkfish as measured in revenue by gear. Vessels that use gillnets, however, are strongly dependent on monkfish revenues as well as on regulated groundfish.

**Table 151.** Annual monkfish revenue in 1997 by gear and target species for active monkfish vessels that will qualify for monkfish limited access

Gear	Contribution to Total Revenues (percentage)				
	Monkfish	Ten large mesh groundfish	Sea scallops	Small mesh groundfish	Other species
Fish Trawl	9.2	32.7	0.7	10.4	46.9
Scallop Dredge	9	0.4	90.5	0	0.2
Gillnet	24.2	50.7	0	0.3	24.9
Scallop Trawl	3.1	0.1	95.6	0	1.2
Longline	0.4	81.7	0.2	0.1	17.7
Other	0.5	2	1.5	0.4	95.6

#### 8.1.7.2.2.2 Vessels determined by Regulatory Flexibility Analysis that will have significant impacts from the preferred alternative

There are 1,401 vessels that the RFA (Section 8.3) identified as economically impacted by the preferred alternative. Like other groups examined above, most vessels are either 31-45 feet or 61-100 feet (Table 152) and 5-50 GRT (Table 153).

**Table 152.** Vessels by length that would have significant economic impacts from the preferred alternative in year 4.

Length <sup>43</sup>	Number of vessels	Percent
0-30 ft	32	2.4
31-45 ft	448	33.9
46-60 ft	239	18.1
61-100 ft	585	44.3
101+ ft	16	1.2
Total	1320	100

**Table 153.** Vessels by size that will have significant economic impacts from the preferred alternative in year 4.

Tonnage <sup>44</sup>	Number of vessels	Percent
0-4 GRT	29	2.2
5-50 GRT	557	42.2
51-100 GRT	283	21.4
101-150 GRT	241	18.3
151+ GRT	210	15.9
Total	1320	100

The majority of economically impacted vessels are from Massachusetts, Maine, New York, New Jersey, followed by Rhode Island and Virginia (Table 154). By port (Table 155), the most affected are Boston, Gloucester, Chatham and New Bedford in Massachusetts; Portland in Maine; Cape May in New Jersey; Montauk and New York

<sup>43</sup> Vessel length information is unavailable for 81 vessels.

<sup>44</sup> Vessel tonnage information is unavailable for 81 vessels.

City in New York, Point Judith in Rhode Island, and Norfolk in Virginia. For the 1,328 vessels which listed both a home port and a primary port, 51% land in their home port. The home ports of these vessels are no more or less likely to be impacted than the average.

**Table 154.** Vessels by home and primary states that would have significant economic impacts from the preferred alternative in year 4.

Home Port State	Number of vessels	Primary Port State	Number of vessels
CT	8	CT	24
DE	6	DE	<3
FL	6	FL	<3
MA	615	MA	528
MD	9	MD	13
ME	98	ME	168
NC	54	NC	68
NH	54	NH	60
NJ	96	NJ	128
NY	137	NY	111
PA	35	PA	3
RI	80	RI	123
VA	95	VA	86
WV	17	WV	<3
Other	3	Other	2
Unknown	7	Unknown	1

**Table 155.** Port distribution for vessels by home and primary states that would have a significant economic impact from the preferred alternative in year 4.

State	Port	Number of vessels by home port	Number of vessels by primary port
CT	New London	4	6
	Stonington	3	17
DE	Wilmington	4	
FL	Miami	3	
MA	<b>Boston</b>	<b>254</b>	<b>35</b>
	Beverly	5	5
	Brant Rock	3	
	<b>Chatham</b>	<b>28</b>	<b>45</b>
	<b>Gloucester</b>	<b>86</b>	<b>102</b>
	Green Harbor		5
	Harwichport		7
	Hull	3	3
	Hyannis	5	6
	Manchester	4	
	Marblehead	5	6
	<b>New Bedford/Fairhaven</b>	<b>131</b>	<b>193</b>
	Newburyport	3	8
	Pigeon Cove	4	5
	Plymouth	3	6
	Provincetown	11	18
	Rockport	7	6

<b>State</b>	<b>Port</b>	<b>Number of vessels by home port</b>	<b>Number of vessels by primary port</b>
	Salisbury	3	
	Sandwich	3	6
	Swampscott		4
	Scituate	15	27
	Westport		5
MD	Ocean City	8	12
ME	Bremen	5	3
	Bar Harbor		4
	Bass Harbor		3
	Boothbay		4
	Boothbay Harbor		3
	Cundys Harbor	5	5
	Jonesport		3
	Kittery		5
	New Harbor		4
	Port Clyde	6	13
	<b>Portland</b>	<b>20</b>	<b>57</b>
	Saco		4
	South Bristol	4	14
	Southwest Harbor	5	4
	Stonington		5
	York		3
	York Harbor		3
NC	Atlantic	5	
	Bayboro		3
	Beaufort-Morehead	5	10
	Belhaven	4	
	Hobucken	3	
	Oriental		8
	Swan Quarter		3
	Vandemere	4	7
NH	Wanchese	13	22
	Hampton	7	8
	Portsmouth	18	26
	Rye	8	11
NJ	Seabrook	15	14
	Atlantic City		3
	Barnegat Light	19	29
	Belford	10	13
	<b>Cape May</b>	<b>34</b>	<b>44</b>
	Point Pleasant	12	22
	Point Pleasant Beach		3
	Sea Isle City	3	3
NY	Wildwood	4	5
	Freeport		3
	Greenport	5	8
	Hampton Bays		14
	<b>Montauk</b>	<b>19</b>	<b>30</b>
	<b>New York</b>	<b>91</b>	<b>12</b>

<b>State</b>	<b>Port</b>	<b>Number of vessels by home port</b>	<b>Number of vessels by primary port</b>
	Point Lookout		6
	Shinnecock	6	28
PA	Philadelphia	35	3
RI	Galilee		5
	Little Compton		5
	Narragansett	3	5
	Newport	7	18
	Providence	5	
	<b>Point Judith</b>	<b>44</b>	<b>75</b>
	Sakonnet Point		4
VA	Wakefield	7	
	Chincoteague		3
	Hampton	12	29
	Newport News	9	29
	<b>Norfolk</b>	<b>69</b>	<b>6</b>
WV	Seaford		19
	Falling Waters	17	

For vessels that are likely to have a significant economic impact by the preferred alternative in year 4, Northeast species permits are also common (Table 156). Of the 1,145 Multispecies permits, 917 are limited access. Of the 730 Summer Flounder permits, 715 are commercial. Of the 958 Lobster permits, all but one are commercial. Of the 894 Squid-mackerel-butterfish permits, 884 are commercial. Of the 1091 sea scallop permits, 254 are limited access. All eight federal Northeast permits are held by 15 percent of this group, while 9 percent hold none of these permits. As before, substantial shifts in effort to any of the FMP species are unlikely given current stocks.

**Table 156.** Permits held during 1997 by vessels that would have a significant economic impact from the preferred alternative in year 4.

Permit Group	Permits	Number of Vessels	Percent
Individual permit	Multispecies	1145	81.73%
	Sea scallop	1091	77.87%
	Summer flounder	730	52.11%
	Lobster	958	68.38%
	Squid/Mackerel/Butterfish	894	63.81%
	Scup	545	38.90%
	Black Sea Bass	414	29.55%
	Tuna	918	65.52%
	None	125	8.9%
Combinations (50 vessels or more)	Multispecies, Scallops, Lobster, Squid/Mackerel/Butterfish	86	6.14%
	All 8 permits	209	14.92%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Tuna	95	6.78%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Black sea bass, Scup, Summer flounder	62	4.43%
	Multispecies, Scallop, Lobster, Squid/Mackerel/Butterfish, Scup, Summer flounder, Tuna	77	5.50%
	Multispecies, Lobster, Scallop & Tuna	75	5.35%

As might be expected from this group of vessels, the number of the 1401 that caught monkfish each year has increased since 1994. So, too has their level of dependence. More vessels derive larger percentages of their income from monkfishing although the majority still derive 10% or less of their total annual fishing income from monkfish

Table 157. Annual monkfish revenue compared to total revenue for vessels that would have a significant economic impact from the preferred alternative in year 4. Source: NMFS dealer data.

	Number of vessels			
	1994	1995	1996	1997
10%	760	761	793	883
20%	128	151	129	190
30%	47	59	49	63
40%	23	23	21	24
50%	14	18	22	18
60%	8	12	18	15
70%	8	8	11	13
80%	8	13	11	14
90%	9	12	10	16
100%	2	9	7	20
TOTAL	1007	1066	1071	1256

As would be expected given that these are vessels already identified as being economically impacted, the number of trips by each category of vessel is substantially higher than under any other grouping examined so far (Table 158 and Table 159). Otter trawls, gillnets, and scallop dredges with limited access DAS permits are the most impacted groups, though some vessels fishing with other gear are also affected (Table 158). By gear and size, trip

dependence increases with vessel size, though number of trips □ except for scallop dredges □ decreases with size (Table 159). Scallop dredges, then, may be among the most impacted.

**Table 158.** Annual monkfish revenue in 1997 by gear and limited access permit category for vessels that would have a significant economic impact from the preferred alternative in year 4.

Gear	Permits held in 1997	Percent of all monkfish revenues	Average monkfish revenue (dollars) per trip	Monkfish trips
Fish Trawl	Multisp. DAS Only	44.69%	493	29566
	Scallop DAS Only	0.71%	272	784
	Multisp & Scallop DAS	2.82%	1025	898
	Neither	4.25%	399	3470
Gillnet	Multisp. DAS Only	17.22%	474	11849
	Scallop DAS Only	0.00%	8	54
	Multisp & Scallop DAS	0.00%	0	7
	Neither	5.10%	564	2956
Scallop Dredge	Multisp. DAS Only	0.17%	232	245
	Scallop DAS Only	15.92%	2568	2023
	Multisp & Scallop DAS	3.84%	3134	400
	Neither	0.33%	1760	61
Scallop Trawl	Multisp. DAS Only	0.01%	1756	1
	Scallop DAS Only	0.26%	313	276
	Multisp & Scallop DAS	0.09%	655	43
	Neither	0.00%	155	3
Longline	Multisp. DAS Only	0.05%	7	2274
	Scallop DAS Only	0.00%	4	27
	Multisp & Scallop DAS	0.00%	0	0
	Neither	0.01%	5	459
Other	Multisp. DAS Only	1.07%	32	10823
	Scallop DAS Only	0.06%	149	129
	Multisp & Scallop DAS	0.00%	<1	103
	Neither	3.40%	182	4816

**Table 159.** Annual monkfish revenue in 1997 by gear and tonnage for vessels that would have a significant economic impact from the preferred alternative in year 4.

Gear	Vessel size	Percent of all monkfish revenues	Average monkfish revenue (dollars) per trip	Monkfish trips
Fish Trawl	0-4 GRT	0.03%	62	152
	5-50 GRT	3.64%	93	12747
	51-100 GRT	8.25%	219	12283
	101-150 GRT	19.77%	1036	6225
	151+ GRT	20.77%	2048	3308
Gillnet	0-4 GRT	0.11%	76	465
	5-50 GRT	17.16%	431	12984
	51-100 GRT	4.89%	1299	1228
	101-150 GRT	0.12%	1013	39
	151+ GRT	0.06%	204	99
Scallop Dredge	0-4 GRT	0.00%	0	26
	5-50 GRT	0.18%	278	206
	51-100 GRT	0.60%	889	220
	101-150 GRT	4.35%	1749	811
	151+ GRT	15.15%	3371	1466
Scallop Trawl	0-4 GRT	0.00%	0	0
	5-50 GRT	0.00%	0	0
	51-100 GRT	0.07%	263	93
	101-150 GRT	0.26%	417	201
	151+ GRT	0.03%	287	29
Longline	0-4 GRT	0.00%	<1	55
	5-50 GRT	0.02%	3	2214
	51-100 GRT	0.03%	29	362
	101-150 GRT	0.00%	8	84
	151+ GRT	0.00%	4	15
Other	0-4 GRT	0.00%	<1	491
	5-50 GRT	2.31%	80	9360
	51-100 GRT	1.24%	112	3626
	101-150 GRT	0.40%	120	1080
	151+ GRT	0.59%	208	923

Otter trawl and gillnet vessels in this group of impacted vessels are more heavily dependent than others on both monkfish and regulated groundfish (Table 160), while scallop dredges and trawls are slightly less dependent on scallops. This would be expected given that, by definition, these vessels would be impacted more by the preferred alternative than other vessels.

**Table 160.** Annual monkfish revenue in 1997 by gear and target species for vessels that would have significant economic impacts from the preferred alternative in year 4.

Gear	Contribution to total revenues (percent)				
	Monkfish	Ten large mesh groundfish	Sea scallops	Small mesh groundfish	Other species
Fish Trawl	11	39.2	0.5	8.2	41
Gillnet	28.5	47.2	0	0.2	24.1
Scallop Dredge	8.3	0.3	91.2	0	0.2
Scallop Trawl	2.7	0.1	96	0	1.3
Longline	0.2	35.5	0.1	0	64.3
Other	4.6	2.1	1.5	0.5	91.3

#### 8.1.7.2.3 Closed areas and seasons

Closed areas are an option, which generally make sense to fishermen, especially provided the areas are chosen for spawning or seasonal aggregations. To the extent that closing some areas allows for less restrictive days-at-sea allocations than would otherwise be necessary, closed areas could have a positive impact. The fact that the waters east of 72°30' W longitude and south of 40°10' N latitude (deepwater fishery) will be closed only in that a lower trip limit will apply from January 16 to October 14 is also a mitigating factor. That multispecies vessels cannot target monkfish in their 20-day blocks out of groundfishing may adversely impact some vessels, but should not impose a major burden overall. Vessels without multispecies or scallop limited access permits are somewhat more restricted in that they cannot fish in any area in the Gulf of Maine/Georges Bank or Southern New England regulated mesh areas that are not designated as an exempted monkfish fishery according to the multispecies regulations.

"[Nonetheless, c]losed areas, ... can disrupt the traditional annual round of fishermen by forcing a switch to different species or different gear, or to becoming a migrant worker [especially for small vessels]. Many factors will be involved in which of these choices is made. Level of community attachment will figure into whether or not migrant labor is chosen, with day fishermen and fishermen from close-knit rural or ethnic communities being less willing to leave home for long periods of time. (But many offshore fishermen would prefer to spend more, not less, time at home as it is.) Draggers will be less likely to choose different gear (Clay 1993)." There are also fewer alternative fisheries with established markets available in 1998 than in 1993.

#### 8.1.7.2.4 Gear restrictions

The number of vessels using gillnets with large mesh has steadily increased since 1994 (Table 161). The vessels that use gillnets with mesh of 8-inches or more are those that are most dependent on monkfish. For all four years, monkfish landings only comprise less than 10% of the total weight landed for approximately 90% of vessels that use smaller meshes. Vessels that use larger meshes are much more evenly distributed into higher ranges.

**Table 161. Frequency of gear use by mesh size and number of nets.**

	1994	1995	1996	1997
<i>Percent of all gillnets with mesh 8 in. or more</i>	5%	26%	29%	31%
<i>Percent gillnet vessels fishing more than 160 nets</i>	19%	9%	12%	13%
<i>Percent of trawl vessels using mesh greater than 6 in.</i>	2%	2%	4%	7%
<i>Percent of scallop vessels using fishing gear with 10-12 in. mesh</i>	1%	0%	0%	0%

Trawl mesh limits while under multispecies day-at-sea are the same as those already required under the Multispecies FMP and thus should impose no additional burden. Scallop vessels that have targeted monkfish with dredges would be affected by the preferred alternative because they could no longer target monkfish jointly with scallops.

#### 8.1.7.2.5 Annual review and management framework adjustment procedure

An annual adjustment procedure increases flexibility and therefore aids fishermen in the long run. It also gives more opportunity for input from the industry. While experience with other similar mechanisms (e.g. the Multispecies framework adjustment procedure) shows that sometimes more restrictions are imposed in the annual adjustments, keeping the plan on target allows for faster rebuilding and ultimately greater profitability. Further, some adjustments under the multispecies plan have been increases, e.g., in the haddock trip limit. Thus, the presence of this mechanism is expected to have positive social impacts.

#### 8.1.7.2.6 Closed Areas

Closed areas are not included in the proposed management measures at this time. The Councils could implement closed areas to conserve monkfish through a framework adjustment or to protect essential fish habitat through a plan amendment. The social impacts of these potential measures cannot be assessed until the parameters of the proposed closures are known, however.

#### 8.1.7.2.7 Recreational Measures

No recreational management measures are proposed or contemplated at this time. Recreational landings of monkfish generally result from infrequent and accidental catches while fishing for other species. In most cases, anglers catch monkfish because they are unaware that they have hooked another species of fish and fail to reel in their catch. The hooked fish are sometimes sucked in by a monkfish before the lucky angler realizes he has a bite. If there is any impact on recreational fisheries caused by the proposed management measures, it will be that larger monkfish are more common and increase angler satisfaction.

### 8.1.7.3 Community Impacts

Community impacts overall are complicated by the interactions of monkfish regulations with recent and proposed regulations in the groundfish and scallop fisheries. It is obvious that there are large groupings of impacted vessels in several large ports such as Boston, Gloucester, New Bedford, Cape May, Norfolk. Mid-sized ports likely to feel impacts include Point Judith and Chatham. What is less obvious is that small aggregations of ports in rural areas of Maine, North Carolina and New Hampshire may also constitute communities for the purposes of this analysis.

Studies are currently underway which will assist in determining whether these aggregations meet the definition of fishing-dependent communities. In the interim, however, this document can only indicate the possibility of such a determination. In terms of gear types, gillnet vessels are generally the most heavily dependent on monkfish revenue as measured by the percentage this revenue constitutes of their entire annual revenue. However, gillnets are also the most diversified gear group in terms of the total number of species and fisheries which they target. This may offer them some opportunity for moving to alternate fisheries, though only non-traditional fisheries offer any real opportunity for growth at this time. Scallop dredges rely on monkfish for a relatively small portion of their annual revenue, generally 5-10 percent. However, with currently proposed scallop regulations drastically reducing available scallop DAS, the additional loss of this small but lucrative monkfish fishery may be of critical importance especially to the largest dredge vessels. Given this, traditional scallop ports, including New Bedford and Norfolk, may be especially hard hit.

As financial burdens increase, strain is placed on the social and cultural fabric of communities. Fishermen put out of work may lose self esteem. Spouses may need to return to work or to work extra hours. These can lead to increases in marital tension, alcohol and drug abuse, and domestic violence. White (1993) noted that where crews are of mixed racial or ethnic backgrounds minorities may be the first to be dropped if crews are cut to save costs. In crews composed of family members, individual crew members may accept lower wages during times of financial stress, thus allowing the vessel to continue operating. This practice has its limits however where most members of the extended family are involved in fishing, because the number of people who can be relied on for financial support during the slow period is also diminished.

There are two sources of information to evaluate the importance of the monkfish fishery on communities. For a community, economic activity can be measured by the total payroll that for all industries. While total payroll is only a fraction of the total economic activity for a single company or for many industries, the remaining economic activity is often spent for goods and services, generating payroll in other industries and companies. In the aggregate, however, total payroll often makes up a significant fraction of the total economic activity of all industries combined. Certain exceptions exist when a single company or industry whose source of supplies is outside the area under consideration dominates the economic activity of a community (here defined at the county level).

For the fishing industry, much of the economic activity is captured by the ex-vessel price and wages paid to dockside workers. When payroll information includes all income of crew and owners, it can be an acceptable measure of economic activity generated by the fishery. For the monkfish fishery, however, most of the processing occurs at sea and the product is shipped rapidly to foreign markets. Most of the dockside processing consists of preparation of the product for shipping. Monkfish are either dressed at sea (removing the head and viscera, retaining the liver as a separate product) or are landed head-on, liver-in. These products are repackaged dockside and shipped to countries in Europe and Asia. As such, the total ex-vessel value represents the majority of economic activity generated by the monkfish fishery.

The impacts of the preferred and non-preferred alternatives were evaluated at the county level and compared to total business payroll. For larger ports and communities with a more diverse economy and commercial fishery, the proposed alternatives would have a smaller, marginal impact than in a community that relies heavily on fishing. Within the monkfish fishery, the Council estimated the total impact within the monkfish fishery by applying the proposed management measures for limited access, day-at-sea limits, and trip limits and calculating the net change in total ex-vessel revenue. This evaluation is made by comparing the "Total Monkfish Fishery Revenue" to the "Adjusted Monkfish Fishery Revenue". As an upper bound on the impact that the proposed management measures would have on the fishing industry and total economic activity, these impacts were scaled up by the ratio between "Total Fishing Payroll" and the "Total Monkfish Fishery Revenue". This procedure overestimates the total impact on the economic activity of commercial fisheries in each community because the "Total Fishing Payroll" includes wages and salaries generated by other fisheries. The groundfish fishery, for example, dominates fishing payroll in Gloucester, MA, while the payroll in New Bedford is dominated by the scallop industry. The impacts on "Total Fishing Payroll" could be apportioned by the ratio between monkfish revenue and total fishery revenue, but the current method is acceptable for placing an upper bound on the expected impacts.

Table 162 to Table 164 summarize the proportion of economic generated by fishing and by the monkfish fishery in coastal communities. All coastal counties with known major commercial fishing ports are included from Maine to North Carolina. Business and payroll data were derived from the U.S. Census (<http://www.census.gov/datamap/www/index.html>) for calendar year 1995 and fishery revenue data were summarized from NMFS dealer data during 1995-1996. Monkfish prices were assumed to remain constant at 1995-1996 levels, since the size distribution of landed fish could not be estimated. Although there is a distinct trend in liver and whole-fish prices during the early to mid-1990's (Figure 18), recent prices have fallen due to the Asian currency devaluation. Future prices therefore are uncertain and the past trend may not continue through the four-year period encompassed by this analysis.

### 8.1.7.3.1 Economic activity due to fishing

The total business payroll and total fishery payroll vary widely across the coastal counties (Table 162). Counties with the largest populations have the largest total payroll and tend to have the lowest fraction of the payroll derived from the fishing industry. Examples of these large, populous counties are Nassau, NY (\$15.6 billion), Suffolk, NY (\$13.0 billion), and Middlesex, NJ (\$11.3 billion). Total business income is often boosted because of government activity. New London, CT has a naval shipyard, for example, boosting its total payroll to \$2.9 billion. The top counties in terms of fishing payroll are also Nassau, NY (\$203 million), Suffolk, NY (\$163 million), and Middlesex, NJ (\$152 million). In percentage terms, however, the top counties tend to be less populous and have lower total business payrolls. These top fishing counties are Pamlico, NC (3.2%), Knox, ME (2.3%), Carteret, NC (2.1%), Washington, ME (1.5%), and Dare, NC (1.5%). New Bedford, a port that processes a considerable portion of its landings, ranked ninth in terms of total fishery payroll which made up 0.9 percent of the total business payroll. The total fishing payroll underestimates the true importance of the fishery to these communities, because the total fishing payroll does not capture all sources of income derived from fishing. This analysis could be improved by comparing these data with the total ex-vessel revenue for all landings by county.

The top counties in terms of 1995-1996 monkfish revenue were Bristol, MA (\$70 million), Essex, MA (\$61 million), Rockingham, NH (\$53 million), Washington, RI (\$17 million) and Cumberland, ME (\$16 million). These correspond with ports with large commercial fishing fleets: New Bedford (scallops), Gloucester (groundfish), Portsmouth (groundfish), Pt. Judith (groundfish, whiting, and squid), and Portland (groundfish). All of these ports have a fleet of vessels that target monkfish. As a percentage of total payroll, the monkfish revenue ranks highest in the counties of York, VA (6.7%), Washington, RI (2.0%), Rockingham, RI (2.0%), Bristol, MA (1.6%), and Hampton, VA (1.4%). These rankings are different than those for total monkfish revenue because of the relationship between monkfish fishery revenue, total fishing payroll, and total business payroll. In York, VA, for example, the monkfish revenue from bycatch in the scallop fishery is large in comparison to the total fishing payroll, perhaps underestimated for this county. In Washington County, RI on the other hand, fishing is a large proportion of total economic activity and in terms of monkfish revenue the county is ranked fourth.

### 8.1.7.3.2 Preferred alternative

The estimated economic impacts of the preferred alternative are shown for year 1 (Table 162), year 2 (Table 163), and year 4 (Table 164). These years represent major changes in the management measures that would affect economic activity and the impacts on communities. These impacts vary across communities because the reductions in day-at-sea and trip limits affect qualifying and non-qualifying vessels in differing amounts. Thus a port with a higher proportion of vessels that qualify for monkfish limited access could be affected more (relative to other communities) in year 4 than in year 1. Communities that have a greater share of landings from monkfish bycatch would be affected more (relative to other communities) in year 1 and less so in year 4. These impacts, throughout the mortality reduction and rebuilding phases of the proposed management program, are highest in communities that have higher numbers of vessels that were active participants in the monkfish fishery during the four-year qualification period. Once stock recovery occurs, the Council expects that additional days will be allocated for a directed fishery and prosecuted by vessels that qualify for limited access. The communities with the highest transitional impacts will therefore also be the ports that will benefit the most from the expected benefits of the preferred alternative.

The impacts of the preferred and non-preferred alternatives could not be estimated at this level of detail for coastal counties in NC. NC does not participate in the NMFS dealer reports and therefore individual trip records were not available for analysis. NC was also unable to provide the Councils with this data due to confidentiality restrictions. Although fishing contributes to a larger share of the economy of communities in NC than in many of the other communities, quantitative assessment of the impacts in NC were not possible. Other sections of the EIS and FMP show the amount of monkfish that are landed in NC and how many vessels that would qualify for monkfish limited access who list their homeport as NC. Based on preliminary review of existing data for this FMP, there are some vessels with NC homeports that qualify for monkfish limited access. Many of these vessels,

however, have summer flounder permits. Vessels may use state landings data to qualify for monkfish limited access and small gillnet vessels may be able to qualify with this data. Many in the fishery, however, began targeting monkfish after the control date and would not therefore qualify. Failure for vessels to qualify in NC could have a significant impact on economic activity for these communities.

Communities are affected more in year 1 if the vessels that targeted monkfish during 1995 and 1996 fail to qualify for monkfish limited access. These vessels fail to qualify because many began fishing after the control date, rather than due to the characteristics of the fleet in the port that do not match the proposed qualification criteria well. Small vessels that could be characteristic of a community could qualify with only 7,500 pounds tail-weight, rather than the 50,000 pounds tail-weight required of large vessels. On the other hand, the incidental catch of monkfish in the multispecies fishery enable a large proportion of active groundfish vessels to qualify, regardless of vessel size. The ports that have the highest impact, therefore, are dominated by ports that have few groundfish vessels and have fleets that entered the monkfish fishery later than in other areas. Counties with the highest impacts on the total monkfish revenue (Table 162) include Worcester, MD (17%), Hampton, VA (17%), Newport, RI (16%), Ocean, NJ (9%) and Nassau, NY (8%). The expected impacts on total business payroll is very small (0.1 percent or less) in any port, owing to the diverse nature of the economy in ports where the monkfish impacts are greatest.

In years 2 and 3, the directed fishery trip limits would begin (provided that the year 1 measures are not expected to achieve the year 2 mortality targets). The ports with the greatest impacts (Table 163) are therefore those that were impacted by the qualification criteria and those that have the higher number of active monkfish vessels that also qualify for limited access. Counties with the highest impacts on the monkfish fishery include Newport, RI (23%), Worcester, MD (18%), Hampton, VA (18%), Monmouth, NJ (16%), and Norfolk, MA (11%). The impacts for the latter two counties rose because they include the ports of Belmar/Brielle, NJ and Boston, MA. Both ports have a high number of vessels that qualify for limited access, the former comprised of gillnet vessels and the latter dominated by vessels that trawl for monkfish in deepwater. Although the total impact in year 2 increased from \$12.4 million in year 1 (Table 162) to \$16.3 million in years 2 and 3 (Table 163), the impact on total business payroll does not exceed 0.2 percent.

In year 4, there would be no days-at-sea allocations for monkfish limited access vessels, unless the measures in year 2 and 3 fail to stop overfishing. This reduction considerably increases the impacts on the monkfish fishery, especially in communities that rely on monkfish landings more than other ports with more diverse fisheries. The other change that would take place in year 4 is a reduction in the bycatch trip limits for multispecies and scallop vessels. Ports with a large multispecies or scallop fleet will also have higher impacts as a result. Counties with the highest impacts (Table 164) include Knox, ME (42%), Norfolk, MA (41%), Lincoln, ME (41%), Newport, RI (41%), and Cumberland, ME (40%). The estimated impacts on the total business payroll is highest in Knox County, ME, having a port (Rockland) that relies heavily on the groundfish fishery and mixed-species fishery in the Gulf of Maine. In fact, Maine counties lead the list of counties with the highest impacts because the bycatch trip limits in year 4 become effective for all multispecies vessels in the Gulf of Maine. Previous to that, the bycatch trip limits only apply to vessels that fail to qualify for monkfish limited access. The total impact on the monkfish fishery is expected to increase to \$58 million, from \$16.3 million in year 2.

**Table 162.** Community impacts of the preferred alternative from May 1, 1999 to April 30, 2000. Blank cells indicate that data are unavailable to estimate the impact of monkfish regulations.

County	Primary port	Total Business Payroll (\$1,000)	Total Fishing Payroll (\$1,000)	Total Monkfish Fishery Revenue (\$1,000)	Adjusted Monkfish Fishery Revenue (\$1,000)	Percent of Total Business Payroll	Impact on Total Business Payroll	Impact on Monkfish Fishery Revenue
New London	Stonington	2,870,795	2,548	-	-	0.0%		
CT Total		2,870,795	2,548	-	-	0.0%		
Barnstable	Chatham/Hyannis	1,364,637	15,493	7,242	7,047	0.5%	0.0%	2.7%
Bristol	New Bedford	4,350,302	38,033	70,033	64,633	1.6%	0.1%	7.7%
Essex	Gloucester	7,184,086	59,873	61,063	60,583	0.8%	0.0%	0.8%
Norfolk	Boston	8,910,450	69,170	5,629	5,249	0.1%	0.1%	6.8%
Plymouth	Plymouth/Scituate	3,318,230	23,282	3,122	3,039	0.1%	0.0%	2.7%
MA Total		25,127,705	205,851	138,338	132,263	0.6%	0.0%	4.4%
York	Kennebunkport	899,908	2,833	-	-	0.0%		
Cumberland	Portland	3,228,216	18,361	16,352	15,649	0.5%	0.0%	4.3%
Hancock	Ellsworth	324,400	3,099	678	673	0.2%	0.0%	0.7%
Washington	Machias	152,855	2,245	-	-	0.0%		
Knox	Rockland	270,489	6,227	1,205	1,157	0.4%	0.1%	4.0%
Sagadahoc	Bath	411,871	-	-	-	0.0%		
Waldo	Belfast	97,025	274	-	-	0.0%		
Lincoln	South Bristol	153,230	1,139	1,062	1,058	0.7%	0.0%	0.4%
ME Total		5,537,994	34,178	19,297	18,537	0.3%	0.0%	3.9%
Carteret	Beaufort	237,475	5,057	-	-	0.0%		
Dare	Wanchese	166,277	2,406	-	-	0.0%		
Pamlico	New Bern	24,950	801	-	-	0.0%		
NC Total		428,702	8,264	-	-	0.0%		
Rockingham	Portsmouth	2,626,851	12,814	52,653	51,570	2.0%	0.0%	2.1%
NH Total		2,626,851	12,814	52,653	51,570	2.0%	0.0%	2.1%
Cape May	Cape May	-	11,071	9,583	9,444			1.5%
Middlesex	Monmouth	11,285,568	151,873	-	-	0.0%		
Monmouth	Belmar/Brielle	5,372,860	16,601	5,466	5,154	0.1%	0.0%	5.7%
Ocean	Pt. Pleasant	2,222,721	12,355	4,054	3,698	0.2%	0.0%	8.8%
NJ Total		18,881,149	191,900	19,103	18,296	0.1%	0.0%	4.2%
Nassau	Freeport	15,577,565	203,151	646	594	0.0%	0.1%	8.0%
Suffolk	Moriches/Shinnecock	13,030,047	163,394	9,578	9,185	0.1%	0.1%	4.1%
NY Total		28,607,612	366,545	10,224	9,779	0.0%	0.1%	4.4%
Newport	Newport/Tiverton	552,936	4,928	4,645	3,900	0.8%	0.1%	16.0%
Washington	Pt. Judith	714,177	8,407	17,196	16,737	2.4%	0.0%	2.7%
RI Total		1,267,113	13,335	21,841	20,637	1.7%	0.1%	5.5%
York	Seaford	112,562	500	7,506	7,503	6.7%	0.0%	0.0%
Hampton	Hampton	835,189	348	11,932	9,924	1.4%	0.0%	16.8%
Newport News	Newport News	1,883,746	1,457	14,456	14,429	0.8%	0.0%	0.2%
Norfolk	Norfolk	2,710,234	1,301	-	-	0.0%		
VA Total		5,541,731	3,606	33,894	31,856	0.6%	0.0%	6.0%
Worcester	Ocean City	320,204	973	2,617	2,173	0.8%	0.1%	17.0%
MD Total		320,204	973	-	-	0.0%		
Grand Total		91,209,856	840,014	295,350	282,938	0.3%	0.0%	4.2%

**Table 163.** Community impacts of the preferred alternative from May 1, 2000 to April 30, 2002. Blank cells indicate that data are unavailable to estimate the impact of monkfish regulations.

County	Primary port	Total Business Payroll (\$1,000)	Total Fishing Payroll (\$1,000)	Total Monkfish Fishery Revenue (\$1,000)	Adjusted Monkfish Fishery Revenue (\$1,000)	Percent of Total Business Payroll	Impact on Total Business Payroll	Impact on Monkfish Fishery Revenue
New London	Stonington	2,870,795	2,548	-	-	0.0%		
CT Total		2,870,795	2,548	-	-	0.0%		
Barnstable	Chatham/Hyannis	1,364,637	15,493	7,242	6,972	0.5%	0.0%	3.7%
Bristol	New Bedford	4,350,302	38,033	70,033	63,195	1.6%	0.1%	9.8%
Essex	Gloucester	7,184,086	59,873	61,063	60,403	0.8%	0.0%	1.1%
Norfolk	Boston	8,910,450	69,170	5,629	5,019	0.1%	0.1%	10.8%
Plymouth	Plymouth/Scituate	3,318,230	23,282	3,122	3,039	0.1%	0.0%	2.7%
MA Total		25,127,705	205,851	138,338	130,570	0.6%	0.0%	5.6%
York	Kennebunkport	899,908	2,833	-	-	0.0%		
Cumberland	Portland	3,228,216	18,361	16,352	15,429	0.5%	0.0%	5.6%
Hancock	Ellsworth	324,400	3,099	678	673	0.2%	0.0%	0.7%
Washington	Machias	152,855	2,245	-	-	0.0%		
Knox	Rockland	270,489	6,227	1,205	1,157	0.4%	0.1%	4.0%
Sagadahoc	Bath	411,871	-	-	-	0.0%		
Waldo	Belfast	97,025	274	-	-	0.0%		
Lincoln	South Bristol	153,230	1,139	1,062	1,058	0.7%	0.0%	0.4%
ME Total		5,537,994	34,178	19,297	18,317	0.3%	0.0%	5.1%
Carteret	Beaufort	237,475	5,057	-	-	0.0%		
Dare	Wanchese	166,277	2,406	-	-	0.0%		
Pamlico	New Bern	24,950	801	-	-	0.0%		
NC Total		428,702	8,264	-	-	0.0%		
Rockingham	Portsmouth	2,626,851	12,814	52,653	51,363	2.0%	0.0%	2.5%
NH Total		2,626,851	12,814	52,653	51,363	2.0%	0.0%	2.5%
Cape May	Cape May	-	11,071	9,583	9,416			1.7%
Middlesex	Monmouth	11,285,568	151,873	-	-	0.0%		
Monmouth	Belmar/Brielle	5,372,860	16,601	5,466	4,582	0.1%	0.0%	16.2%
Ocean	Pt. Pleasant	2,222,721	12,355	4,054	3,626	0.2%	0.1%	10.6%
NJ Total		18,881,149	191,900	19,103	17,624	0.1%	0.1%	7.7%
Nassau	Freeport	15,577,565	203,151	646	594	0.0%	0.1%	8.0%
Suffolk	Moriches/Shinnecock	13,030,047	163,394	9,578	9,160	0.1%	0.1%	4.4%
NY Total		28,607,612	366,545	10,224	9,754	0.0%	0.1%	4.6%
Newport	Newport/Tiverton	552,936	4,928	4,645	3,578	0.8%	0.2%	23.0%
Washington	Pt. Judith	714,177	8,407	17,196	16,056	2.4%	0.1%	6.6%
RI Total		1,267,113	13,335	21,841	19,634	1.7%	0.1%	10.1%
York	Seaford	112,562	500	7,506	7,503	6.7%	0.0%	0.0%
Hampton	Hampton	835,189	348	11,932	9,847	1.4%	0.0%	17.5%
Newport News	Newport News	1,883,746	1,457	14,456	14,419	0.8%	0.0%	0.3%
Norfolk	Norfolk	2,710,234	1,301	-	-	0.0%		
VA Total		5,541,731	3,606	33,894	31,769	0.6%	0.0%	6.3%
Worcester	Ocean City	320,204	973	2,617	2,160	0.8%	0.1%	17.5%
MD Total		320,204	973	-	-	0.0%		
Grand Total		91,209,856	840,014	295,350	279,031	0.3%	0.1%	5.5%

**Table 164.** Community impacts of the preferred alternative after May 1, 2002. Blank cells indicate that data are unavailable to estimate the impact of monkfish regulations.

County	Primary port	Total Business Payroll (\$1,000)	Total Fishing Payroll (\$1,000)	Total Monkfish Fishery Revenue (\$1,000)	Adjusted Monkfish Fishery Revenue (\$1,000)	Percent of Total Business Payroll	Impact on Total Business Payroll	Impact on Monkfish Fishery Revenue
New London	Stonington	2,870,795	2,548	-	-	0.0%		
CT Total		2,870,795	2,548	-	-	0.0%		
Barnstable	Chatham/Hyannis	1,364,637	15,493	7,242	6,634	0.5%	0.1%	8.4%
Bristol	New Bedford	4,350,302	38,033	70,033	53,975	1.6%	0.2%	22.9%
Essex	Gloucester	7,184,086	59,873	61,063	38,223	0.8%	0.3%	37.4%
Norfolk	Boston	8,910,450	69,170	5,629	3,318	0.1%	0.3%	41.1%
Plymouth	Plymouth/Scituate	3,318,230	23,282	3,122	3,009	0.1%	0.0%	3.6%
MA Total		25,127,705	205,851	138,338	98,832	0.6%	0.2%	28.6%
York	Kennebunkport	899,908	2,833	-	-	0.0%		
Cumberland	Portland	3,228,216	18,361	16,352	9,859	0.5%	0.2%	39.7%
Hancock	Ellsworth	324,400	3,099	678	625	0.2%	0.1%	7.8%
Washington	Machias	152,855	2,245	-	-	0.0%	#DIV/0!	#DIV/0!
Knox	Rockland	270,489	6,227	1,205	700	0.4%	1.0%	41.9%
Sagadahoc	Bath	411,871	-	-	-	0.0%		
Waldo	Belfast	97,025	274	-	-	0.0%		
Lincoln	South Bristol	153,230	1,139	1,062	632	0.7%	0.3%	40.5%
ME Total		5,537,994	34,178	19,297	11,816	0.3%	0.2%	38.8%
Carteret	Beaufort	237,475	5,057	-	-	0.0%		
Dare	Wanchese	166,277	2,406	-	-	0.0%		
Pamlico	New Bern	24,950	801	-	-	0.0%		
NC Total		428,702	8,264	-	-	0.0%		
Rockingham	Portsmouth	2,626,851	12,814	52,653	51,061	2.0%	0.0%	3.0%
NH Total		2,626,851	12,814	52,653	51,061	2.0%	0.0%	3.0%
Cape May	Cape May	-	11,071	9,583	9,240			3.6%
Middlesex	Monmouth	11,285,568	151,873	-	-	0.0%		
Monmouth	Belmar/Brielle	5,372,860	16,601	5,466	4,357	0.1%	0.1%	20.3%
Ocean	Pt. Pleasant	2,222,721	12,355	4,054	3,533	0.2%	0.1%	12.9%
NJ Total		18,881,149	191,900	19,103	17,130	0.1%	0.1%	10.3%
Nassau	Freeport	15,577,565	203,151	646	581	0.0%	0.1%	10.1%
Suffolk	Moriches/Shinnecock	13,030,047	163,394	9,578	9,111	0.1%	0.1%	4.9%
NY Total		28,607,612	366,545	10,224	9,692	0.0%	0.1%	5.2%
Newport	Newport/Tiverton	552,936	4,928	4,645	2,762	0.8%	0.4%	40.5%
Washington	Pt. Judith	714,177	8,407	17,196	14,309	2.4%	0.2%	16.8%
RI Total		1,267,113	13,335	21,841	17,071	1.7%	0.2%	21.8%
York	Seaford	112,562	500	7,506	7,501	6.7%	0.0%	0.1%
Hampton	Hampton	835,189	348	11,932	9,376	1.4%	0.0%	21.4%
Newport News	Newport News	1,883,746	1,457	14,456	14,121	0.8%	0.0%	2.3%
Norfolk	Norfolk	2,710,234	1,301	-	-	0.0%		
VA Total		5,541,731	3,606	33,894	30,998	0.6%	0.0%	8.5%
Worcester	Ocean City	320,204	973	2,617	2,120	0.8%	0.1%	19.0%
MD Total		320,204	973	-	-	0.0%		
Grand Total		91,209,856	840,014	295,350	236,600	0.3%	0.2%	19.9%

### 8.1.7.3.3 Non-preferred alternatives

The Non-preferred alternatives 3a and 3b differ from the preferred alternative because of more conservative qualification criteria for monkfish limited access. The major difference in impacts would occur during years 2 and 3, since in year 4 no days-at-sea would be allocated to monkfish limited access vessels. In year 4, there is therefore little difference from the preferred alternative. A complementary analysis of monkfish impacts for non-preferred alternatives 3a and 3b shows how the different qualification criteria would change the impacts on communities. In general, more conservative qualification criteria translates into more vessels fishing under the monkfish bycatch trip limits and discards therefore increase. These additional discards translate in loss of yield from the fishery, increasing costs to communities. Some communities would furthermore have fewer vessels that would qualify for monkfish limited access and the qualification criteria would therefore have a greater effect on economic activity from fishing. These effects, however, differ on by community because the two non-preferred alternatives differ in how they treat qualification for vessels that hold a limited access permit for multispecies.

The expected impacts on communities are greatest for non-preferred alternative 3a (Table 165) in Newport, RI (23%), Worcester, MD (18%), Norfolk, MA (13%), Monmouth, NJ (10%), and Nassau, NY (9%). Compared to the preferred alternative, these qualification criteria and the trip limits associated with this alternative reduce the impacts on Hampton, VA, but generally affect the same communities. The relative impacts on the monkfish fishery are slightly less in Newport, RI, about the same for Worcester, MD, 20 percent higher for Norfolk, VA, 50 percent less for Monmouth, NJ, and slightly higher for Nassau, NY. Accounting for the proportion of the fishing economy contributed by monkfish and the proportion of the total economy contributed by economic activity due to fishing, the impacts on total business payroll are minimal (less than 0.2 percent) for all communities. Over all communities included in this analysis, the non-preferred alternative 3a has a cost of \$14.0 million vs. \$16.4 million for the preferred alternative.

For non-preferred alternative 3b (Table 166), the highest impacts on the monkfish fishery would occur in Newport, RI (22%), Worcester, MD (17%), Monmouth, NJ (16%), Norfolk, MA (14%), and Bristol, MA (11%). Like non-preferred alternative 3b, the highest impacts involve the same communities as the preferred alternative but the impacts are significantly lower for Hampton, VA. The relative impacts on the monkfish fishery are slightly less for Newport, RI, about the same for Worcester, MD, about the same for Monmouth, NJ, and higher for Norfolk, MA and Bristol, MA. Compared to the total economic activity accounted for by total business payroll, the expected costs to communities is expected to be low (less than 0.2 percent of total business payroll). Over all communities included in this analysis, non-preferred alternative 3b has a cost of \$18.3 million vs. \$16.4 million for the preferred alternative.

Non-preferred alternatives 1 and 4 were not analyzed at this level of detail, because the Councils rejected them due to the high aggregate costs to the industry and the high amount of discards that would be created by the lower bycatch trip limits. Industry opposed non-preferred alternative 1 because it managed by seasonal quotas and would create unacceptable discards when the season closed due to filling the quota. Other mortality reduction schedules were also considered in the aggregate but the distributional aspects and the effects would be the same across communities as the preferred alternative.

**Table 165.** Community impacts of non-preferred alternative 3a between May 1, 2000 and April 30, 2001. Blank cells indicate that data are unavailable to estimate the impact of monkfish regulations.

County	Primary port	Total Business Payroll (\$1,000)	Total Fishing Payroll (\$1,000)	Total Monkfish Fishery Revenue (\$1,000)	Adjusted Monkfish Fishery Revenue (\$1,000)	Percent of Total Business Payroll	Impact on Total Business Payroll	Impact on Monkfish Fishery Revenue
New London	Stonington	2,870,795	2,548	-	-	0.0%		
CT Total		2,870,795	2,548	-	-	0.0%		
Barnstable	Chatham/Hyannis	1,364,637	15,493	7,268	6,999	0.5%	0.0%	3.7%
Bristol	New Bedford	4,350,302	38,033	89,176	82,156	2.0%	0.1%	7.9%
Essex	Gloucester	7,184,086	59,873	61,344	60,699	0.9%	0.0%	1.1%
Norfolk	Boston	8,910,450	69,170	5,645	4,934	0.1%	0.1%	12.6%
Plymouth	Plymouth/Scituate	3,318,230	23,282	3,122	3,039	0.1%	0.0%	2.7%
MA Total		25,127,705	205,851	157,788	149,854	0.6%	0.0%	5.0%
York	Kennebunkport	899,908	2,833	-	-	0.0%		
Cumberland	Portland	3,228,216	18,361	17,386	16,366	0.5%	0.0%	5.9%
Hancock	Ellsworth	324,400	3,099	653	649	0.2%	0.0%	0.6%
Washington	Machias	152,855	2,245	-	-	0.0%		
Knox	Rockland	270,489	6,227	1,205	1,155	0.4%	0.1%	4.1%
Sagadahoc	Bath	411,871	-	-	-	0.0%		
Waldo	Belfast	97,025	274	-	-	0.0%		
Lincoln	South Bristol	153,230	1,139	1,062	1,048	0.7%	0.0%	1.3%
ME Total		5,537,994	34,178	20,306	19,218	0.4%	0.0%	5.4%
Carteret	Beaufort	237,475	5,057	-	-	0.0%		
Dare	Wanchese	166,277	2,406	-	-	0.0%		
Pamlico	New Bern	24,950	801	-	-	0.0%		
NC Total		428,702	8,264	-	-	0.0%		
Rockingham	Portsmouth	2,626,851	12,814	51,829	51,363	2.0%	0.0%	0.9%
NH Total		2,626,851	12,814	51,829	51,363	2.0%	0.0%	0.9%
Cape May	Cape May	-	11,071	12,885	12,667			1.7%
Middlesex	Monmouth	11,285,568	151,873	-	-	0.0%		
Monmouth	Belmar/Brielle	5,372,860	16,601	8,517	7,709	0.2%	0.0%	9.5%
Ocean	Pt. Pleasant	2,222,721	12,355	4,246	3,916	0.2%	0.0%	7.8%
NJ Total		18,881,149	191,900	25,648	24,292	0.1%	0.1%	5.3%
Nassau	Freeport	15,577,565	203,151	655	598	0.0%	0.1%	8.7%
Suffolk	Moriches/Shinnecock	13,030,047	163,394	9,579	9,206	0.1%	0.0%	3.9%
NY Total		28,607,612	366,545	10,234	9,804	0.0%	0.1%	4.2%
Newport	Newport/Tiverton	552,936	4,928	4,745	3,663	0.9%	0.2%	22.8%
Washington	Pt. Judith	714,177	8,407	17,243	15,920	2.4%	0.1%	7.7%
RI Total		1,267,113	13,335	21,988	19,583	1.7%	0.1%	10.9%
York	Seaford	112,562	500	7,641	7,638	6.8%	0.0%	0.0%
Hampton	Hampton	835,189	348	11,809	11,581	1.4%	0.0%	1.9%
Newport News	Newport News	1,883,746	1,457	17,962	17,910	1.0%	0.0%	0.3%
Norfolk	Norfolk	2,710,234	1,301	-	-	0.0%		
VA Total		5,541,731	3,606	37,412	37,129	0.7%	0.0%	0.8%
Worcester	Ocean City	320,204	973	2,629	2,172	0.8%	0.1%	17.4%
MD Total		320,204	973	-	-	0.0%		
Grand Total		91,209,856	840,014	325,205	311,243	0.4%	0.0%	4.3%

**Table 166.** Community impacts of non-preferred alternative 3b between May 1, 2000 and April 30, 2001. Blank cells indicate that data are unavailable to estimate the impact of monkfish regulations.

County	Primary port	Total Business Payroll (\$1,000)	Total Fishing Payroll (\$1,000)	Total Monkfish Fishery Revenue (\$1,000)	Adjusted Monkfish Fishery Revenue (\$1,000)	Percent of Total Business Payroll	Impact on Total Business Payroll	Impact on Monkfish Fishery Revenue
New London	Stonington	2,870,795	2,548	-	-	0.0%		
CT Total		2,870,795	2,548	-	-	0.0%		
Barnstable	Chatham/Hyannis	1,364,637	15,493	7,529	7,235	0.6%	0.0%	3.9%
Bristol	New Bedford	4,350,302	38,033	79,116	70,243	1.8%	0.1%	11.2%
Essex	Gloucester	7,184,086	59,873	63,748	62,813	0.9%	0.0%	1.5%
Norfolk	Boston	8,910,450	69,170	8,615	7,378	0.1%	0.1%	14.4%
Plymouth	Plymouth/Scituate	3,318,230	23,282	3,134	3,033	0.1%	0.0%	3.2%
MA Total		25,127,705	205,851	150,393	140,291	0.6%	0.1%	6.7%
York	Kennebunkport	899,908	2,833	-	-	0.0%		
Cumberland	Portland	3,228,216	18,361	16,798	15,434	0.5%	0.0%	8.1%
Hancock	Ellsworth	324,400	3,099	740	735	0.2%	0.0%	0.7%
Washington	Machias	152,855	2,245	-	-	0.0%		
Knox	Rockland	270,489	6,227	1,205	1,153	0.4%	0.1%	4.3%
Sagadahoc	Bath	411,871	-	-	-	0.0%		
Waldo	Belfast	97,025	274	-	-	0.0%		
Lincoln	South Bristol	153,230	1,139	1,237	1,216	0.8%	0.0%	1.7%
ME Total		5,537,994	34,178	19,980	18,538	0.4%	0.0%	7.2%
Carteret	Beaufort	237,475	5,057	-	-	0.0%		
Dare	Wanchese	166,277	2,406	-	-	0.0%		
Pamlico	New Bern	24,950	801	-	-	0.0%		
NC Total		428,702	8,264	-	-	0.0%		
Rockingham	Portsmouth	2,626,851	12,814	52,948	51,659	2.0%	0.0%	2.4%
NH Total		2,626,851	12,814	52,948	51,659	2.0%	0.0%	2.4%
Cape May	Cape May	-	11,071	10,176	9,987			1.9%
Middlesex	Monmouth	11,285,568	151,873	-	-	0.0%		
Monmouth	Belmar/Brielle	5,372,860	16,601	5,466	4,598	0.1%	0.0%	15.9%
Ocean	Pt. Pleasant	2,222,721	12,355	4,345	3,917	0.2%	0.1%	9.9%
NJ Total		18,881,149	191,900	19,987	18,502	0.1%	0.1%	7.4%
Nassau	Freeport	15,577,565	203,151	742	685	0.0%	0.1%	7.7%
Suffolk	Moriches/Shinnecock	13,030,047	163,394	11,486	10,975	0.1%	0.1%	4.4%
NY Total		28,607,612	366,545	12,228	11,660	0.0%	0.1%	4.6%
Newport	Newport/Tiverton	552,936	4,928	5,202	4,039	0.9%	0.2%	22.4%
Washington	Pt. Judith	714,177	8,407	19,503	17,729	2.7%	0.1%	9.1%
RI Total		1,267,113	13,335	24,705	21,768	1.9%	0.1%	11.9%
York	Seaford	112,562	500	7,506	7,501	6.7%	0.0%	0.1%
Hampton	Hampton	835,189	348	10,523	10,152	1.3%	0.0%	3.5%
Newport News	Newport News	1,883,746	1,457	15,349	15,277	0.8%	0.0%	0.5%
Norfolk	Norfolk	2,710,234	1,301	-	-	0.0%		
VA Total		5,541,731	3,606	33,378	32,930	0.6%	0.0%	1.3%
Worcester	Ocean City	320,204	973	2,631	2,176	0.8%	0.1%	17.3%
MD Total		320,204	973	-	-	0.0%		
Grand Total		91,209,856	840,014	313,619	295,348	0.3%	0.1%	5.8%

## **8.1.8 Summary**

### **8.1.8.1 Yield benefits of delayed harvest**

#### **8.1.8.1.1 Biological effects**

The most common technique historically used in fisheries management is to delay the age at entry to the fishery via minimum size limits to increase yield in weight from a given level of recruitment. SAW-14 (NMFS 1992) concluded that substantial gains in yield per recruit could be achieved by increasing the age at first capture. A size limit, therefore, has the potential for increasing yield and also would prevent markets for small monkfish tails from developing.

Gains in yield could be substantial in the monkfish fishery if small fish are released alive. The conservation benefits that would result from the minimum size limit depends largely on the fishermen's ability to avoid small monkfish while seeking the primary specie. High discard mortality for monkfish has been observed when otter trawls were used inshore. Preliminary results of research conducted by Massachusetts Division of Marine Fisheries have indicated discard survival rates ranging from 8 to 57 percent (J. Harris, pers. comm.). Most of these samples were from fish captured by trawls in relatively shallow water. Discard mortality in offshore waters is likely to be significantly higher. The intended effect of a minimum size limit is, therefore, not to increase yield per recruit and spawning potential through discard survival, but rather to cause fishermen to avoid areas with high concentrations of small fish. Many fishermen have indicated that there are patchy areas that have small monkfish. The fishermen felt it would be possible to avoid these areas, but it would be difficult to pre-define closed areas to reduce the catch of small fish.

The historical industry practice of landing parts (i.e., tails, cheeks, livers and belly flaps) further complicates the imposition of minimum size limits, but has been greatly simplified by defining the size limit as the length between two anatomical reference points that almost always appear on landed tails.

Rationale for an 11 inches minimum tail size: The Councils considered a range of size limits, especially as compared to maturation, to make this recommendation. According to data collected on research surveys, 50% of females become sexually mature between 41.5 and 47.7 cm (10 $\frac{1}{4}$  - 12 $\frac{1}{2}$  inches tail length) in the Gulf of Maine, and between 38.8 and 46.7 cm (10 and 12 $\frac{1}{4}$  inches tail length) south of Georges Bank (U.S. Dept. of Commerce 1992, Table SC3). On the other hand, there is a significant amount of catches and landings of monkfish with tails measuring less than 12 inches (Figure 38 and Figure 39). In Portland, ME over 45% of the landings consisted of monkfish tails less than 12 inches. Monkfish tails less than 11 inches comprised 20 percent of the landings.

Assuming that monkfish recruit to the commercial fishery when they reach 13.7 inches (9 inches tail length) and other factors do not change, these fish would require 12 months to reach legal size with a 12 inch limit and 8 months with an 11 inch limit (Table 106). In other words under a 12-inch limit, landings could immediately decline 40% and would begin to recover over 12 months to former levels. Under an 11-inch minimum tail size, landings could decline 20% and take 8 months to recover. Although larger size limits might be more desirable over the long term, the Councils believe that a 12-inch size limit would be too restrictive, and therefore recommend an 11-inch size limit. Fifty percent of monkfish measuring 16 $\frac{1}{2}$  inches total length will yield an 11-inch tail if cut using normal practices (see Recommended enforcement). The total size limit being recommended, therefore, is 17 inches to ensure that nearly all landings of whole monkfish exceed the 11-inch tail length. The whole number would also reduce the burden of monitoring compliance.

#### **8.1.8.1.2 Economic effects**

The proposed 14-inch minimum tail size would preclude landings in the peewee market category (up to 12 inches) and narrow the range of sizes in the small market category (currently about 12 to 15 inches). In the short run, monkfish landings and revenues would most likely decline until stocks rebuild. For example, had a 14-inch tail length restriction been in place during 1994 and 1995, and assuming that landings in the small market category were evenly distributed by length, then the average price of tails would have been an estimated \$1.31 and \$1.56, respectively, compared to \$1.16 and \$1.42 (excluding landings of unclassified tails in both cases), but tails revenues would have been 25 and 30 percent less--about \$11.5 and \$14.5 million during 1994 and 1995, respectively, compared to \$14.6 and \$19.0 million.

The implications of size restrictions for future total revenues cannot be analyzed at this time because yield streams are not segmented by fish size.

#### **8.1.8.2 Realized fishing mortality rates**

The anticipated mortality reduction is approximately the same for all the alternatives, however changes in discarding will influence the effectiveness of the proposed actions to achieve the desired mortality rates. Current fishing mortality is 0.17 in the northern area and 0.45 in the southern area, although the NEFSC is conducting an updated assessment that may change this information. These values are unlikely to change substantially, however. The threshold mortality rates, to be achieved no later than July 1, 2002, are 0.05 and 0.22 in the northern and southern areas, respectively. The year 2 fishing mortality rate objective is 0.07 in the northern area and 0.26 in the southern area, corresponding to a TAL of 3,000 and 6,000 mt, respectively. The current fishing mortality rate and the overfishing threshold mortality reference points will change slightly with the updated assessment now underway. The interim mortality rates, expected from the proposed action, are certain to fall between current levels and the thresholds, according to plan.

Gradual reductions in mortality are expected between July 1, 1998 and July 1, 2002, and overfishing may be halted due to reductions in monkfish bycatch and unquantified management measures introduced by the proposed action. If the mortality rates are not lower than expected from the proposed action, then the Councils will have to make framework adjustments to bring management in line with the biological milestones. Changes in discarding mortality, brought on by the proposed actions, would change the relationship between F and the TALs, possibly causing the Councils to take additional action to compensate.

#### **8.1.8.3 Total allowable catch**

The TAL limits gradually decrease from current landings to a threshold amount meant to stop overfishing by July 1, 2002. These TAL reductions are intended to produce reductions in mortality down to sustainable levels.

The TAL limits for alternatives 1 and 4 are approximately the same as for non-preferred alternative 4, although they act more as concrete limits rather than targets. For Alternative 1, the anticipated monkfish bycatch is deducted from the TALs to determine annual quotas to allocate in seasonal portions to the limited access fishery. For Alternative 4, the same procedure is used to determine an allocation for the limited access fishery, which is translated, based on the fishery history of qualifying vessels, into annual days-at-sea allocations. The TALs for preferred alternative 3, on the other hand, are targets to be used in evaluating the effectiveness of the management program. They would serve the same function as do the TACs for cod, haddock, and yellowtail flounder in the Multispecies FMP.

#### **8.1.8.4 Size limit**

The proposed 11-inch minimum tail size limit is intended to reduce mortality on small, immature monkfish. This limit approximates the size at which 50 percent of females are sexually mature and capable of spawning (Table 103). The effectiveness of the size limit for improving selectivity of the fishery depends on a variety of factors and influences that are described elsewhere in this document.

#### **8.1.9 Endangered or Protected Species**

A number of endangered and other protected species inhabit the management unit addressed in the Monkfish Fishery Management Plan. Eleven are classified as endangered or threatened under the Endangered Species Act (ESA) of 1973; the remainder are protected by the provisions of the Marine Mammal Protection Act (MMPA) of 1972. In the Northeast and Mid-Atlantic regions, endangered and protected species utilize marine habitats for purposes of feeding, reproduction, as nursery areas and as migratory corridors. Some species occupy the area year round while others use the region only seasonally or move intermittently inshore and offshore.

Entanglements of several species of marine mammals have been documented in sink gillnets, one of the principal gears used in the monkfish fishery. They include the northern right whale, humpback whale, fin whale, minke whale, harbor porpoise, white-sided dolphin, bottlenose dolphin, common dolphin, harp seal, harbor seal and gray seal. The status of these and other marine mammal populations inhabiting the Northwest Atlantic has been discussed in detail in the *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments*. Initial assessments were presented in Blaylock *et al.* (1995) and are updated in Waring *et al.* (1997). The reports present information on stock definition and geographic range, population size and productivity rates, a description of current population trends, an estimate of the annual human-caused mortality and serious injury as well as other causes of stock declines or impediments to recovery, a description of the commercial fisheries that interact with these stocks and an estimate of Potential Biological Removals (PBR). Endangered and threatened species found in New England and Mid-Atlantic waters are listed below. Right and humpback whales and harbor porpoise, however, are the species of particular concern because of their vulnerability to entanglements, their stock status and/or historic high levels of interactions with commercial fishing gear.

##### **Endangered**

- Right whale (*Eubalaena glacialis*)
- Humpback whale (*Megaptera novaeangliae*)
- Fin whale (*Balaenoptera physalus*)
- Sperm whale (*Physeter macrocephalus*)
- Blue whale (*Balaenoptera musculus*)
- Sei whale (*Balaenoptera borealis*)
- Kemp's ridley (*Lepidochelys kempi*)
- Leatherback turtle (*Dermochelys coriacea*)
- Green sea turtle (*Chelonia mydas*)
- Shortnose sturgeon (*Acipenser brevirostrum*)

##### **Threatened**

- Loggerhead turtle (*Caretta caretta*)

##### **Species Proposed for ESA Listing**

- Harbor porpoise (*Phocoena phocoena*)

More detailed descriptions of the species in the above list were provided the Final Environmental Impact (EIS) Statements for Amendments 5 and 7 to the Northeast Multispecies FMP, which governs the federally regulated use of sink gillnet gear in the Northeast multispecies (groundfish) fishery, and in the EIS prepared for Amendment 4 to the Atlantic Sea Scallop FMP. The low level of incidental takes and serious injuries and mortalities of marine mammals in otter trawl and sea scallop gear also has been discussed in these documents and in framework

adjustment documents submitted to NMFS subsequent to these amendments. (Northeast Multispecies FMP Framework Adjustments 4, 12, 14, 15 and 23 were implemented specifically to protect harbor porpoise and Atlantic large whales by reducing encounters with sink gillnet gear.)

Other species of marine mammals likely to occur in the monkfish management unit include the minke whale (*Balaenoptera acutorostrata*), white-sided dolphin (*Lagenorhynchus acutus*), white-beaked dolphin (*Lagenorhynchus albirostris*), bottlenose dolphin (*Tursiops truncatus*), [coastal stock listed as depleted under the MMPA], pilot whale (*Globicephala melaena*), Risso's dolphin (*Grampus griseus*), common dolphin (*Delphinus delphis*), spotted dolphin (*Stenella spp.*), striped dolphin (*Stenella coeruleoalba*), killer whale (*Orcinus orca*), beluga whale (*Delphinapterus leucas*), Northern bottlenose whale (*Hyperoodon ampullatus*), goosebeaked whale (*Ziphius cavirostris*) and beaked whale (*Mesoplodon spp.*). Pinnipeds species include harbor (*Phoca vitulina*) and gray seals (*Halichoerus grypus*) and less commonly, hooded (*Cystophora cristata*) harp (*Pagophilus groenlandicus*) and ringed seals (*Phoca hispida*).

#### 8.1.9.1 Species of concern - Harbor porpoise

Beginning in 1994, NMFS implemented a number of Council-approved framework adjustments to the Multispecies FMP with the intent of reducing porpoise entanglements in the Gulf of Maine sink gillnet fishery through time/area closures. Because gillnets deployed in the monkfish fishery were fished by multispecies gillnet vessels, in addition to the fact that they had documented entanglements of marine mammals, they also became subject to the Gulf of Maine closures. The most recent estimate of harbor porpoise mortality in the gillnet fishery, calculated from observed takes in 1996, is 1,200 animals, while the weighted stock size estimate is 54,300 animals. The PBR level is estimated at 480.

In response to the MMPA mandates to establish Take Reduction Teams (TRTs) and to reduce the porpoise bycatch to PBR levels, a Gulf of Maine Harbor Porpoise TRT was established in 1996. The TRT developed a plan based on the Council's established time/area closures, added to them and mandated the use of acoustic deterrents in certain times and areas. The TRT met again in December 1997 and responded to a NMFS-modified Take Reduction Plan published as a proposed rule in *Federal Register* [62(156): 44302-43307]. To date, NMFS has not published a final rule that addresses porpoise bycatch in New England. The current closures which prohibit the use of sink gillnet gear are listed below.

Northeast Closure Area: August 15 through September 13 - implemented in 1994.

Mid-coast Closure Area: September 15 through December 31 - implemented in 1994. November 1 through December 31 this area will be open to gillnet vessels using acoustic devices deployed on the nets according to NMFS specifications.

Mid-Coast Closure Area: March 25 through April 25 - implemented in 1996.

Mass Bay Closure Area: March 1- 31 - implemented in 1995.

Cape Cod South Area: March 1 - 31 - implemented in 1996.

Although not associated directly with marine mammal protection, additional management actions occurred that directly affected gillnet vessels. In May 1998, the Council approved Framework Adjustment 25 to the Multispecies FMP, which included a series Gulf of Maine groundfish gear closures to address the overfished condition of Gulf of Maine cod. As evaluated in the NMFS Biological Opinion, rendered as part of the ESA Section 7 consultation process for the framework, the sequential "rolling closure" feature in this action is projected to have a beneficial impact on entanglements of marine mammals because the cod closures overlap in time, and also extend the duration and areas in which sink (and monkfish) gillnets are already prohibited. A year-round closure of areas of Jeffreys Ledge/Tillies Bank/Stellwagen Bank/Wildcat Knoll, known as the Western Gulf of Maine closure [*Federal Register* 63(61):15326-15333] should also provide significant protection in view of porpoise distribution, seasonal movements and bycatch patterns. The overall result of Framework 25 should be a substantial reduction in fishing effort and any associated porpoise bycatch in this region.

While investigating porpoise bycatch in the Gulf of Maine, it became apparent that animals from this same stock were being taken incidentally in monkfish and other gillnet fisheries off the mid-Atlantic states. Bycatch estimates for 1995 and 1996 were 103 and 310 animals, respectively. A separate Take Reduction Team was convened to address the problem, and although members did not reach consensus on a plan, certain elements were agreed to and submitted to NMFS. The team found that bycatch rates were higher on New England boats fishing in the region – apparently owing to their use of lighter weight twine, different mesh sizes, greater numbers of nets and longer soak times. Therefore, rather than recommending the use of time/area closures and pingers<sup>45</sup>, the TRT recommended to NMFS a series of seasonal gear restrictions including minimum twine diameters, caps on the number of nets, lengths of float lines, maximum mesh sizes, a one-month closure of the gillnet fishery off New Jersey from February 15 through March 15 and a 20 day block of time out of the fishery for each vessel sometime during the period of highest bycatch – February 1 through April 30. A mid-Atlantic Take Reduction Plan is currently under development by NMFS and will be published as a proposed rule in the near future.

#### 8.1.9.2 Species of concern - Right and humpback whales

Because of an unprecedented number of right whale mortalities in the right whale critical habitat/calving grounds off Florida and Georgia in 1996, trends which indicated a population decline, uncertainty in the rate of recovery and an historic record of right whale entanglements in sink gillnet gear, the National Marine Fisheries Service asked the New England Council to initiate Northeast Multispecies FMP management measures that would reduce the risk of right whale entanglements. The Council responded by approving Framework Adjustment 23 to the FMP that closed portions of right whale critical habitat to fishing with sink, including monkfish, gillnets.

Right Whale Critical Habitat/Cape Cod Bay (federal waters portion): January 1 through May 15 - Closed to sink gillnet gear unless gear or alternative practices are developed that reduce the likelihood of entanglement or reduce the chances that entanglements will result in serious injury or mortality.

Right Whale Critical Habitat/Great South Channel: April 1 through June 30 - Closed to sink gillnet gear unless gear or alternative practices are developed that reduce the likelihood of entanglement or reduce the chances that entanglements will result in serious injury or mortality.

The Western Gulf of Maine closure, which was discussed in the context of harbor porpoise earlier in this section, also will serve to protect right, humpback and other Atlantic large whales. The rolling closure scenario effectively extends the Cape Cod Bay critical habitat closure in area during the month of March. Other actions implemented in 1997-1998, specifically to protect right, humpback, fin and minke whales were required by or undertaken through the Atlantic Large Whale Take Reduction Plan [*Federal Register* 62(140):39157-39188]. These include gear modifications, gear research, expanded disentanglement efforts, extended outreach efforts in key areas and expanded whale surveillance (Early Warning System) program. In association with the effort reductions required in the Monkfish FMP, these and other activities associated with the Atlantic Large Whale Plan should reduce the risk entanglements in monkfish gillnets.

#### 8.1.9.3 Overview of monkfish management measures and impacts

The proposed action and alternatives are described in detail in Section 4.0 of the FMP and in Section 8.1.4 of the EIS, respectively. Primary measures proposed by the Councils include: qualification criteria for limited access and allocations of days-at-sea to vessels that qualify for limited access; trip limits for vessels on a monkfish day-at-sea and bycatch allowances for vessels not on a monkfish day-at-sea; minimum size limits; a cap on the number of gillnets; mandatory time out of the fishery during the spawning season; and a framework adjustment process.

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<sup>45</sup> Acoustic deterrent.

Given that the overall goal of the FMP is to reduce fishing mortality by limiting fishing effort, the monkfish management program is expected to reduce the likelihood of encounters between endangered and protected species and commercial fishing gear. Qualification criteria that will preclude new entrants into the fishery, a substantial reduction in the number of days available to fish for monkfish for vessels that qualify for limited access or have multispecies permits, trip limits for all other vessels, a 160-net cap for gillnets and time out of the fishery during spawning season are all the measures that are likely to produce reductions in incidental takes of marine mammals in this fishery.

#### 8.1.9.4 Impacts of fishing gear

The discussion of impacts of the proposed action and alternatives to endangered and protected species will focus on sink gillnet gear because of high level of documented entanglements of a number of marine mammals in the fishery and because of the low probability of interactions with otter trawls and sea scallop gear. (For a compete description of the major gear types used in the monkfish fishery see Section 6.4). Otter trawls and scallop dredges are classified as Category III fisheries in the Final List of Fisheries for 1998 [*Federal Register* 63(23):5748-5762], prepared in accordance with Section 118 of the MMPA. Category III fisheries have an annual mortality and serious injury that is less than or equal to 1 percent of the PBR level.

The impacts of bottom trawling and sea scallop dredging on endangered species of whales, sea turtles, and fish under NMFS jurisdiction, as well as impacts on critical habitat areas designated for the northern right whale have previously been addressed pursuant to Section 7 of the ESA for the Amendments 5 and 7 to the Northeast Multispecies FMP and for Amendment 4 to the Atlantic Sea Scallop FMP.

For purposes of the 1998 List of Fisheries, gillnet gear employed in the monkfish fishery is an extension of the multispecies sink gillnet fishery, and as such is classified as Category I, that is, fisheries in which the annual mortality and serious injury of a marine mammal stock is greater than or equal to 50 percent of the PBR level. Monkfish gillnets, therefore, are subject to all of the management actions taken to reduce entanglements of marine mammals in sink gillnet gear permitted under the Northeast Multispecies FMP. A description of gillnet gear and its use in the monkfish fishery is provided in Section 6.4.3.3.

#### 8.1.9.5 Impacts of alternatives

Given that the behavioral responses of fishermen under any circumstances vary widely and could be affected as much by market and biological conditions as the particular management regime selected, it is difficult to predict impacts to marine mammals. The following examples, therefore, represent only a few among the range of responses that could occur under the proposed action or the alternatives not selected by the Councils.

Under the proposed action, vessels not qualifying for monkfish limited access could fish under the trip limit which applies to their gear or area fished, or shift into other fisheries or reduce their fishing effort (see Section 7.0). Obviously, the latter would have the most beneficial impact on marine mammals that are vulnerable to entanglement in this gear type. Gillnet vessels fishing in the Gulf of Maine and on Georges Bank might continue to participate in the multispecies fishery, but might increase their utilization of days-at-sea up to the limit of their allocation to compensate for income lost as the result of monkfish effort reductions. These boats would be subject to the marine mammal restrictions discussed earlier in this section, but the potential increase in effort could negatively impact marine mammals in areas where entanglements are likely to occur. Another possible response for gillnet vessels would be to target dogfish. The resulting impacts could be negative for marine mammals over the short-term, given the current lack of management measures in that fishery, although a Spiny Dogfish Plan is currently under development that would nearly eliminate directed fishing by 2000.

Similarly, in the Mid-Atlantic, gillnet vessels are most likely to target dogfish, based on an analysis of the permit data. Some small-scale vessels also participate in the coastal gillnet fisheries for shad, menhaden, weakfish and croaker and could increase their participation in those fisheries. While the impacts of greater effort in these fisheries are currently unknown, the results of expanded observer coverage in 1998 should be available in the near future to assess marine mammal bycatch levels, and in particular possible interactions with bottlenose dolphins.

For purposes of evaluating the impacts on endangered and protected species there are a number of differences between the proposed action and the two non-preferred alternatives. The most substantive with respect to gillnet activity is that more vessels qualify under the proposed action than in either of the non-preferred alternatives in Section 8.1.4.2. (Alternatives to the Preferred Alternative) of the EIS. This could mean a difference in the impacts to marine mammals in the first three years of the plan if measured in terms of monkfish effort reductions. By year four of the plan, however, monkfish mortality reductions are projected to be roughly equivalent between the alternatives, as well as the proposed action, as more stringent effort reduction measures become effective.

Under non-preferred alternative 3a, fewer monkfish-only vessels would qualify for limited access, with the possible outcomes that: a) they could fish under the trip limit which would reduce effort and possibly entanglements; and b) vessels could switch to an alternative fishery, possibly one in which gillnets are also used, such as the dogfish fishery. In the case of the latter, few, if any reductions in risks to marine mammals would occur and may increase over the short-term, again because of the current lack of effort controls in the dogfish fishery. Multispecies vessels that qualify for monkfish limited access under this alternative could target monkfish on any of the vessel's allocated days-at-sea resulting in a potential increase in monkfish fishing mortality. The outcome for marine mammals could be neutral, however, since gillnet vessels would fish the same gear type whether targeting monkfish or multispecies and given that nets caps would be in place for both fisheries. Non-preferred alternative 3b has the fewest number of vessels qualifying for monkfish limited access when compared to the proposed action, but much the same responses could be expected as described in non-preferred alternative 3a.

#### **8.1.9.6 Conclusions**

Although there is some uncertainty about the impacts of the monkfish management actions initially, over time limited access as well as a cap on landings and effort should contribute toward a reduction in marine mammal interactions, and harbor porpoise specifically. Additionally, NMFS intends to promulgate rules under the MMPA that are based on measures submitted to the agency by the Gulf of Maine and Mid-Atlantic Harbor Porpoise Take Reduction Teams. In concert with the Atlantic Large Whale Take Reduction Plan, monkfish management measures should, at a minimum, not jeopardize these efforts to reduce total marine mammal bycatch in the Northeast to less than the Potential Biological Removal (PBR) levels. Additionally, less gillnet fishing, provided that effort does not simply shift, may have a direct positive impact on achieving the PBR goals for endangered whales.

Based on information collected in similar fisheries, the major gear types used in the monkfish fishery appear to have few interactions with sea turtles, although it must be acknowledged there is little or no information available from the Southern Management Area where such occurrences are likely to take place.

Like marine mammals, seabirds are vulnerable to entanglement in commercial fishing gear. The interaction has not been quantified in the monkfish fishery, but impacts are not considered significant. Human activities such as coastal development, habitat degradation and destruction, and the presence of organochlorine contaminants are considered the major threats to some seabird populations. Endangered and threatened bird species, which, in the Northeast, include the roseate tern and piping plover, are unlikely to be impacted by the gear types employed in this fishery.

#### **8.1.10 Adverse Impact on Public Health and Safety**

The impacts on public health and safety are described in Section 5.10 of the FMP.

#### **8.1.11 Cumulative impacts of the proposed action in concert with other laws, regulations, or plans on the target resource species or related stocks**

Two proposed management changes that would substantially affect catches of monkfish are Amendment 7 to the Atlantic Sea Scallop FMP and gillnet closed areas in the Mid-Atlantic to protect harbor porpoise. A third

management change having potential impacts on monkfish mortality is the area closures to conserve Gulf of Maine cod. These area closures were implemented in May 1998 via Framework 25 to the Multispecies FMP. The impacts of these three management changes are analyzed and/or described below. Days-at-sea restrictions in the multispecies and scallop fisheries are a fourth type of regulation that has cumulative effects on monkfish, multispecies, and sea scallop mortality. This potential effect is evaluated qualitatively below.

### 8.1.11.1 Proposals to manage sea scallops

The potential effects of Amendment 7 to the Atlantic Sea Scallop FMP are 1) days-at-sea reductions for limited access scallop vessels and 2) area closures. Both options in Draft Amendment 7 are subject to change and cannot be fully analyzed. The proposed day-at-sea reductions would reduce total fishing effort available for qualifying vessels to target monkfish and to reduce monkfish bycatch on less days than the vessel uses to target sea scallops. Since monkfish bycatch is a significant fraction of the total landings, especially in the Southern Fishery Management Area, changes in sea scallop days-at-sea will have a significant impact on monkfish mortality and are described below.

The effect of potential area closures to conserve sea scallops is to divert fishing away from areas of small scallops and intensify fishing effort in the remaining open areas (assuming days-at-sea limits are unchanged). If the proposed area closures reduce the availability of scallops to the fleet, it would reduce catch per unit effort and make scalloping less attractive. Depending on the location of the area closures and the availability of monkfish in areas that remain open, targeting monkfish with sea scallop days-at-sea could become more attractive and increase monkfish mortality. Since these scallop proposals have been developed, however, time has been insufficient to modify the Gulf of Maine area-closure assessment models and estimate the impacts of closed areas in the Mid-Atlantic. A more complete estimate of the fishery impacts of the final scallop management measures will be included in the final amendment.

The New England Fishery Management Council has proposed to reduce scallop day-at-sea allocations, stop overfishing, and rebuild sea scallop biomass. It is informative to compare the monkfish mortality implications from the proposed scallop days-at-sea reductions with the monkfish preferred alternative without Amendment 7 (i.e. the status quo with respect to scallop management). Amendment 7 to the Atlantic Sea Scallop FMP is currently in draft form and the actual impacts of the final management measures may however be different from those predicted below.

During the first four years following implementation of the Monkfish FMP, the comparative impacts of Amendment 7 compared to the status quo (for sea scallop management) would result in a reduction of monkfish mortality of five percent in the Northern Fishery Management Area and seven to ten percent in the Southern Fishery Management Area. Within Draft Amendment 7, the annual full-time scallop day-at-sea allocations are expected to be 75 days in 1999, 70 days in 2000, and 55 days in 2002. These correspond to the year 1, year 2 and year 4 results, respectively, in Table 167 and Table 168.

This estimated impact of Amendment 7 accounts for 30 percent of the quantitative shortfall in mortality reduction in the north and 60 percent in the south. This analysis only includes the effects of limited access, days-at-sea allocations, and trip limits. Other management measures (i.e. size limits, mesh restrictions, gillnet limits, closed areas for groundfish and harbor porpoise, etc.) are anticipated to account for the difference between the estimated impacts and the mortality reduction goals. Thus the proposed reductions in scallop days-at-sea in Amendment 7 will have a significant bearing on the Monkfish FMP's mortality results and increase the probability of success.

In the northern area (Table 167), landings under Amendment 7 are expected to be 7,086 mt, rather than 7,718 mt with the preferred alternative alone in year 1 (1999). Most of the added reduction in landings is within the "DAS qualifiers" category due to reductions in scallop days-at-sea. There is also an equivalent eight percent reduction in landed monkfish bycatch by vessels that do not qualify for monkfish limited access. Regulatory discards, although a small fraction of the total catch, is estimated to be 30 percent less (38 mt compared to 53 mt) than the status quo (for scallop management). The anticipate impacts are similar in years 2 and 4 due to decreasing scallop days-at-sea for targeting scallops or monkfish.

**Table 167.** Northern Fishery Management Area: Summary of estimated landings and discards after applying the proposed qualification criteria day-at-sea limits and trip limits. These results are compared to the total 1995-1996 landings for vessels in each category to estimate the anticipated monkfish mortality reduction. The qualification criteria for the Scallop Amendment 7 preferred alternative are the same as those for non-preferred alternative 3b.

	Vessel classification	<b>Mortality reduction objective</b>	Preferred alternative			Preferred alternative for Amendment 7 to the Atlantic Sea Scallop FMP – Monkfish preferred alternative qualification criteria		
			Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)
Year 1	DAS Qualifiers	6,492	53	7,991	5,911	38	7,991	
	DAS Non-qualifiers	706	49	1,599	656	49	1,599	
	Monkfish-only	416	115	708	416	115	708	
	Bycatch fisheries	104	33	389	104	33	389	
	Total	7,718	250	10,687	7,086	235	10,687	
	Percent reduction	<b>55%</b>	<b>25%</b>			<b>31%</b>		
Year 2	DAS Qualifiers	5,781	49	7,991	5,324	37	7,991	
	DAS Non-qualifiers	697	49	1,599	654	49	1,599	
	Monkfish-only	309	115	708	309	115	708	
	Bycatch fisheries	104	33	389	104	33	389	
	Total	6,891	246	10,687	6,391	233	10,687	
	Percent reduction	<b>55%</b>	<b>33%</b>			<b>38%</b>		
Year 4	DAS Qualifiers	2,546	1,663	7,991	2,152	1,569	7,991	
	DAS Non-qualifiers	656	68	1,599	609	63	1,599	
	Monkfish-only	68	243	708	68	243	708	
	Bycatch fisheries	104	33	389	104	33	389	
	Total	3,374	2,007	10,687	2,933	1,908	10,687	
	Percent reduction	<b>68%</b>	<b>50%</b>			<b>55%</b>		

In the southern area (Table 168), monkfish landings are estimated to be reduced by the effects of Amendment 7, landings declining from 8,672 to 7,437 mt and regulatory discards declining from 425 to 403 mt in year 1. This is equivalent to a 14 and 5 percent reduction in mortality, respectively. Unlike the northern area, a greater fraction of mortality reduction is anticipated from the days-at-sea vessels that do not qualify for monkfish limited access. Landings are estimated to decline from 1,104 to 779 mt for vessels that do not qualify for monkfish limited access, a 29 percent decline compared to a seven percent decline for the comparable category in the north (Table 167). Similar impacts are estimated for year 2 and year 4 (Table 168). This additional reduction in monkfish bycatch would reduce monkfish mortality by a few percentage points in the southern area. In year 4, the additional effort reduction causes the quantitative estimate of monkfish mortality to be only five percentage points short of the overfishing definition threshold. Thus the proposed reductions in scallop days-at-sea in Amendment 7 will have a significant contribution for monkfish mortality reduction and increase the probability of meeting the FMP goals.

**Table 168.** Southern Fishery Management Area: Summary of estimated landings and discards after applying the proposed qualification criteria day-at-sea limits and trip limits. These results are compared to the total 1995-1996 landings for vessels in each category to estimate the anticipated monkfish mortality reduction. The qualification criteria for the Scallop Amendment 7 preferred alternative are the same as those the preferred alternative in the Monkfish FMP.

	Vessel classification	<b>Mortality reduction objective</b>	Preferred alternative			Preferred alternative for Amendment 7 to the Atlantic Sea Scallop FMP – Monkfish preferred alternative qualification criteria		
			Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)	Expected landings (mt)	Expected discards (mt)	1995-1996 Landings (mt)
Year 1	DAS Qualifiers	6,391	48	7,853	5,481	36	7,853	
	DAS Non-qualifiers	1,104	212	3,200	779	202	3,200	
	Monkfish-only	1,091	105	1,426	1,091	105	1,426	
	Bycatch fisheries	86	60	935	86	60	935	
	Total	8,672	425	13,414	7,437	403	13,414	
	Percent reduction	<b>59%</b>	<b>32%</b>			<b>42%</b>		
Year 2	DAS Qualifiers	4,903	44	7,853	4,179	35	7,853	
	DAS Non-qualifiers	1,046	210	3,200	766	201	3,200	
	Monkfish-only	409	105	1,426	409	105	1,426	
	Bycatch fisheries	86	60	935	86	60	935	
	Total	6,444	419	13,414	5,440	401	13,414	
	Percent reduction	<b>59%</b>	<b>49%</b>			<b>56%</b>		
Year 4	DAS Qualifiers	2,432	712	7,853	1,758	584	7,853	
	DAS Non-qualifiers	955	233	3,200	639	210	3,200	
	Monkfish-only	104	180	1,426	104	180	1,426	
	Bycatch fisheries	85	59	935	85	59	935	
	Total	3,576	1,184	13,414	2,586	1,033	13,414	
	Percent reduction	<b>78%</b>	<b>65%</b>			<b>73%</b>		

### 8.1.11.2 Proposals to reduce impacts on harbor porpoise

NMFS is evaluating the potential of possible management regulations to reduce interactions with harbor porpoise in the Mid-Atlantic. One of the primary fisheries that these regulations would impact is the gillnet fishery for monkfish. In addition to limits on the amount and type of fishing gear, the regulations that are under evaluation include seasonal closed areas. It is too early, however, to quantify the anticipated impacts because these regulations have not yet been formally proposed and are subject to change. Generally, the effect of closed areas to protect harbor porpoise is to change seasonal and geographic fishing patterns so as to reduce encounters.

This type of management measure, promulgated under the Marine Mammal Protection Act would also have coincidental effects on monkfish mortality and economic yield. The harbor porpoise closed area discussions include closed areas during February through April, overlapping the peak in spring fishing activity by vessels using gillnets to target monkfish. The seasonal distribution of landings is described in Section 6.4.2 and Section 6.4.3.

Two responses by fishermen to these area closures are possible. Fishermen in the Mid-Atlantic could relocate to Southern New England and Gulf of Maine waters to continue targeting monkfish. To some extent, the ability for monkfish vessels to relocate is limited because many would have to fish in fisheries (defined by area and gear) that are exempt from the multispecies days-at-sea regulations. Vessels with multispecies limited access permits, could however fish in the more northern and eastern areas during a multispecies day-at-sea. The other likely response is to fish harder during the open season. It is impossible to predict at this point whether fishermen would fish harder for monkfish during June and July to compensate or fish harder during October to January. Although prices for monkfish livers are higher during October to January, gillnet fishermen prefer not to fish during this season because of poor weather conditions. When the weather is poor, fishermen report that net efficiency is compromised due to agitation of the net and the response of monkfish to the different conditions. Typically, gillnets fish better during the calmer spring season when the monkfish are moving to their spawning areas.

#### 8.1.11.3 Area closures to conserve Gulf of Maine cod

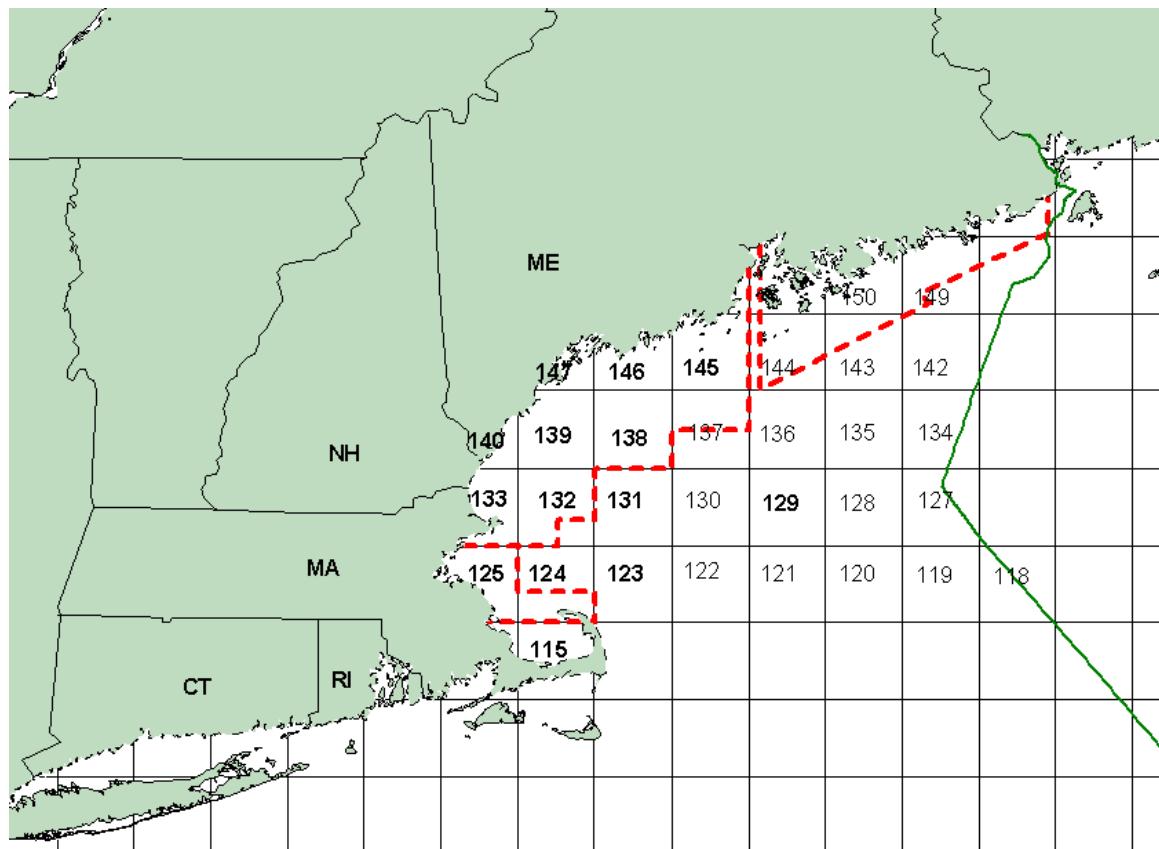
Public comments often identified closed areas for groundfish conservation as having a major contribution to monkfish mortality reduction. The groundfish area closures on Georges Bank and Nantucket Shoals were in place during most of the baseline period (1995-1996) for evaluating various management options. Only the recently implemented Gulf of Maine cod closures were not included in the monkfish analyses. As the proposed area closure management options solidified in the Multispecies FMP, the impacts on monkfish mortality were also analyzed using a two-bin model developed by the Northeast Fisheries Science Center (NEFSC; John Walden, pers. comm.) to evaluate codfish conservation.

Simplistically, the two-bin model uses catch per trip to predict where the next-best fishing area would be given a proposed closure area. It does not take into account added travel time from port or cost thresholds when it becomes unprofitable to fish. The NEFSC included monkfish catch-per-effort data in the model to also evaluate the impacts of the proposed cod area closures on monkfish. The preliminary results for area closure options (6, 7, and 8) in the Multispecies Monitoring Committee (MSMC) report indicated very little impact on monkfish mortality. The net change in monkfish mortality was estimated to range from a decrease of 2 percent to an increase of 1.4 percent in monkfish landings (Table 169). This result was not surprising, since the model estimates shifts in effort based on potential economic return. The proposed area closures in the MSMC report were chosen to maximize the effect on cod mortality. As a result, areas that have higher monkfish catches would experience more fishing effort and mitigate the positive benefits of monkfish conservation in the closed areas.

The area closures that the Council included in Framework 25 (Table 169; Figure 49) included more areas, but closed them for shorter periods of time than those proposed by the MSMC. The chosen alternative was intended to have equivalent mortality impacts for cod without unfairly penalizing the fishery in only one area of the coast. The additional area closures could have had more effect on monkfish mortality than originally estimated, but the same two-bin model suggests that this is not the case. In fact, monkfish mortality is expected to increase slightly by 1.6 percent (Table 169).

**Table 169.** Estimated implications for monkfish mortality caused by closing areas to protect groundfish. The framework 25 option was implemented on May 1, 1998.

Multispecies monitoring committee option	Closed areas and times (Figure 49)	Net change in monkfish landings
6	Blocks 129 and 130 – January through June Blocks 132 and 139 – January through July, excluding February	No change
7	Blocks 129, 130, 132, 139 – June through November	Increase of 1.4 %
8	Blocks 129, 130 – year round Block 132 – October through December	Decrease of 2 %
Framework 25 implementation	Blocks 124, 125 – March 1 to 31 Blocks 131, 132, and 133 – April 1 to 30 Blocks 138, 139, and 140 – May 1 to 31 Blocks 129, 145, 146, 147, and 152 – June 1 to 30 Northeast area closure – August 15 to September 13 Western Gulf of Maine closure area – Year round	Increase of 1.6 %



**Figure 49.** Gulf of Maine area closure reference blocks. The groundfish/harbor porpoise closed areas that existed prior to Framework 25 are indicated by dashed lines.

Added to the quantitative estimates of the area closure impacts on monkfish are intra-species shifts in fishing effort caused by the more restrictive measures for codfish. These shifts cannot be analyzed with the two-bin model currently in use, however. The area closures and trip limits in the Gulf of Maine are intended to cap landings

and decrease the opportunity to target cod. If the economics are more attractive for multispecies vessels that qualify for monkfish limited access, multispecies fishermen could use more of a vessel's days-at-sea allocation to target monkfish, rather than cod. Thus, the effect of the Framework 25 measures could increase monkfish mortality by 5 percent or more, depending on how the fishery reacts to the new multispecies regulations.

#### 8.1.11.4 Unquantified effects of days-at-sea regulations in the multispecies and scallop fisheries

There are important implications of the proposed management system that the Councils believe will contribute to the realized monkfish mortality reductions. These benefits, however, could not be predicted because they would result from behavioral changes that could not be analyzed. The Monkfish FMP proposes to require multispecies and scallop vessels that qualify for monkfish limited access to target monkfish while using a multispecies or scallop day-at-sea (Section 4.3.2). Non-qualifying vessels would not be able to exceed the bycatch trip limits, greatly reducing their opportunity to target monkfish.

The effect of the existing days-at-sea regulations in these fisheries has been estimated within the models used to assess the implications of the proposed management measures for monkfish. The Councils, however, anticipate that the inclusion of monkfish in the existing multispecies and scallop days-at-sea programs will have a positive synergistic effect that could not be quantified. Unlike the status quo, multispecies and scallop vessels would have to relinquish a valuable day-at-sea to target monkfish, increasing the cost of vessel conversion to pursue monkfish<sup>46</sup>. Vessels that use most or all of their allotted days-at-sea to target groundfish or scallops would lose revenue from those species in order to target monkfish. The Council believes that this added cost would dissuade multispecies and scallop fishermen from targeting monkfish, even though the vessel qualifies for monkfish limited access and would have the opportunity to use up to 40 multispecies or scallop days-at-sea for monkfish.

The PDT analysis<sup>47</sup> assumed that a vessel would target monkfish during an unused day-at-sea<sup>48</sup>, regardless of the amount of monkfish that it formerly caught on a directed trip. On the other hand, a trip that had a mixed catch of groundfish/monkfish or scallops/monkfish was assumed to target only groundfish or scallops, unless the revenue from monkfish exceeded the revenue derived from other species. The actual response by fishermen, however, will be governed by many factors that could not be taken into account by the PDT. These factors include relative changes in price and availability, the costs of targeting other species versus the cost of targeting monkfish, and the relative stock biomass of the alternative species.

As groundfish biomass rebuilds, fewer days-at-sea will be available to target monkfish because the days-at-sea would be used to target more-profitable groundfish as catch per unit effort increases. When fishermen take these factors into account, it could have a beneficial effect on monkfish mortality if it remains more attractive to target multispecies or scallops, rather than monkfish. In this case, many vessels that qualify for monkfish limited access would use few of the 40 allotted days to target monkfish. Conversely, if fishing for monkfish is more attractive than fishing for groundfish or sea scallops, vessels may use a higher proportion of days to target monkfish and thereby reduce fishing mortality on groundfish and sea scallops. This response would have a beneficial effect on overfished groundfish and scallop stocks. It is unclear how much benefit will accrue from this synergistic effect on the rebuilding schedules for all implicated stocks or how much of the benefit will apply to each species. The Councils believe however that there will be a substantial unquantified benefit that will account for the difference between the monkfish mortality reduction goals and those calculated to accrue through days-at-sea restrictions, size limits, and area closures.

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<sup>46</sup> For vessels that do not use all of the allotted annual days-at-sea, there is no cost associated with conversion to target monkfish, other than the cost of the needed gear and equipment.

<sup>47</sup> The PDT analyzed the expected landings and discard by qualifying and non-qualifying vessels, based on the history of that vessel during 1995 and 1996. This analysis is described in more detail in Section ???.

<sup>48</sup> An unused day-at-sea is one in which a multispecies or scallop vessel used fewer days during the 1996-97 fishing year than were allotted to the vessel during the fishing year. This number for each vessel was reduced to account for planned reductions in day-at-sea during 1998 and 1999 in the Atlantic Sea Scallop FMP.

## **8.1.12 EIS Circulation List**

The following is a list of government agencies and industry organizations, in addition to members of the New England Fishery Management Council, who were sent copies of the Final Environmental Impact Statement. Other interested parties may obtain a copy from the NEFMC office (see cover).

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## **8.2 Executive Order 12866 (RIR)**

### **8.2.1 Introduction**

The Regulatory Impact Review (RIR) provides an assessment of the costs and benefits of the proposed action and other alternatives in accordance with the guidelines established by Executive Order 12866. The regulatory philosophy of Executive Order 12866 stresses that, in deciding whether and how to regulate, agencies should assess all costs and benefits of all regulatory alternatives and choose those approaches that maximize net benefits to the society.

The RIR also serves as a basis for determining whether any proposed regulations are a “significant regulatory action” under the criteria provided in Executive Order 12866 and whether the proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act of 1980 (RFA).

This RIR summarizes the effects of the proposed action and other alternatives considered in this FMP to rebuild monkfish biomass to levels capable of producing optimum yield. The FMP and FEIS contains all the elements of the RIR/RFA and the relevant sections are referenced. The Initial Regulatory Flexibility Analysis, which evaluates the impacts of the proposed action on small business is provided in Section 8.3.6.

### **8.2.2 Problem Statement**

The purpose and need for management (statement of the problem) is described in Section 3.5 of the FMP.

### **8.2.3 Objectives**

The management objectives are identified and discussed in Section 3.4 of the FMP.

### **8.2.4 Management Alternatives**

The proposed action is described in Section 4.0 of the FMP. Alternatives to the proposed action are described in Sections 8.1.4.2 and 8.1.4.4 of the FEIS.

### **8.2.5 Impacts of Management Alternatives**

The cost-benefit analysis of the proposed action and non-preferred alternatives is provided in Section 8.1.6. Trends in landings, revenues, and total net benefits to the nation under the alternatives were contrasted with predicted trends under status quo. Sectoral impacts of the proposed measures are examined in Section 8.1.5. There are no measurable impacts on the recreational fishery.

### **8.2.6 Enforcement Costs**

The cost-benefit analysis assumes that there will be no significant change in the costs to monitor and enforce days-at-sea as a result of the proposed action (Section 8.1.6.1.4). The administrative costs are estimated in Section **Error! Reference source not found.**, and are negligible compared to the expected net benefits derived from taking action. The basis for this assumption is that although more vessels will be subject to days-at-sea limits, the majority of costs associated with setting up a monitoring and enforcement system from scratch have already been covered. Modifications to the existing monitoring system will be necessary to track monkfish days separately from multispecies or scallop days. These modifications are, however, expected to be modest.

## **8.2.7 Summary of Regulatory Impacts**

The results of the cost-benefit analysis (Section 8.1.6) show that, in the short-term, the proposed action will reduce gross revenues in the fishing industry. Although not specifically analyzed, profits and crew incomes will also be negatively affected. Over the long-term, however, the net impacts on the economy will be positive, totaling \$38 million over a twenty-year period.

Monkfish landings are expected to be less than the status quo for the first eight years, until stock rebuilding allows harvests of higher yields associated with optimum yield. The FMP is expected to produce optimum yield (36,000 mt) in year 10, about 80 percent above the landing expected for the status quo (Table 117). The net present value of gross revenues is expected to decline, relative to the status quo, through 2006 and then begin recovering in year 9 from the effects of stock rebuilding (Figure 46). If the estimates are conservative, then the net present value of the proposed action is expected to exceed the status quo in 2010, or year 12. The net present value of the proposed action is expected to exceed the status quo in 2017, or year 19. However, if the parameter estimates are liberal and OY is overestimated, the net present value of the proposed action will remain less than the status quo.

## **8.3 Initial Regulatory Flexibility Analysis (IRFA)**

### **8.3.1 Introduction**

The purpose of the RFA is to reduce the impacts of burdensome regulations and recordkeeping requirements on small businesses. To achieve this goal, the RFA requires government agencies to describe and analyze the effects of regulations and possible alternatives on small business entities. On the basis of this information, Regulatory Flexibility Analysis determines whether the proposed action would have a “significant economic impact on a substantial number of small entities.”

The main elements of the RFA are fully discussed in several sections of the Monkfish FMP and the relevant sections are identified by reference. The following discussion summarizes the consequences for small businesses of the proposed action and non-preferred management options for the monkfish fishery.

### **8.3.2 Problem Statement**

The purpose and need for management (statement of the problem) is described in Section 3.5 of the FMP.

### **8.3.3 Objectives**

The management objectives are identified and discussed in Section 3.4 of the FMP.

### **8.3.4 Management Alternatives**

The proposed action is described in Section 4.0 of the FMP. Alternatives to the proposed action are described in Sections 8.1.4.2 and 8.1.4.4 of the FEIS.

### **8.3.5 Determination of Significant Economic Impact on a Substantial Number of Small Entities**

The RFA recognizes three kinds of small entities: small business, small organization and small government jurisdictions. It defines a small business in any fish-harvesting or hatchery business as a firm with receipts of up to \$2 million annually. The Northeast multispecies, scallop, and Mid-Atlantic monkfish gillnet fisheries directly affected by the proposed action are composed of primarily small business entities.

According to the RFA, if more than 20 percent of the small businesses in a particular industry are affected by the regulations, the regulations are considered to have an impact on a **substantial number** of these entities. Since the proposed monkfish plan will affect all vessels participating in the Northeast multispecies, scallop, and Mid-Atlantic gillnet fisheries the **substantial number** criterion will be met.

NMFS considers economic impacts on small business entities to be **significant** if the proposed regulations are likely to cause any one or more of the following:

- a) A decrease in annual gross revenues of more than 5% for 20% of the affected small entities;
- b) An increase in total costs of production of more than 5% as a result of an increase in compliance costs, for 20% or more of the affected small entities;
- c) Compliance costs as a percent of sales for small entities that are at least 10% higher than compliance costs as a percent of sales for large entities; for 20% or more of the affected small entities;

- d) Capital costs of compliance that represent a significant portion of capital available to small entities, considering internal cash flow and external financing capabilities; or
- e) Two percent of the small business entities affected being forced to cease business operations.

To determine whether any one or more of these thresholds would be exceeded under a proposed regulation a threshold analysis is required. Due to lack of data on individual vessel operating costs or financial condition a quantitative estimate of number of affected entities for threshold criteria b, c, d, or e was not possible. A quantitative estimate for criterion a, was performed and where possible, a qualitative assessment for the other criteria is provided. The threshold analysis performed for the proposed monkfish regulation is described below.

### **8.3.6 Threshold Analysis**

The proposed regulations could affect every vessel that fishes for monkfish and although the proposed regulations would establish limited access permits for monkfish there are no such permits at present. For this reason, a fishery participant was defined as being any vessel that reported landings of monkfish through either dealer or vessel trip reports during calendar year 1997. For each participant, a summary of each recorded trip was constructed and gross revenues for all trips taken during calendar year 1997 were summed. Based on the proposed qualification criteria each participant was assigned to a qualification category as either a qualified or non-qualified multispecies, scallop, or monkfish-only limited access permit holder. The proposed management measures for year 1 (1999) and subsequent years 2 and 4 (2000 and 2002) were then applied to each observed trip in 1997 as if they were to be implemented in 1997. The reduced monkfish revenues were then summed and added to gross revenues from all other species to derive an estimate of total revenues under a with regulation condition.

#### Findings

There were a total of 1,401 vessels that recorded landing monkfish or monkfish parts during calendar year 1997. The total number of recorded trips recorded by these vessels was 72,702 of which monkfish was landed on 29,237 of those trips. Of the 1401 vessels, 530 qualified for monkfish limited access and 871 were not. Based on the qualification criteria and the proposed regulations a total of 23.8%, 26.1%, and 34.1% of all vessels were estimated to suffer a reduction in gross revenues of 5% or greater in year 1, year 2, and year 4 respectively. Each of these percentages exceeds threshold criterion (a). A break-down of impacts by percentile intervals, qualification status, tonnage class, state of principal port, and home port state is reported in Table 170 through Table 174.

**Table 170.** Number of vessels by gross revenue loss interval.

<b>Revenue Loss Interval</b>	<b>Number of Vessels</b>
0 < 5%	923
>= 5% to < 15%	211
>= 15% to < 25%	100
>= 25% to < 35%	28
>= 35% to < 45%	27
>= 45% to < 55%	18
>= 55%	94

The majority of vessels (65%) were not projected to experience a reduction in gross revenues of 5% or more. However, in excess of 9.9 % (139) vessels were projected to have reduced revenues of more than 35%. Revenue reductions of this magnitude may be able to be absorbed in the short run as long as alternative fisheries were available. If such revenue losses were to persist, however, it conceivable that these vessels would cease business operations. If 28 of the 139 hardest hit vessels were to cease business operations than Criteria (e) would be exceeded.

**Table 171.** Number of vessels according to monkfish qualification and permit status.

<b>Qualification Category</b>	<b>Number of Vessels With Revenue Loss of 5% or More</b>	<b>Number of Vessels with Revenue Loss Less Than 5%</b>
Multispecies Qualifier	209	197
Multispecies Non-Qualifier	317	72
Scallop Qualifier	57	43
Scallop Non-Qualifier	14	18
Monkfish-Only Qualifier	16	8
Monkfish-Only Non-Qualifier	110	275

The expected revenue losses affect proportionally more qualifer vessels than non-qualifiers. This result was expected since qualifiers must have been able to demonstrate a higher level of activity in the monkfish fishery than non-qualifiers. Relatively few of the total number of Monkfish-only vessels appeared in the 1997 data. These vessels may have been active in the monkfish fishery during the qualifying period and have since chosen to enter other fisheries.

**Table 172.** Summary of affected vessels by ton class (Gross Registered Tons, GRT).<sup>49</sup>

Ton Class	Number of Vessels With Revenue Loss of 5% or More	Number of Vessels with Revenue Loss Less Than 5%
< 5 GRT	4	25
5 to < 50 GRT	171	475
50 to < 150 GRT	175	306
=> 150 GRT	125	101

A few of the smallest vessels (< 5GRT) were estimated to be affected by the monkfish regulations. These vessels are restricted to a relatively narrow range and may be able to earn sufficient revenues from monkfish even at the low trip limits imposed in year 4 under the default plan measures.

**Table 173.** Summary of vessels affected by the proposed action by state of principal landings port.<sup>50</sup>

State	Number of Vessels With Revenue Loss of 5% or More	Number of Vessels with Revenue Loss Less Than 5%
Maine	78	106
New Hampshire	15	46
Massachusetts	197	375
Rhode Island	61	62
Connecticut	11	13
New York	17	95
New Jersey	58	70
Delaware	1	1
Maryland	3	10
Virginia	17	69
North Carolina	13	55
All Others	5	4

State of principal port comes from permit application data. Across all states, Massachusetts had the greatest number of both affected and unaffected vessels. Nearly half the vessels reporting Rhode Island ports as their principal port were estimated to experience a loss of revenue in excess of 5%. The proportion of vessels listing New Jersey ports as their principal port was also relatively high (45%).

<sup>49</sup> Tonnage for 19 vessels not reported.

<sup>50</sup> Principal port state not reported for 19 vessels.

**Table 174. Summary of vessels affected by the proposed action by Home State.<sup>51</sup>**

State	Number of Vessels With Revenue Loss of 5% or More	Number of Vessels with Revenue Loss Less Than 5%
Maine	43	62
New Hampshire	16	40
Massachusetts	234	432
Rhode Island	38	41
Connecticut	2	6
New York	30	108
New Jersey	46	50
Delaware	5	1
Maryland	1	8
Virginia	19	76
North Carolina	11	43
All Others	30	40

Vessels Impacted by 35% or More

Relative to 1997 data, a total of 139 vessels incurred losses of gross revenues of 35% or more. These vessels might be expected to have difficulty overcoming revenue losses of this magnitude and at least some portion of these vessels could cease operations. The following discussion presents further analysis of these “at-risk” vessels.

Of the 139 at-risk vessels 87 (61%) held a multispecies permit, 51 (37%) did not possess a multispecies or a scallop limited access permit and only 1 vessel held a limited access scallop permit (Table 175). Unlike the affected (5% loss of gross revenues or greater) enterprises (Table 171) the majority of “at-risk” vessels are not expected qualify for a limited access monkfish permit. These vessels were dependent upon monkfish in 1997 but may have started fishing for monkfish after the control date and could not qualify with the least burdensome qualification criteria.

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<sup>51</sup> Home port state not reported for 19 vessels.

**Table 175.** Summary of anticipated limited access qualification and permit holdings by vessels that are estimated to have a 35 percent or more impact on total gross revenues.

Qualification Category	Number of At-Risk Vessels
Multispecies Qualifier	42
Multispecies Non-Qualifier	45
Scallop Qualifier	0
Scallop Non-Qualifier	1
Monkfish-Only Qualifier	9
Monkfish-Only Non-Qualifier	42

The proportion of smaller (< 50 GRT) “at-risk” vessels (Table 176) is estimated to be nearly twice as high (64.7%) as compared to the “affected” vessels (36.1%; Table 172). Given their size, these vessels may have less flexibility to enter alternative fisheries which may increase the likelihood that a portion of these vessels will be unable to compensate for their monkfish revenue losses and will cease business operations.

**Table 176.** “At-risk” vessels by tonnage class (gross registered tons, GRT)<sup>52</sup>.

Ton Class	Number of At-Risk Vessels
< 5 GRT	3
5 to < 50 GRT	87
50 to < 150 GRT	32
=> 150 GRT	16

Approximately ¾<sup>ths</sup> of all affected vessels are from of the 5 coastal New England port states. The majority of at-risk vessels (58%) also indicated a New England state on their 1997 permit application (Table 177). The proportion of at-risk Mid-Atlantic port vessels, however, is considerably higher (42%) relative to the population of affected vessels (25%).

**Table 177.** “At-risk” vessels by state of principal landings port<sup>53</sup>.

State	Number of At-Risk Vessels
Maine	2
New Hampshire	9
Massachusetts	45
Rhode Island	21
Connecticut	3
New York	12
New Jersey	32
Delaware	0
Maryland	3
Virginia	3
North Carolina	7
All Others	1

The “at-risk” vessels in **Table 177** indicated a total of 50 different principal ports on their 1997 permit applications. There were three or less at-risk vessels for most principal ports reported on the applications for “at-risk” vessels. Table 178 shows the number of vessels in each principal port where the number of “at-risk” vessels is four or more. Massachusetts had the greatest number of ports (6) where the number of “at-risk” vessels is four or

<sup>52</sup> Tonnage for 1 vessel not reported.

<sup>53</sup> Principal port state not reported for 1 vessel.

more. New Jersey was the only other state where more than one port (3) had four or more “at-risk” vessels. Among the ports reported in Table 178, New Bedford, MA has the highest number of “at-risk” vessels (15). Thirteen “at-risk” vessels are from Barnegat Light, NJ. Gloucester, MA and Point Judith, RI each have eight “at-risk” vessels and Portsmouth, NH has six. Both Fairhaven, MA and Westport, MA have five “at-risk” vessels and the remaining ports each have four or fewer “at-risk” vessels.

**Table 178.** “At-risk” vessels by principal landings port<sup>54</sup>.

Principal Port and State	Number of At-Risk Vessels
Portsmouth, NH	6
Boston, MA	4
Fairhaven, MA	5
Gloucester, MA	8
New Bedford, MA	15
Scituate, MA	4
Westport, MA	5
Point Judith, RI	8
Shinnecock, NY	4
Barnegat Light, NJ	13
Cape May, NJ	4
Point Pleasant, NJ	4
Other Ports	80

Monkfish are targeted or caught using several different gears. At present, any vessel may switch among these different gears during the fishing season. For purposes of analysis a primary gear is defined as being the gear type accounted for the majority of a vessel’s annual gross revenues. The NMFS dealer data was used to determine a primary gear for each “at-risk” vessel for the 1997 calendar year. Because different gears are often used to target monkfish, a primary gear was determined for each vessel’s total annual gross revenue from all species and a primary gear was determined for each vessel’s total annual gross revenues from monkfish. Of the 139 “at-risk” vessels, a primary gear for all species could not be determined for eight vessels and a primary gear for monkfish could not be determined for seven vessels.

Based on 1997 data, most “at-risk” vessels used gillnet gear for their gross annual (84) and their monkfish (85) income (Table 179). The next most frequently used gear was trawl gear for all species (40) and for monkfish (41). None of the “at-risk” vessels used scallop dredge gear for the majority of their 1997 income and a small number of vessels derived 1997 income using other gear besides gillnets, otter trawls, or scallop dredges. Since the results reported in Table 179 indicate little difference between primary gear used for all species and that used for monkfish, only summary results for primary monkfish gear are reported from this point forward.

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<sup>54</sup> Principal port not reported for 1 vessel.

**Table 179.** Primary gear types used by “at-risk” vessels.

Gear Type	Number of Vessels	
	Primary Gear (All Species)	Primary Monkfish Gear
Gillnet	84	85
Trawl	40	41
Scallop Dredge	0	0
Other	7	6
Unknown	8	7

Among “at-risk” vessels that hold a limited access multispecies permit and that are expected to qualify for a limited access monkfish permit, twice as many used gillnet gear than used trawl gear to target monkfish. Multispecies vessels that are not expected to qualify for a limited access monkfish permit are predominantly split between gillnet vessels (18) and trawl vessels (22). Among vessels without multispecies or scallop permits, all of the “at-risk” vessels that are expected to qualify for monkfish limited access used gillnets to catch monkfish and 80% of the non-qualifiers used gillnets.

**Table 180.** “At-risk” vessels by primary monkfish gear and monkfish qualification.

Qualification Category	Number of Vessels by Primary Gear		
	Gillnet	Trawl	Other
Multispecies Qualifier	26	13	2
Multispecies Non-Qualifier	18	22	1
Scallop Qualifier	0	0	0
Scallop Non-Qualifier	0	1	0
Monkfish-Only Qualifier	9	0	0
Non-Qualifiers with no multispecies or scallop permits	32	3	5

The majority of gillnet vessels (76) are vessels less than 50 GRT (Table 181). By contrast, the majority of “at-risk” trawl vessels exceeded 50 GRT and 30% (12) of these vessels were larger vessels in excess of 150 GRT.

**Table 181.** “At-risk” vessels by primary monkfish gear and tonnage class.

Ton Class	Number of Vessels by Primary Gear		
	Gillnet	Trawl	Other
< 5 GRT	2	0	0
5 to < 50 GRT	74	9	2
50 to < 150 GRT	9	20	1
>= 150 GRT	0	12	3

The proportion of at-risk gillnet vessels in the New England states (72%) is higher than that of the Mid-Atlantic states (62%; Table 182). Massachusetts has the highest number of both gillnet and trawl vessels, followed by New Jersey. “At-risk” New Hampshire vessels were only gillnet vessels.

Of the ports that had four or more “at-risk” vessels, there is a clear delineation between predominance of either trawl or gillnet vessels (

**Table 183).** The majority of “at-risk” New Bedford vessels used trawls. The “at-risk” vessels from Cape May, NJ are exclusively trawl vessels. By contrast the “at-risk” vessels from Portsmouth, NH; Scituate, MA;

**Westport, MA; Point Judith, RI; Shinnecock, NY; Barnegat Light, NJ; and Point Pleasant, NJ** are exclusively gillnet vessels.

As a subset of affected vessels, the “at-risk” vessels are predominantly small (less than 50 GRT) gillnet vessels. These vessels may be limited in their range and have relatively less ability to compensate for their loss of monkfish revenue. The “at-risk” gillnet fleet is concentrated in New Hampshire, Massachusetts, Rhode Island, and New Jersey (Table 182) with some “at-risk” gillnet vessels Barnegat Light, NJ; Portsmouth, NH; Gloucester, MA; and Westport, RI (

Table 183). Trawl vessels that are considered to be “at-risk” are less frequent than they are for the affected vessels. The trawl vessels, however tend to be concentrated in Massachusetts, New York, and New Jersey (Table 182), with the largest concentrations of at-risk trawl vessels from New Bedford, MA and Cape May, NJ (

**Table 183).**

**Table 182.** “At-risk” vessels by primary monkfish gear and principal port state.

State	Number of Vessels by Primary Gear		
	Gillnet	Trawl	Other
Maine	0	1	1
New Hampshire	9	0	0
Massachusetts	26	15	2
Rhode Island	17	4	0
Connecticut	1	1	0
New York	7	5	0
New Jersey	22	7	2
Delaware	0	0	0
Maryland	1	2	0
Virginia	0	2	0
North Carolina	2	3	1
All Others	0	1	0

**Table 183.** “At-risk” vessels by primary monkfish gear and principal port.

Principal Port and State	Number of Vessels by Primary Gear		
	Gillnet	Trawl	Other
Portsmouth, NH	6	0	0
Boston, MA	2	2	0
Fairhaven, MA	2	2	0
Gloucester, MA	6	1	1
New Bedford, MA	4	10	1
Scituate, MA	3	0	0
Westport, MA	5	0	0
Point Judith, RI	3	0	1
Shinnecock, NY	4	0	0
Barnegat Light, NJ	13	0	0
Cape May, NJ	0	3	1
Point Pleasant, NJ	3	0	1

### **8.3.7 Mitigating Factors**

The estimates of affected entities assumed that all default measures would be implemented as described in the proposed action. If the measures are more effective than projected and adjustments are made to accommodate new information, the revenue losses may not be as great as estimated herein. Additionally, the data used to determine which vessels would qualify covers a period of time when small vessels (less than 5 gross registered tons) and vessels that landed in North Carolina ports were not uniquely identified in dealer data. Since the new data collection system was implemented in 1994, the under-tonnage vessels can now be identified. Starting in 1997, North Carolina vessels can also be identified. In the present analysis, none of these under-tonnage North Carolina vessels were determined to be qualified, only because the NMFS individual trip records for NC do not include the four-year qualification period ending February 27, 1995. These vessels will be given the opportunity to present evidence (including state records) of sufficient landings of monkfish during the qualification period.

If the unaccountable NC and undertonnage vessels qualify for a limited access monkfish permit, the reductions in annual gross revenues will not be as great than if they had not qualified. The estimated revenue losses are based on the default year 4 management measures. As such, the analysis of impacts assumes that vessels fail to adjust to the future management measures specified in the FMP. The extent to which these adjustments are actually made will affect the actual number of vessels that incur substantial revenue losses or cease business operations.

### **8.3.8 Indirectly Affected Industries**

A required component for preparation of this analysis under the Regulatory Flexibility Act is identification of the industries and economic sectors that will either be directly or indirectly affected by the proposed regulation. This information is specifically provided for the affected economic sectors for the commercial fishing industry in Table 184. This information is also provided for processors since, while not directly subject to the regulations, they are nevertheless indirectly affected through the loss of monkfish product. These sectors are identified by their four-digit Standard Industrial Classification (SIC) code as 0910 and 2092 respectively. The economic sectors that will be indirectly affected were identified in the following manner: An Input/Output model of the United States economy was estimated using a PC-Based software program called IMPLAN. IMPLAN has been in use since its development by the U.S. Forest Service in 1979. IMPLAN is based on Bureau of Economic Analysis (BEA) data for 521 industries. The U.S. model provides information on linkages among industries as well as an estimate of the required amount of purchases from all sectors in order to produce one dollar's worth of output in a given sector. Note that the list of sectors is not exhaustive, but include sectors in descending order of impact and reports those sectors whose cumulative impact was 90 percent or greater.

In each column of Table 184, headed by the title "Impact Percent" are estimated proportions of expenditures by directly affected sectors on purchased inputs (i.e. expenses per dollar of commercial fishing output net of value added) from each of the indirectly affected sectors. For example, of the inputs used by commercial vessels, 22.88 percent were from SIC sector 2992 (lubricating oils and greases). Value added includes payments that go to labor (captain and crew) and profits. This means that for every dollar spent to produce a dollar's worth of commercial fishing \$0.75 goes to value added and \$0.25 goes to purchase inputs other than labor. Thus, the effect on indirectly affected industries is the product of \$0.25 and the "Impact Percent". Sector 2992 has the highest impact percent (22.88) and revenues in that sector would change at a rate of \$0.057 per dollar of output change in the commercial fishing sector.

**Table 184.** List of Indirectly Affected Industry Sectors.

Commercial Fishing (0910)		Impact		Processors (2092)		Impact	
Sector	SIC Code	Percent		Sector	SIC Code	Percent	
LUBRICATING OILS AND GREASES	2992	22.88%		COMMERCIAL FISHING	910	36.03%	
CORDAGE AND TWINE	2298	11.84%		BUILDING MATERIALS AND GARDENING SUPPLIES	5200	18.07%	
SHIP BUILDING AND REPAIRING	3731	11.72%		PREPARED FRESH OR FROZEN FISH OR SEAFOOD	2092	15.12%	
MISCELLANEOUS REPAIR SHOPS	7690	6.53%		MISCELLANEOUS LIVESTOCK	0191, 0219, 0259, 0271, 0272, 0273, 0279, 0291	9.30%	
MANUFACTURED ICE	2097	5.55%		WATER TRANSPORTATION	4400	6.05%	
PETROLEUM REFINING	2910	4.76%		PAPERBOARD CONTAINERS AND BOXES	2650	4.03%	
BOAT BUILDING AND REPAIRING	3732	4.23%		COMMUNICATIONS, EXCEPT RADIO AND TV	4810, 4820, 4849, 4890	2.36%	
INSURANCE CARRIERS	6300	3.53%		GAS PRODUCTION AND DISTRIBUTION	4920, 4930	1.36%	
AUTOMOBILE RENTAL AND LEASING	7510	2.24%				92.32%	
WATER TRANSPORTATION	4400	2.05%					
MAINTENANCE AND REPAIR OTHER FACILITIES	1500, 1600, 1700	1.96%					
CANVAS PRODUCTS	2394	1.61%					
MOTOR FREIGHT TRANSPORT AND WAREHOUSING	4200, 4789	1.41%					
BANKING	6000	1.33%					
HOTELS AND LODGING PLACES	7000	1.16%					
MANAGEMENT AND CONSULTING SERVICES	8740	1.11%					
COMMERCIAL FISHING	910	1.04%					
AUTOMOTIVE DEALERS & SERVICE STATIONS	5500	1.03%					
HARDWARE, N.E.C.	3429	0.95%					
AUTOMOBILE REPAIR AND SERVICES	7530	0.92%					
INTERNAL COMBUSTION ENGINES, N.E.C.	3519	0.86%					
MANIFOLD BUSINESS FORMS	2760	0.77%					
BUSINESS ASSOCIATIONS	8610	0.62%					
		90.10%					

### **8.3.9 Compliance Costs**

See Section 8.2.6 of the RIR above.

### **8.3.10 Determination of Significant Regulatory Action**

Executive order 12866 defines a “significant regulatory action” as one that is likely to result in: a) an annual effect on the economy of \$100 million or more or one which adversely affects in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; b) a serious inconsistency or interference with an action taken or planned by another agency; c) novel legal or policy issues arising out of legal mandates, the President’s priorities, or the principles set forth in this Executive Order.

The preceding threshold analysis shows that the proposed action would exceed the thresholds established by NMFS to determine what may be a significant regulatory action. The proposed action, however, will not adversely affect the productivity, environment, public health or safety, or state, local, or tribal governments or communities in the long run. The proposed action also does not interfere with an action planned by another agency. It will not raise any novel legal and policy issues because it applies to the monkfish fishery the restrictions already in place for other fisheries in the Northeast region.

### **8.3.11 Identification of Overlapping Regulations**

The proposed minimum size limits and restrictions on the sale of livers will overlap state regulations in NH, MA, RI, CT, NY, and NJ. The proposed action will mostly complement and re-enforce the existing regulations in these states. There will, however, be differences between state regulations governing the sale of livers in NJ. NJ allows livers to be landed in amounts up to 30 percent of the total weight of tails onboard the vessel as opposed to only 25 percent for the proposed action. The more-restrictive federal regulations will apply for vessels holding federal fisheries permits or for vessels that caught monkfish in the EEZ. The minimum size limit in the Southern Fishery Management Area will increase on May 1, 2000 unless the increase in the size limit is unnecessary to meet the mortality objectives. The 14-inch minimum size limit will then conflict with state minimum size regulations specifying a minimum size of 11-inches. The Councils anticipate that the state regulations will be amended to agree with federal regulations if the federal size limit increases, since the states originally implemented a minimum size at Council request.

The proposed action also overlaps, but complements the existing regulations for multispecies and scallop days-at-sea. Since this overlap was developed intentionally, there is not expected to be any conflict with existing federal regulations.

### **8.3.12 Conclusion**

The following Regulatory Flexibility Analysis and the relevant sections of the RIR indicate that the regulations proposed by the Monkfish FMP will have “significant impacts” on a substantial number of small businesses.

## **8.4 Endangered Species Act (ESA)**

Neither the Monkfish Plan measures nor the fishery is expected to jeopardize the continued existence of the threatened and endangered species found within the Northern and Southern Management Areas. As has been discussed in the Biological Assessment which the Council has prepared pursuant to Section 7 of the ESA., there are listed species or those that are proposed to be listed which interact with the monkfish fisheries to varying degrees, depending on the gear type deployed and the area and season in which it is fished. With a proposed moratorium on entrants into the monkfish limited access fishery and substantial effort reductions, the impacts of the fishery on these species can at least be expected to remain stable and possibly decrease.

## **8.5 Marine Mammal Protection Act (MMPA)**

All U.S. commercial fishing operations are placed into one of three categories based on their levels of incidental and serious injury of marine mammals as required by section 118 of the MMPA. At a minimum, vessel owners must register for an Authorization Certificate and may also be required to carry fishery observers.

The principal gear types addressed by the Monkfish Plan include a Category I fishery, the Northeast multispecies sink gillnet fishery, and several Category III fisheries. The measures proposed in this plan are discussed relative to marine mammals and are consistent with the provisions of the MMPA as well as other actions taken by the Councils and NMFS. Further actions to reduce the likelihood of interactions between the gear types governed by this FMP and the marine mammals that inhabit the area in which these fisheries are prosecuted will be considered if deemed necessary.

## **8.6 Coastal Zone Management Act (CZMA)**

### **8.6.1 States Contacted and Council Determination of Consistency with State Programs**

The Councils compared the Coastal Zone management Plans of the following states with the FMP to determine the consistency with the state programs: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. The FMP documents and the following letters giving the Councils' determination were mailed to all affected states.